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Keleti Faculty of Business and Management
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The most significant corporate challenges in the life of SME sector in the 21st century – Theoretical overview

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Abstract: The importance of small and medium-sized enterprises in economic life was widely recognized after the 1980s, when the focus shifted from large companies to smaller enterprises. From this period onwards, these economic units are considered the core of development macro-, social and economic policy at the international level. In the last three decades, they have become key economic players in both developed and developing countries, especially in terms of the shift towards a more global business environment and the development of information technologies. During our topic selection, we asked what challenges the small and medium-sized enterprise sector must face in the era of the fourth industrial revolution of the 21st century. In connection with this, we have set ourselves the primary goal of getting answers to our question, with the help of which we have the opportunity to provide the managers of the SME sector with a comprehensive picture of the current situation typical of our days. The study is a theoretical overview, during which they are collected with the help of secondary data to present the most relevant organizational trials affecting the SME sector. In general, it can be said that the small and medium-sized enterprise sector must carry out innovative activities in order to maintain their competitiveness and continue to develop in a dynamic and competitive environment.

Keywords: SME sector, global challenge, local challenge, organizational challenges, XXI century, competitiveness

1 Introduction

During the topic selection, I asked what challenges the small and medium-sized business sector must face in the era of the fourth industrial revolution of the 21st century, especially in the field of social media. In connection with this, we have set ourselves the primary goal of getting answers to our question, with the help of which we have the opportunity to provide the managers of the SME sector with a comprehensive picture of the current situation typical of our days. In our rigorous work, we place great emphasis on the presentation of the most significant organizational challenges, by placing social media in the center. In the course of our investigation, secondary data collection is used to present the relevant challenges affecting the SME sector. In order to get a comprehensive picture of the examined area, it is important to address the challenges inherent in the digital world. Our study is a theoretical overview, in which the most significant global and local challenges affecting small and medium-sized enterprises are presented with the help of literature processing, after which the conclusions related to the topic are formulated. With our study, our primary goal is to provide insight into the corporate challenges that play an important role in the life of businesses in the 21st century. In general, it can be said that the small and medium-sized enterprise sector must carry out innovative activities in order to maintain their competitiveness and continue to develop in a dynamic and competitive environment. The road to success is bumpy and long in any case, but if the business is persistent enough, success will gradually reach it.

2 Literature review

The importance of small and medium-sized enterprises in economic life was widely recognized after the 1980s, when the focus shifted from large companies to smaller enterprises. From this period onwards, these economic units are considered the core of development macro-, social and economic policy at the international level. In the last three decades, they have become key economic players in both developed and developing countries, especially in terms of the shift towards a more global business environment and the development of information technologies (Karadag, 2015). The SME sector plays an extremely important role in the modern economy, which can be defined as the most attractive and largest innovative system today. It is a recognized fact that this group of enterprises has an essential contribution to economic development. The SME sector plays a fundamental role in a country's economy. They are the main source of entrepreneurial skills, innovation and the creation of new jobs, which is an important alternative in the fight against unemployment. Their unique ability is shown in the application and dissemination of new technologies (Neagu, 2016). Several reasons justify the importance of the role played by small and medium-sized enterprises in the process of economic growth. This can be explained by the following facts:

- play a central role in the successful dissemination of the latest technologies;
- are able to efficiently satisfy relatively small but special needs;
- due to their flexibility, adaptability to market changes, and their impact on employment and knowledge sharing, they have a positive impact on the economic growth and competitiveness of a country;

- they are able to change their production programs relatively quickly and stop producing products that are not in demand on the market;
- • compared to large companies, they have lower production costs, higher labor productivity and lower transport costs;
- their business activities often result in innovation, which is one of the most important sources of growth and prosperity in modern economies. (Petkovska, 2015)

Overall, it can be said that small and medium-sized enterprises have a central role in the world economy, thanks to their dynamism, flexibility and adaptability (Petkovska, 2015), and they play a key role in a country's income generation, investments, and socially indispensable factors such as job creation and employment (Mester-Tóth, 2015).

2.1 Global challenges of SME sector

The SME sector faces many challenges due to increased competition, adaptation to extremely fast changing market demand, technological changes and capacity constraints related to knowledge, innovation and creativity (Yoshino-Taghizadeh-Hesary, 2016). In 2019, Gamage and his colleagues divided the most significant challenges for small and medium-sized enterprises into global and local challenges (Gamage et al., 2019). Considering the most important challenges, the following eight factors can be classified into the global category:

1. Market competition
2. Global capital and economic crisis
3. Information and communication technology (ICT)
4. Impact of multinational enterprises (MNCs)
5. Impact of transnational corporations (TNCs)
6. International terrorism and religious conflicts
7. International trade war

International dumping (Gamage et al., 2020)

In addition to the eight factors formulated by Gamage and his colleagues, we cannot go without saying the COVID-19 health crisis, which has been defining our everyday lives and the everyday lives of businesses for 2 years now. Zutshi et al. (2021) formulated additional influencing factors taking into account the epidemic situation, which are as follows:

- Interruption of activity caused by an epidemic situation
- Expectation of expertise, flexibility and perseverance
- Existential challenges
- Issues of corporate operation, income and trust

In 2015, Ahmedova formulated six factors that can help in eradicating the unfavorable results caused by global challenges. These components are innovation, activities related to intellectual properties, internationalization, implementation of best practices, adaptability, and flexibility (Amhedova, 2015).

2.2 Local challenges of SME sector

In addition to an overview of the global challenges, it is important to examine which are the most significant trials that affect the European small and medium-sized enterprise sector. In their 2019 report, Michelle Alessandrini and her colleagues formulated three factors. The first aspect worth mentioning is the limited availability of skilled labor. At the European Union level, small and medium-sized enterprises often experience problems in hiring skilled workers due to competition from large companies and general financial conditions. EU SMEs do not invest enough time, energy and capital in training existing employees and are often held back by increased labor and individual costs. The second factor includes difficulties in accessing financing, which has been one of the most important issues for small and medium-sized enterprises since the economic crisis of 2008. The financial needs of the SME sector remain significant, especially in terms of fixed investments and working capital. It is also important to mention that access to state financial support is still limited for small and medium-sized enterprises. As a third and final challenge, the authors deal with the issue of excessive regulation and administrative burden. They say that in the case of the small and medium-sized enterprise sector, the compliance costs and requirements have a greater influence on their innovation capacity, the trained human capital at their disposal and hinder their internationalization (Alessandrini et al., 2019). After our global and European study, we will examine what are the challenges typical of small and medium-sized enterprises, which can be a problem for them at the local level. Table 5 illustrates these factors.

Table 1: Challenges affecting small and medium-sized enterprises at the local level

Authors	Challenging factors
Sandiso Ngcobo, Sandheel Sukdeo (2015)	• Government policies and laws • Lack of adequate information • Financing difficulties • Extremely competitive business environment • Domination by large corporations • Inaccessible markets • Lack of self-confidence
Holicza Péter (2016)	• Lack of preparation for starting a business • Insufficient financial contribution (financing) • If success is not achieved, the losses are serious • Too complicated administrative processes
Ambika Zutshi et al. (2021)	• Resource breakdown for fixed operating costs and variable costs • Existential questions due to the failure to cover costs • Experiencing a liquidity crisis due to the lack or delay in reimbursement of fixed operating costs • Pressure on production processes due to the lack of human resources and the increase in the ratio of human costs

Source: Ngcobo-Sukdeo, 2015; Holicza, 2016; Zutshi et al., 2021

In general, it can be said that the small and medium-sized enterprise sector must carry out innovative activities in order to maintain their competitiveness and continue to develop in a dynamic and competitive environment. (Petkovska, 2015)

Conclusions

Based on the literature review, the author managed to define 8 global corporate challenges and 15 local corporate challenges that define the life of small and medium-sized enterprises in the 21st century and that they must face in order to survive on a daily basis. Nowadays, it is crucial that businesses cannot ignore the issue of globalization, it is extremely important that they attach great importance to this issue in order to survive on a daily basis. Considering the secondary data collection, the author proposes seven steps for small and medium-sized enterprises that can help them overcome the challenges listed earlier. These seven factors are:

- Innovation – plays a key role in the life of the SME sector. Innovation/continuous improvement can be central to overcoming any obstacle
- Implement best practices – every business has best practices that can help overcome challenges. However, at times they need to observe others, learn from others, and adapt their own best practices in order to be able to solve emerging problems.
- Adaptability - today, a company can only solve a problem if it can adapt, new problems create new situations, to which companies must always adapt
- Flexibility – in addition to adaptability, flexibility is also a key factor, since a company must not only adapt to a new situation caused by a newly emerging challenge, but also be flexible considering that new challenges can be solved with new solutions
- Loyal leaders – from a company perspective, solving a challenge requires company leaders and managers who always work together with employees to solve the problem, instead of prematurely abandoning the sinking ship
- Valuing key people - however, loyal leaders are nothing without employees, so it is crucial to value key people (not only during challenging times) who are a driving force in a challenging period
- Reserves and alternative resources – a company must always think that anything can happen at any moment. In this regard, it is extremely important to have adequate financial reserves so that there are no obstacles in overcoming the challenges.

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Competitive analysis of textile industry in Pakistan

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Abstract: The primary goal of this essay is to research and evaluate the textile manufacturing companies in Pakistan's private sector in terms of their operational competitiveness. The subject research field will be examined using databases on global manufacturing techniques to cross-reference and compare Pakistani Private Sector (PPS)—Textile Manufacturing Enterprises (TME) with international Textile Manufacturing companies. The findings indicated that "quality" is the case of PPS-top TME's competitive priority, and they also suggested that the prospector group might have some competitive advantages. Due to the current weak and ineffective organizational management structure and practices, it will, however, take a considerable amount of time for Pakistani Private Sector—Textile Manufacturing Enterprises to regain their prior level of global recognition and then further improve their operational competitiveness.

Keywords: textile industry; competitiveness; Pakistan; export-import, sustainability

1 Introduction

The findings revealed that "quality" is the competitive priority of PPS-top TMEs, and they also suggested that the prospector group may have certain competitive advantages. However, due to the existing poor and ineffective organizational management structure and practices, it would take some time for Pakistani Private Sector—Textile Manufacturing Enterprises to restore their earlier degree of worldwide reputation and subsequently enhance their operational competitiveness.

Pakistan's textile sector contributes significantly to the country's economy. Unlike in other regions of the world, its textile sector is based on cotton production and harvesting rather than sheep and wool. Pakistan is the world's fourth-largest grower of cotton, making it one of the most proficient textile-producing countries in Asia.

Pakistan, in particular, has around 440 mills that are used by over 2,500 textile-producing firms.

The birth of Pakistan's textile industry is linked to the birth of the country itself. The first textile factories were established shortly after the state earned independence from the British Raj in 1954. The textile sector began to play an increasingly important part in the national economy in the 1970s and 1980s. Throughout the second part of the twentieth century, the sector steadily progressed from a cottage industry to an industrialized, worldwide business, putting Pakistan in a favorable position in the global economy.

Because of the importance of the textile sector, as well as the growth of some foreign economic cotton textile challenges (particularly textiles made in China, Bangladesh, and India), the Pakistani government has intervened directly. It has made significant investments in research and technology to increase textile mill output and procedures.

However, developments in the textile business have brought with them a number of important difficulties. While the government has taken certain steps to assist its textile manufacturers, it has also turned a blind eye to some of these enterprises' harmful conduct. Textile firms, for example, habitually disregard safety and quality regulations. Among the violations include poor working conditions and insufficient supervision of labor procedures. Several foreign organizations have vowed to punish Pakistani textiles unless the government forces enterprises to change their protocols and policies.

Pakistan's textile industry is the country's largest manufacturing industry. It has traditionally been the only industry that has employed both skilled and unskilled employees, and it remains Pakistan's second-largest job-creating sector. Pakistan is Asia's eighth-largest textile exporter.

This industry contributes 9.5% to the GDP and employs around 15 million people or almost 30% of the country's 49 million workers. Pakistan is the world's fourth largest cotton grower, with the third highest spinning capacity in Asia behind China and India, accounting for 5% of worldwide spinning capacity. There are now 1,221 ginning units, 442 spinning units, 124 big spinning units, and 425 small units that manufacture textile goods.

The textile industry is mostly centered in Punjab (primarily in Faisalabad and Lahore), with Sindh coming in second (mostly Karachi). Textile exports increased at a very respectable 16% rate in 2006. Textile exports totaled $10.62 billion between July 2007 and June 2008.

Textile exports in Pakistan fell from 67% in 1997 to 55% in 2008, as exports from other textile industries increased. The main reasons for the reduction in textile exports in Pakistan include government policies and energy deprivation, deteriorating security, and a decreasing compliance rate with labor regulations and international labor standards. The Pakistani government is seriously contemplating it. The Pakistani government is seriously evaluating its competitiveness in the global market, and to that end, it has ratified a number of global and United Nations Conventions. As a result, the European Union has awarded the government GSP-plus (Generalized System of Preferences) designation (EU).

However, the continuation of GSP-Plus status is heavily reliant on favorable performance on 27 UN Conventions, eight of which are ILO core conventions. The Netherlands is a significant purchaser of Pakistani textile and garment items. Pakistani textile exports to the Netherlands were over USD 300 million in 2013. The Government of the kingdom of Netherlands enhances trade with mutual understanding under the motto of enhancing 'Trade and no aid'. However, in view of the increasing sensitivity of European buyers to social and environmental standards, it is imperative for Pakistan's textile industries to understand and implement these standards in letter and spirit to become eligible for long-term export to Europe. To remove these issues and problems, Govt of Pakistan and the Royal Netherlands Embassy in Islamabad on 24TH May 2014 by ILO through the roundtable discussion "The Pakistani Textile Sector in International Arena."

Significance:

The textile sector of Pakistan is the heart and soul of this nation since Independence. It is the largest Manufacturing industry in Pakistan. Export of $3.5 billion (6.5% of total exported cotton in the world) in 2017-2018. Pakistan is the eighth largest exporter of textile Products in Asia. It contributes to the economy is equal to approx. 8.5% of total GDP. The textile sector employs 45% of the total labor force in the country. In the year 2017-2018, the export of the textile grew by $4.4 billion. Pakistan is also the third largest consumer of cotton in the world. Total Textile mills are 464 in Pakistan out of which 5% are on the PSX. Textile has a total processing capacity of 5.2 billion square meters. International brands working in Pakistan with local textile mills are namely; H & M, Levis's, Nike, Adidas, Puma, Target, etc. Textile businesses are concentrated in Karachi with a share of 38% and 28% in Faisalabad.

Punjab and Sindh each have 116 textile units out of 464 total. Since the governments of these nations provide more support to their textile industries than Pakistan's government does, they are the key regional rivals that pose a danger to Pakistan's exports. For the Export Development Fund to advance the textile industry, Pakistan has granted 185 million rupees. In Pakistan, the bank credit goes to the textile industry to the tune of 40%.

Shortly after South Asia's independence from British control in the 1950s, textile production began to take center stage in Pakistan's industrialization. Pakistan's government created the Cotton Export Corporation of Pakistan in 1974. (CEC). Private manufacturers were prevented from taking part in foreign commerce by the CEC.

However, the CEC's influence began to wane in the late 1980s, and by 1988–1989, private manufacturers were able to purchase cotton from ginners and sell it in both domestic and international markets. In Pakistan, there were six hundred textile factories in 2000 compared to three in 1947. Spindles climbed from 177,000 to 805 million throughout the same time span.

Although there are numerous organized or unorganized textile setups in Lahore, Karachi, Sialkot, and other major cities, Faisalabad is Pakistan's textile center and is even referred to as the Manchester of Asia. The biggest textile market in Pakistan is Liberty Mills, which started out small but has grown to become one of Karachi's largest textile processing and production facilities.

2 Production Types

In Pakistan, there are six main industries that produce textiles:

- Spinning,
- Weaving,
- Processing,
- Printing,
- Garment Manufacturing,
- Manufacturing of Filament Yarn

The majority of textiles are made from cotton. In addition, synthetic fiber, filament yarn, art silk, wool, and jute are manufactured.

• Cotton: With 521 installed and active units, cotton spinning is arguably the most significant sector in Pakistan's textile industry.

• Synthetic fibers: The most popular synthetic fibers on the market include nylon, polyester, acrylic, and polyolefin. Pakistan now has five main synthetic fiber manufacturers, with a combined annual production capacity of 636,000 tons.

• Filament yarn: Pakistan produces three different types of filament yarn. These are filament yarns made of nylon, polyester, and rayon acetate. Currently, the nation has roughly six units.

Artificial silk is a material that mimics silk but is less expensive to make. Around 90,000 looms may be found throughout the nation, most of which are concentrated in Karachi, Faisalabad, Gujranwala, and Jalapur Jattan. A few are also found in the FATA.

- Wool is mostly used to make garments, woolen yarn, acrylic yarn, shawls, blankets, and carpets.

- Jute: Agricultural items like grain and rice are typically packaged in jute bags and hessian fabric. About 100,000 tons of jute goods were produced in 2009–2010.

The global value chain (GVC), which is driven and coordinated by buyers—retailers, buying houses, and brand-name companies—includes Pakistan's apparel industry. The clothing value chain needs to be viewed in terms of the nature of lead firms (generally recognized as US and European brands and local and foreign buying houses) and the type of contractual relationship the lead firms have with local production networks in order to comprehend the participation of manufacturers in a buyer-driven global network practically. The lead firm, which might be a brand marketer like Polo Ralph Lauren or Tommy Hilfiger, a mass or specialty retailer like Walmart, Target, or Mango, or a brand manufacturer like Zara and the Benetton Group, sits at the top of the global value chain.

Top brands including American Eagle, H&M, Zara, Benetton, Abercrombie & Fitch, Hollister, Nike, Quicksilver, Kohl's, Sears, Gap, and Old Navy are just a few of the American and European ones that Pakistani companies provide. Through domestic or foreign buying houses, these brands establish direct or indirect contractual contact with the regional manufacturing networks.

In Pakistan, there are two different kinds of buying houses: domestic and international. As commission agents, local buying houses. Local buying houses' primary responsibilities include maintaining client interactions and overseeing quality controls. While managing client relations and overseeing quality standards, overseas buying houses and importers like Li and Fung help businesses with the planning, organization, and supervision of the job performance of garment makers.

Trade in clothing has remained Western-centric with a North-South orientation for the past three decades as major corporations in developed nations (the USA, EU, and Japan) have handled buyer-driven value chains and production networks. South Asian nations are among their top trade partners, and the US and Europe continue to be the two largest export markets. Our survey's results are consistent with similar worldwide trends: more than 70% of Pakistani businesses had agreements with buying organizations that deliver orders to the United States, while more than 20% of all orders were processed for Europe.

Many businesses serve both the US and European markets. While middle-income nations continue to gradually increase their import percentages, South Asia will continue to be a prospective market for sourcing from the US, EU, and Japan. The following categories—full package providers, original design manufacturers (ODMs), or original brand manufacturers—can be used to describe the capacity of local manufacturing enterprises to carry out multiple activities (from production to design) (OBMs).

In buyer-driven chains, design, marketing, and product innovation provide the greatest entry hurdles. Unsurprisingly, with only a few ODMs and very few OBMs, the bulk of Pakistani manufacturers are designated as full package providers. Full package production necessitates the development of the capacity to interpret designs, make samples, source the necessary inputs, monitor product quality, and ensure on-time delivery, in contrast to local manufacturers operating as assemblers in which foreign companies assume the responsibility of supplying all the components to manufacturers.

The complete package companies are free to delegate part of the cut-make-trim (CMT) tasks to second-tier vendors at the bottom of the value chain. An original design manufacturer is a step up from full package providers (ODM). An ODM company creates its own designs, which increases the product's value. Some ODMs are able to advance and become producers of their own brands (OBM).

The majority of businesses in emerging nations, including Pakistan, began as second-tier assemblers, providing a small number of complete package businesses. However, several businesses in Pakistan moved on to become complete package suppliers whereas the bulk of businesses did not climb the corporate ladder to become ODMs. A few of businesses in Bangladesh, China, and Turkey advanced to the level of ODMs, while a few businesses in China and Turkey attained the status of OBMs.

For businesses in nations like Pakistan, climbing the ladder to become OBMs and developing their own global value chain is incredibly difficult, but it appears to be the only way out of the low value-added trap. The survey findings, which show that the majority of businesses, both in the knitwear and woven sectors, are functioning as contracting firms, confirm the claim that garment industry enterprises in Pakistan are producing for lead firms.

When asked if they export their own brand, businesses across both industries responded that they do not sell branded goods in huge numbers. There are, however, just a few companies that produce brands, and an additional study of the data indicates that these companies exclusively serve local markets.

The study results show the prevalence of complete package suppliers in Pakistan's production network and the lack of ODMs and OBMs—nearly 54% of the enterprises interact with buying houses, while only 7% supply MNCs directly

Companies that provide brands directly have a high likelihood of being ODMs. However, very few businesses have been successful in moving up the value chain to become a global OBM.

The average export price of a product may be used to gauge its level of value addition and place within the global value chain. The research of trade data revealed that Bangladeshi and Turkish exports of goods often fetch higher prices than do Pakistani garment exports. Our firm-level statistics for the Pakistani clothing industry at the macro level support this.

The data demonstrate unequivocally that Pakistan's garment industry occupies a lower position in the global value chain, producing largely inexpensive goods with high value added. The average export price of the products exported is less than $10. When the average export price is broken down by size in the woven industry, it is found that approximately the same amount of small and medium businesses (40%) set their prices between $1 and $5 and $5 and $10.

In contrast, 80% of significant businesses export their goods for between $5 and $10 on average. Few companies sell products for more than $10. Compared to the woven industry, a greater share of small and medium-sized knitwear enterprises (62%) had an average export price between $1 and $5, indicating that the knitwear industry mostly exports low-priced items.

However, for major businesses, the woven and knitwear industries see the same volatility in export pricing. Between low-cost, high-value products and branded goods, there is often a $20 to $25 price gap. With an average export price of $5 to $10, Karachi has more than 80% of the woven sector's businesses, followed by Lahore (65%) and Faisalabad (60%).

Only Sialkot has more than 40% of businesses with average selling prices over $10, indicating that these businesses are engaged in the production of semi-technical clothing, such as uniforms and sportswear. Similar to this, the bulk of businesses in knitwear throughout several clusters are focused at a low average export price ($1 to $5), with the exception of Sialkot ($5 to $10).

The absence of value addition in the apparel industry is also shown by information on business strategy that was retrieved from the survey data. The poll specifically asked about the tactics used by businesses to increase sales. Unsurprisingly, the majority of businesses cited improved product quality, better marketing, and cheaper costs as their primary tactics for boosting sales through domestic and international buying houses.

Buying houses have significant market strength (oligopsony) within the key product categories as a result of the garment industry's position on the Global Value Chain, requiring suppliers to compete on both price and product quality. There are intriguing differences in strategy depending on business size; smaller organizations rely more on lower pricing to generate sales than bigger enterprises, for example.

On the other side, larger businesses prioritize stronger marketing and enhancements to product quality. Knitwear depends more on price-based rivalry than woven does across industries. The latter relies more on marketing as a sales-boosting tactic. Few businesses, regardless of size or industry, suggested product diversity and advancements in technology as a way to boost sales.

This bolsters the argument that Pakistan's garment sector is stymied at a lower level of the Global Value Chain, where competition is centered on product quality and price within a constrained range of low-value-added commodities. The strategies that could aid businesses in progressing in the Global Value Chain are not seen as realistic choices.

Based on the nature of their capacity and transaction costs, the US- and European-brand lead businesses work through distinct contractual partnerships (as does Global Value Chain) with local manufacturers. The value chain for clothes in Pakistan has a complex governance structure, with enterprises falling under captive, relational, and modular types. Given the nature of the survey data we collected, it is difficult to determine the precise scope and degree of one governance structure's dominance over the other.

However, the bulk of Pakistani businesses come under relational and modular forms of the value chain, according to our research and focus group talks. In the woven and knitwear industries, more than 90% of our studied companies work as contract manufacturers for national or international brands. With worldwide brands, the contractual arrangement is either relational or modular in character.

The major brand manufacturers, such as Levis, Gap, and others, create long-term relational value chains, according to the results of our focus group discussion with the clothing makers. Strong reputations, trust, and asset-specific investments are the foundation of relational value chains, which are frequently in contact with local producers.

In contrast to modular value chains, these partnerships have extremely high entry barriers. The modular value chain is mostly driven by local and international buying houses that work as middlemen on behalf of brands to assure producer compliance, in contrast to the relational value chain, which is likely to be driven by brand marketplaces and brand manufacturers.

It also observed that traders who are dealing with Textile materials exported to other countries organized this business in their houses and hide the actual situation of the textile due to tax and heavy-duty charges.

Moreover, these companies export raw materials to other Asian countries, and they further use them to make final goods for export to other developed countries such as Europe and America.

Small textile industries which are operated in the home lack knowledge and technology as compared to the large textile companies. The buying house divides the production order among several enterprises, taking into consideration the size of local businesses. For instance, multinational buying house Synergies Worldwide works with 80 distinct manufacturing companies in Pakistan while representing 35 brands from the US and Europe. The variability in value chains is explained by variations in the capacity of clothing manufacturers and in the number of transactions, codification, and collaboration necessary. According to the Global Value Chain of the garment sector, a sizable majority of companies have upgraded from a captive contractual connection to a relational and modular one with top brand marketers in developed nations as a result of considerable improvements in firms' capabilities.

Additionally, this shift has corresponded with the development of both domestic and international buying houses in nations that export clothing, such as Bangladesh, China, India, and Pakistan, as well as the expanding use of information technology in the industry. By lowering transaction costs via the interchange of information on design, processing, and assembly, the emergence of foreign purchasing houses and regular interactions with international buyers have made sourcing from local enterprises simpler. It has also promoted a protracted partnership with the regional production networks. According to survey results, the majority of companies in the apparel industry are full-service suppliers who work with worldwide brands or lead companies through both domestic and foreign buying agencies.

There is little internal design work done, and there is little branding of items for the global market. As a result, the sector is at the bottom of the Global Value Chain, generating goods that are exported for a low price even if they have a high value-added. This is clear from the data on export prices provided by businesses across clusters in the woven and knitwear industries, as well as from the study of trade statistics.

Last but not least, it can be deduced from the firm data and focus group sessions that businesses in Pakistan's garment sector often come under both the relational and modular forms of the value chain. As was previously indicated, Pakistan's clothing industry is stymied in a low equilibrium in a high-value-added area, producing low-cost goods for mass sellers. The industry has to continuously invest in cutting-edge technology, skilled staff, and agglomeration economies or intra-cluster spillovers to escape this trap and advance up the garment value chain.

For the apparel industry to advance up the value chain, supporting government policies that enhance the business climate, infrastructure, and trade facilitation are also crucial. By analyzing the firm-level data gathered during the survey, the following section makes an effort to explain why Pakistan's clothing industry is positioned so poorly in the GVC.

Further, this business is also impacted by friends and family influence, who have their own brothers, family friends, and sisters, who promoted them in the textile business who don’t have any knowledge and skills in this industry. The industries that are controlled by exporting companies are open to competition as well as the latest technological advancements. Exporting companies develop their knowledge of "doing things better," "making things better," and "improving via functional upgrading," or entering a stage with a greater value-added, more quickly than non-exporting companies over time. There is rich literature on how firms in developing countries learn and innovate upon becoming part of a global value chain.

With the introduction of microelectronics at every level of garment manufacture in the 1980s, the clothing industry saw a significant technological transformation. The most major technological advancements occurred in designing, cutting, sewing, and other related areas, giving rise to computer-aided design (CAD), computer numerical control (CNC) cutting, and computer-aided manufacturing (CAM).

It is essential for businesses to use these technical breakthroughs if they want to advance the global value chain of the apparel sector. However, businesses must develop the capability to absorb these new technologies if they want to advance from full-package suppliers to ODMs and then to OBMs. The amount of education and competence of the labor force is directly related to this ability to absorb.

As a result, even while technology is a must to advance up the value chain, it cannot be deployed successfully without trained labor. The use of computer-aided design (CAD), computer numerical control (CNC) cutting and computer-aided manufacturing has just recently become more widespread in Pakistan's garment industry.

The discussion that follows focuses on how survey respondents who work for clothing manufacturers rate their technological aptitude. The study results, which reveal that 75% of the enterprises desire to upgrade to a higher level of technology while 23.9% are pleased with the current level, confirm the claim that our technological development has been constrained.

The majority of businesses want to update their technology, regardless of their size or location, and across the woven and knitwear industries. It's interesting to note that smaller businesses are, across all of these categories, the most willing to invest in new technology. This suggests that smaller businesses are fully aware of the challenges they face due to low levels of mechanization as well as the benefits that new technology could provide.

Technology is going to be one of the most serious obstacles to the industry's capacity for development, competitiveness, and value creation. Relying solely on labor-intensive production techniques may impede this sector's success, particularly its worldwide growth potential. As a result, it is critical that the garment industry enhance its technical infrastructure in order to boost competitiveness and efficiency while also being able to respond to the ever-changing changing needs and expectations of worldwide merchants.

Manufacturers, in particular, are increasingly under pressure to meet tighter deadlines, necessitating more flexibility and faster turnaround times for orders and reorders (GLC, 1986). This increases cost pressure, and only enterprises that use the necessary technologies to respond to these needs profit from shorter manufacturing runs (Gibs, 1987).

The fact that the fabric business is competing in the global market despite seeming comment thread technology points to the potential that technology advancement may provide. Furthermore, the fact that the majority of enterprises desire to upgrade their technology shows that they are well aware of this new opportunity. Costs and impediments to updating technology Although the majority of the companies polled wish to modernize their technology, the large expenses involved are a big impediment, particularly for smaller enterprises.

When the data is broken down by firm size, the majority of firms consider the costs of technology upgrades to be more than Rs 50 million. This is true for both sectors—in both woven (45.5%) and knitwear (44.4%), the smaller firms face the highest percentage of costs exceeding Rs 50 million. This pattern is repeated across multiple clusters. Given that many enterprises already operate at a somewhat primitive or low technology level, the higher perceived cost of technical up-gradation is to be expected.

Evaluating the key barriers across industries indicates that financing is seen as the most significant limitation in updating technology by more than 80% of small and medium-sized businesses in both sectors.

In comparison, a lower proportion of large enterprises (60%) across both sectors regarded money as the key impediment to technological advancement. This clearly demonstrates that small and medium-sized businesses, as opposed to large businesses, have limited access to credit markets due to high interest rates and collateral requirements.

Pakistan's garment industry is one of the most labor-intensive industries in the country. One of the most important variables influencing the growth and success of any business is the availability of skilled workers. Indeed, the availability of abundant and inexpensive labor has contributed to the garment sector's worldwide competitiveness, allowing the country to remain a vital component of the global textile value chain.

For an excessively decades, the garments industry has been perceived as a low-tech, unskilled labor-intensive enterprise that relies on migrant labor. Low wages, on the other hand, will be less important in the future, with skills and technological capabilities in clustered networks, investment in modern production facilities, development of training institutes, and the quality of infrastructure facilities determining which countries remain active partners in the global value chain and eventually increase their share in value-added products through design and brand development.

The lack of research and development (R&D) in Pakistan's cotton sector has resulted in inferior cotton quality compared to the rest of Asia. Farmers are migrating to other cash crops, such as sugar cane, due to the following low profitability of cotton crops. This situation has resulted from a lack of appropriate R&D. They also accuse cartels, particularly those in the pesticide industry, of impeding adequate R&D. Because better yield cotton is more pesticide resistant, the pesticide industry stands to profit by stifling domestic R&D.

Furthermore, opponents claim that the textile sector uses antiquated technology and equipment. The inability to upgrade equipment and machinery on schedule has resulted in a loss in Pakistani textile competitiveness. The cost of production in

Pakistan is greater than in other nations such as India, Bangladesh, and China due to antiquated technology.

The All-Pakistan Textile Mills Association (APTMA) has stated that the government's actions do not match its statements about the textile sector. Referring to Prime Minister Yusuf Raza Gilani's address at the inauguration ceremony of the Infrastructure Development of the Pakistan Textile City at Port Qasim Industrial Area, where the Prime Minister emphasized the importance of the textile sector to the country's economy. The reinstatement of a minimum tax on domestic sales would create an inescapable liquidity crisis, which has already reached catastrophic proportions.

Pakistan's textile sector is suffering from low productivity as a result of antiquated textile machinery. To solve this difficulty and compete, the Pakistan Textile Industry would require significant expenditures. For many years, there has been a consistent trend of investment in spinning. Pakistan's textile sector estimates that roughly Rs1,400 billion (US$32 billion) of investment is needed till 2010 to meet the government's export objective." Pakistan is confronting foreign as well as domestic difficulties that limit new investment. The volatile internal situation in Pakistan resulted in a sharp drop in foreign investment, affecting all industries but particularly the textile industry.

The United States cancels more than half of Pakistan's textile orders. The United States also imposes substantial tariffs on Pakistani textile imports, negatively impacting exports. The United States and the European Union are the two largest importers of Pakistani textiles, which makes a significant impact in Pakistani textile exports after putting import restrictions on Pakistani textile items.

According to current data, the Pakistan textile sector accounts for more than 60% of the country's overall exports, which total around 5.2 billion US dollars. The industry accounts for around 46% of the overall output in the country. In Asia, Pakistan is the 8th largest exporter of textile products.

This industry contributes 8.5% of the overall GDP. It employs 38% of the labor force in the country, or over 15 million people. However, the share of skilled labor is far lower than that of unskilled work.

China was the world's leading textile exporter in 2020, with a total value of roughly 154 billion US dollars. Textiles can refer to both the raw materials used in clothing manufacturing and the final clothes. The European Union placed second, with an export value of almost 64 billion US dollars, approximately half that of China. China's export results represent around 43.5 percent of the global textile export market.

Other Specific Recommendations are as follows:

• Remedy via Foreign Direct Investment (FDI) • Image Building of Pakistan to Attract Foreign Direct Investment (FDI) • Value Addition Focus • Technology Upgradation & Capacity Building

• Reducing the cost of doing business in Pakistan • Improving Textile Production • Productivity Improvement • Awareness of International Quality Standards • Introducing the concept of on-the-job training • Introducing efficient management practices

• Interest rates should be kept low in order to thrive in this business; • Electricity and gas tariffs should be eliminated. • New export markets should be explored.

3 Data and Methodology

The methodological basis of the study is the index of manifest comparative advantage defined by Balassa Balassa,]. The index is based on the theory of trade based on Ricardo's theory of comparative advantage. The original index is calculated using the following formula:

$$B_{ij} = RCA_{ij} = \left(\frac{X_{ij}}{X_{it}} \right) \bigg/ \left(\frac{X_{nj}}{X_{nt}} \right),$$

Figure 1

Balassa index

where X is the export, i is the country, j is the product, t is the group of products, and n is the reference country. i.e. the index compares the share of the product under consideration in the exports of a country with the share of the same product in the exports of the reference country. In the present analysis, the product (j) is selected from among the textile product groups and the product group (t) is all products for both the country and the reference country. The latter can be all countries in the world, and in the case of a specific analysis of the results is Pakistan. The Balassa index is calculated for Pakistan and the world total.

Where only some data were missing, they were filled in by linear extrapolation (but it was not necessary). The source of the trade data used to calculate the Balassa Index was the World Bank's WITS (World Integrated Trade Solution) database (World Bank (2022). The data were downloaded at HS-2 (Harmonized Commodity Description and Coding System) level for Textile products (chapters 5-63) for the period 2010-2021.

4 Results

We can calculate the following data in the Figure 2.

Years	Silk	Wool,	Cotton	Vegetable textile fibres;	Textile fabrics; impregnated,	Fabrics; knitted or crocheted	Apparel and clothing accessories; knitted or crocheted	Apparel and clothing accessories; not knitted or crocheted	Textiles, made up articles; sets; rags	TextCloth
2010	0,18	0,66	52,60	0,8	0,31	2,38	8,35	6,46	47,58	13,34
2011	0,08	0,50	53,95	0,7	0,29	1,30	8,01	6,63	44,81	13,19
2012	0,16	0,62	58,81	1,0	0,39	0,91	7,21	6,61	41,63	13,03
2013	0,43	0,82	57,60	0,4	0,36	0,76	6,98	6,77	42,62	12,95
2014	0,35	0,74	57,64	0,2	0,29	0,82	8,35	6,99	43,79	13,12
2015	0,55	0,52	54,53	0,5	0,27	0,95	8,07	7,24	43,78	12,43
2016	0,55	0,41	51,41	0,7	0,20	0,86	9,22	8,76	47,61	13,32
2017	0,41	0,28	48,57	0,7	0,15	0,61	9,93	9,57	50,82	13,92
2018	0,24	0,33	46,63	0,5	0,19	0,57	10,88	9,76	49,84	13,96
2019	0,15	0,17	45,08	0,9	0,29	0,79	11,11	10,37	48,75	13,86
2020	0,22	0,20	43,24	1,3	0,46	0,87	12,56	10,90	27,23	13,74
2021	0,10	0,22	43,35	1,4	0,19	1,09	14,69	12,65	46,52	15,96

Figure 2

Pakistan textile competitiveness

Pakistan has a comparative advantage in the following products, so it makes sense to continue producing and exporting. Apparel and clothing accessories; knitted or crocheted. Apparel and clothing accessories; not knitted or crocheted.Textiles, made up articles; sets; worn clothing and worn textile articles; rags clothes in general. Pakistan had a comparative advantage in some years, but it is not a stable. Fabrics; knitted or crocheted Pakistan has a comparative disadvantage in the following products, so it does not make sense to continue producing but importing. Silk, Wool, fine or coarse animal hair; horsehair yarn and woven fabric. Vegetable textile fibres; paper yarn and woven fabrics of paper yarn

Conclusions

Pakistan's garment business is on the bottom rung of the global value chain, with the majority of manufacturers offering low-cost products to retailers, brand marketers, and brand producers. A few companies have succeeded in becoming their own design producers. The majority of organizations have relational or modular Global Value Chain governance structures, with only a few examples of captive value chains. The key reasons for Pakistan's unique place in the international market span from firm-level capabilities to transaction costs. While the garment industry has seen significant reductions in transaction and information costs, there are still persistent issues with firm capabilities. One of the primary aspects influencing corporate competence is technology. According to the study results, the majority of enterprises of all sizes and clusters wish to enhance their technology.

However, the expense of modernizing technology prevents many businesses, particularly small businesses, from doing so. According to the poll, the most significant barrier stopping enterprises from updating technology is access to institutional sources of capital. At its present low level of equilibrium, Pakistan's garment industry faces no shortage of semi-skilled labor.

To continue development, rise up the value chain, and produce technical spillovers, they would also need to consistently innovate and invest in machinery and IT hardware/software. These spillovers may encourage other activities that take advantage of garment industry advances.

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Young people's perception of inflation in Hungary

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Abstract: Inflation generally means the devaluation of money, which leads to a relative rise in prices. Nowadays inflation is a prevalent phenomenon, the causes of which include the Covid pandemic that broke out in 2020 and the Russian-Ukrainian war of 2022. Although the epidemic has now reached a resting point, and the war also affects our country only indirectly, these events still have an impact on the Hungarian economy. Inflation is increasing and the economy is heading towards recession.

The purpose of this article is to assess how well young Hungarian people are aware of the current inflationary processes, the reasons behind them, and the expected consequences.

After processing the relevant literature, primary research has been prepared in which we tried to get answers to our research questions using an online questionnaire. Our research approach is functionalist since we do not intend to change perceptions about inflation, but to observe and quantify them.

We have used a convenience sampling procedure, with snowball methodology, so our research results cannot be considered representative, however, many interesting correlations were revealed during the research. With the questionnaire, we reached 270 young people, including 33 foreigners studying in Hungary, which provided an opportunity to investigate whether foreigners have a better understanding of the inflation process, its causes and consequences.

In the light of the results, it can be said that since young people do not yet have their own income, and they hardly or only partially make financial decisions, they are therefore not really aware of the causes and consequences of inflation. No significant difference was found between respondents from the two genders. However, those who are already working and their main source of income is their work are significantly more aware of the effects of inflation than those who can buy mainly with the support of their families.

Keywords:inflation; perceptions; young people

1 Introduction

Inflation generally means the devaluation of money, leading to a relative price rise. A household can feel this best when shopping, as buying a cheap product for the same amount also affects the prices of individual leisure activities (cinemas, nightclubs, restaurants). As a result, inflation is a financially tighter time, which can impact young people's financial situation. While inflation is an objective phenomenon, there are perceptive elements to it as well. For example, in case of devaluation, people start stocking up on goods, causing further increase in inflation. In order to forgo a downward spiral, it is inevitable to understand the causes and effects of inflation.

2 Inflation

In order to understand the concept of inflation, we must first know a few basic economic factors and their effects on each other. (Lim-Sek, 2015). We can talk about inflation if the companies pay their employees the same level of salary, but the employees, i.e. the households, are no longer able to pay for the basic products necessary for their livelihood from the same amount. As a result, household savings are reduced. It is important to note, that fluctuations in the price of individual goods cannot be classified as inflation, since we can only speak of inflation if the prices of a wide range of products increase permanently. The rate of inflation is determined using the consumer price index, which shows the extent to which the prices of representative products have changed in a year (Brya, Cecchetti, 1993). The consumer basket contains the aforementioned products and services, and the percentage price change that occurred in one year is determined based on this.

All members of every economic sector want to mitigate the negative effects of inflation, for example, employees can negotiate their salaries to rise if they have the opportunity, businesses can increase the price of their products or services. These opportunities differ between different social groups, so there will be those who do well and others who do poorly with this monetary fluctuation (Doepke-Schneider, 2006; Yunusovna, 2022).

An increase in inflation can lead to early purchases, as due to price increases, people try to make the purchases due before further price increases. This further increases prices, as businesses can sell the same products to their customers at a higher price. Depending on the level of inflation, there can be creeping, galloping and hyperinflation. In the case of creeping inflation, the rate is a few percent per year, the annual rate of galloping inflation is already 2-3 digits. In hyperinflation, the price level increases to such an extent that it completely disintegrates the economy (Anghelache et al, 2022).

Triggers of inflation may be, for example, the sudden increase in the already mentioned demand, in such cases, businesses cannot satisfy the demand of customers, so they raise prices (demand driven inflation), or if the source of raw materials necessary for the production of a certain product is insufficient, or the cost of its transportation increases (cost driven inflation), as well as if a bankrupt country prints too much money to pay its debts (money supply inflation) (Totonchi, 2011).

Demand driven inflation occurs when the total demand for goods and services increases and exceeds the supply of goods and services that can be sustainably produced (Shapiro, 2022). Excess demand puts pressure on prices for a wide range of goods and services and ultimately leads to an increase in inflation. Aggregate demand may increase because consumer, business, or government spending increases, or net exports increase. As a result, the demand for goods and services will increase relative to their supply, and because of this, companies will raise the price of goods and services. At the same time, companies will hire more workers to meet this additional demand. Due to the increased demand for labour, companies must offer higher wages to attract new workers and retain existing employees. Firms may raise the prices of their goods and services to cover their higher labour costs. More jobs and higher wages increase household incomes and lead to higher consumer spending, further increasing aggregate demand and the ability of firms to raise the prices of their goods and services. If this happens in a large number of businesses and sectors, it will lead to an increase in inflation.

Cost-driven inflation only happens when the lack of supply is coupled with enough demand for the producer to raise prices (Sbordone, 2005). On the supply side, several factors contribute to inflation. An increase in the price of raw materials can also cause an increase in inflation, since it can make it difficult for manufacturers to provide their products at the same price level. The goods and services we purchase often contain components from around the world and require extensive logistics to arrive at the local stores. A failure in this system may be yet another reason for a sharp rise of production costs for companies. For example, global supply chain disruptions such as those caused by the pandemic in 2020 could lead to cost inflation. Monopolies can also contribute to cost-driven inflation because a monopoly controls the entire supply of a good or service. Natural disasters temporarily cause costly inflation by damaging productive facilities. In general, the depletion of natural resources is increasingly causing cost-driven inflation.

Some believe that rising wages can result in cost-driven inflation due to higher costs for businesses, while others believe that higher wages also increase demand enough to offset price increases. Rising wages should allow consumers to fight inflation, especially if wages rise at the same or faster rate than the rate of inflation. Rising wages allow consumers to pay higher prices without affecting their purchasing power.

Certain regulations may also result in cost-driven or demand-driven inflation. When the government issues tax subsidies on certain products, it can increase demand. If that demand is greater than supply, costs can rise. Additionally, strict building codes and even rent stabilization policies can inadvertently increase costs and create an inflationary environment by passing those costs on to residents or artificially reducing housing supply (Smith, 2005).

Money supply is defined as the total amount of money in circulation, which includes cash, coins, and bank accounts accredited by a country's central bank. If the money supply grows faster than the rate of production, it can result in inflation, especially demand-driven inflation, because there is too much demand for too few products. An increase in the money supply is usually created by a country's central bank through open market operations.

The strongest and most obvious consequence of inflation is the devaluation of money, since we can buy significantly fewer products for the same amount. With its devaluation, money loses its credibility and destroys its reputation on the world market, as a result of which economic participants invest in other currency-based systems. to this devaluation, purchasing needs usually increase inducing demand driven inflation and a negative inflation spiral.

The central bank however can influence inflation in a very specific way; by moderating inflation to achieve and maintain price stability through its actions by increasing the base interest rate (Mankiw-Reis, 2003; Davidson, 2006). Increasing the base interest rate makes local currency-based investments more favourable for foreign investors, thus increasing the value of a given country's currency. However, an increase in demand leads to an increase in inflation, as businesses have the opportunity to sell their products to their customers at a higher price. Another important effect of increasing the base interest rate is that it becomes significantly more expensive to take out a loan, so it becomes unfavourable also for the households. Due to the small amount of loans, the general demand for products falls, thus resulting in at least lower inflation or even a decrease in production. In addition, those who have entered into a fixed-rate loan contract before the start of inflation can repay their debt with the already inflated value of money upon repayment. Importantly, this only applies to fixed-rate loans, so it does not apply to credit card balances or other specific loans, that have the option of raising their interest rates to keep up with inflation.

Inflation, as a macroeconomic phenomenon, greatly affects all parts of an economy. To a small extent, it helps the progress and development of the economy, as soon as it exceeds the controllable level, it can cause serious financial problems for all economic actors. Inflation can mean profit for these actors, but its most important factor is that the profit of some can only result from the loss of others.

Recession basically means a decrease in the GDP or the decline of the economy. The production of a country in recession decreases, its unemployment may increase, thereby increasing the extent of the low standard of living (Friedman, 1977).

One of the defining characteristics of a country's economy is the unemployment rate. If the unemployment rate in a country is high, it undermines the strength of its economy (GPD). Inflation leads to unemployment in the long term, as companies lay their employees off as the demand for purchases decreases, since the income from sales does not allow for guaranteed wage payments. Employees who are dismissed as a result receive state benefits (unemployment benefits) and hence increase governmental expenditures that need to be covered from tax money, which also negatively influences inflation (Gordon, 1976).

Housing market prices can depend on other economic factors, such as the construction industry, because if construction industry prices rise, it can also cause real estate market prices to rise (Dougherty-Van Order, 1982). The increased costs of raw materials, tools and labour used for construction and renovation are added to the basic value of the properties, thus increasing their prices. In a general period, the price increase in the real estate market does not exceed the rate of inflation, but they may exceed it in an unfavourable period due to artificially stimulated price increases. This price increase is most significantly influenced by changes in energy prices. These price changes are mainly reflected in the costs included in the rent, for example water, gas, heating. Landlords can compensate for these price changes by increasing rents. Homeowners who took out fixed-rate mortgages before inflation started will have an easier time repaying their debt.

Inflation also has a particular impact on the price of different energy carriers. While a country that does not have sustainable energy sources is forced to import them from abroad, in the course of importing, a significant loss of foreign currency occurs, because due to the increase in inflation, the world market value of one's currency is less favourable on foreign markets (compared to other currencies). "The increase in energy prices ripples through the economy and occurs at all levels of production." (Ékes, 1998). Thus, thanks to globalization, the already mentioned real estate, basic foodstuffs, leisure services, and loans become more expensive. Based on this, it can be concluded that the most influential factors during inflation are actually energy prices.

3 Research

The main goal of our research was to find out how inflation affects young people, as well as how much they are generally aware of the root causes and consequences of inflation. We prepared a questionnaire-based survey with the help of Google Forms. We utilised a convenience sampling starting our research procedure with the students of Óbuda University, disseminating our questionnaire with snowball methodology, so the research results are not expected to be representative.

In the end, there were 270 people in our sample, of which 23 were foreigners and 247 were Hungarians, but regarding demographic variables, - of course besides nationality - the only difference between foreigners and Hungarians was that the Hungarian sample included people younger than 18, while the foreign sample did not since we asked university students from abroad yes.

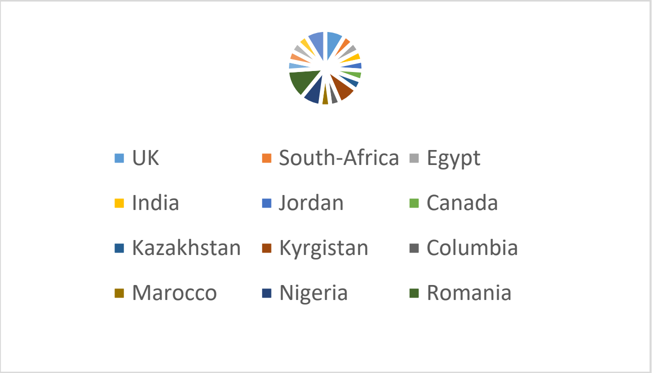

Figure 1

Distribution of foreign respondents by country of origin

While our primary target was Generation Z, we have broadened are definition later on, using the general term young people as a more adequate phrasing. Generational research considers those born after 1995 to belong to Generation Z due to the generation's special characteristics. However, the respondents born between 1990 and 1995 in the sample did not show any significant difference compared to those born between 1995 and 2000 beyond the size and composition of monthly expenses, so we took these respondents and their answers into account when examining the answers in order to increase the size of the sample.

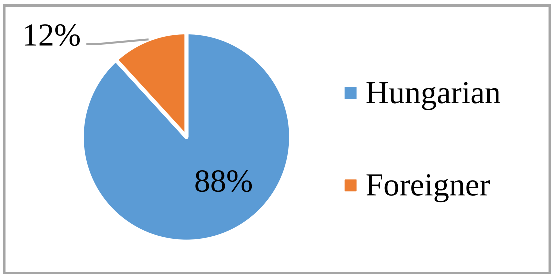

Figure 2

The ratio of Hungarians in the sample

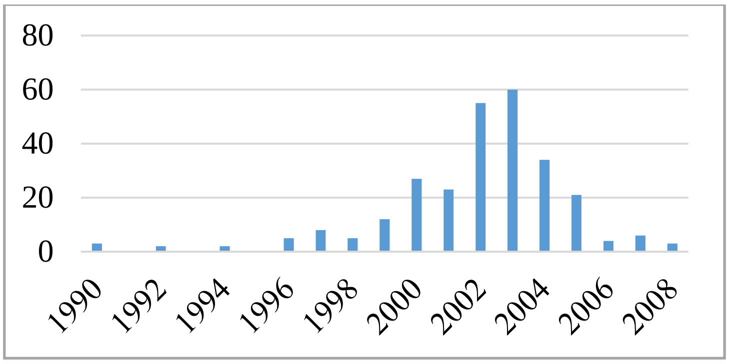

Figure 3

Distribution by age

4 The respondents

The average age of the respondents was 21 years, with a standard deviation of 2.8 years. Based on the data obtained after the screenings, we can say that we actually reached the target audience, the "young people" with our questionnaire.

By reaching the target audience, the vast majority of respondents are BSc or BSc graduate students.

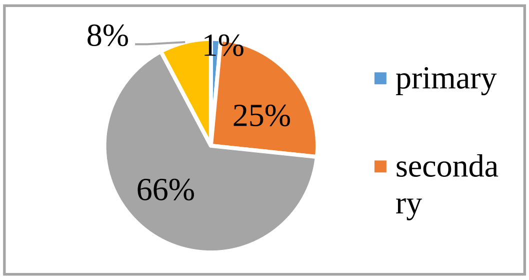

Figure 4

Respondents by highest education

The results of the questionnaire form a representative group in terms of age, since the respondents belong to the same generation, but the gender distribution is not biased at all. 52% of those who completed the survey were men, while 45% were women, and 3% did not wish to state their gender. Based on the Hungarian demographic age group, the results cannot be considered representative in terms of age distribution, nor in terms of gender based on the number of respondents. The survey was prepared as a convenience sampling, starting from the students of the John von Neumann Faculty of Informatics of Óbuda University, and collecting additional answers and respondents using the snowball method. The overrepresentation of men can be closely aligned with the faculty's students' gender ratio.

The distribution of the respondents by education is very diverse. In addition to Computer science students (45%), there were also a large number of students majoring in Tourism and Hospitality (17%), Business and Management (5%), and Commerce and Marketing (4%). The large number of IT engineering students is a consequence of the previously mentioned snowball method, since we started distributing the questionnaire among engineering IT students.

The survey shed light on how the respondents manage their financial issues and what sources of income they have. Based on the results, it is clear that in the case of the vast majority of them, i.e. 92%, their parents help in some form and only 8% are able to manage their financial affairs on their own. Due to their age, a large part of the respondents still live with their families and parents, which explains their financial dependence. In addition to parental help, 31% have some other source, but this will be clarified in later questions.

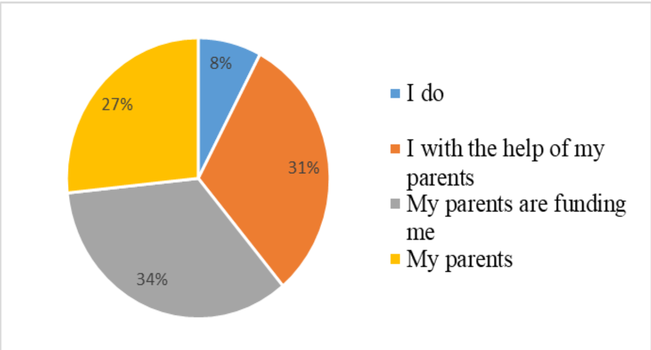

Figure 5

Who makes your financial decisions?

For the vast majority of respondents, the main source of income is pocket money received from their parents. This further emphasizes the dependence on parents from a budgetary point of view. However, this is not the only source for most students, as thanks to their studies they are entitled to various scholarships or work based on their professional knowledge. The following figure indicate how many of the respondents have the various sources of incomes. As t is clearly visible, most of them have multiple sources of income.

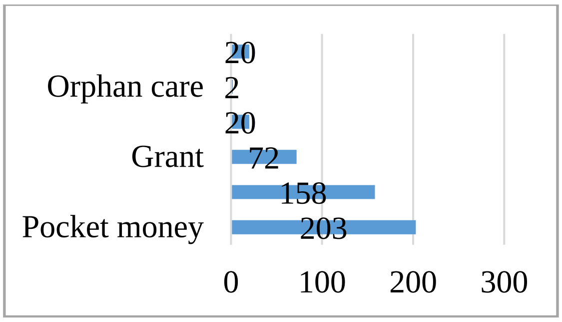

Figure 6

Source of income

Only 21% of the respondents work or work full-time. This is a rational value, since most of the respondents are university students, for whom it is usually not possible to take on full-time jobs in addition to their studies. 12% of the respondents have not yet worked at all, they are probably among those supported only by their parents in the earlier part of the questionnaire.

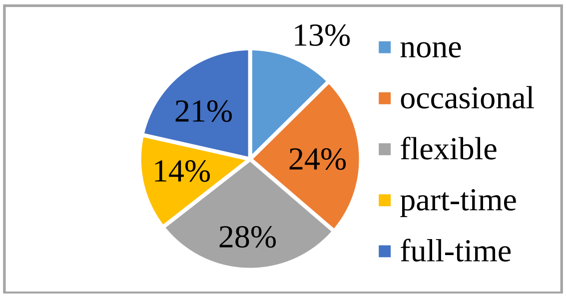

Figure 7

Work experience

The next question of the questionnaire tried to shed light on the self-earned income of the respondents. By aggregating the data, we obtained the values shown in the table below. The graph shows again that most of the respondents are financially dependent on their parents. Regardless, it is extremely different who has how much total income. Apart from the millions, the earnings of part-time or occasional jobs are lined up. It can be seen that the earnings values between fifty and four hundred thousand forints show that among the respondents there are a significant number of those who have already performed some kind of casual or part-time activity. The data in the table are shown in thousands of forints.

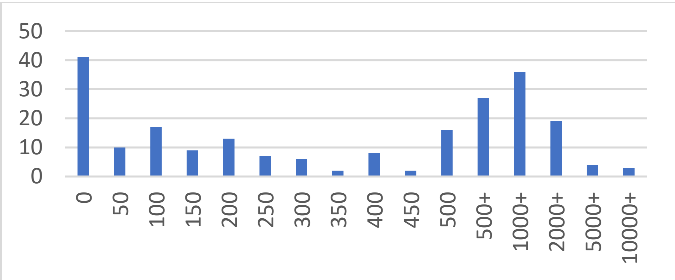

Figure 8

Self-earned income

5 Research results

The popularity of card payments is clearly visible from the questionnaires, as 80% of the respondents pay by card while only 20% pay with cash more regularly. In addition to all this, 98% of the respondents do their shopping themselves. Most people spent between 10,000 and 20,000 forints on food, but there are those who spent more than 100,000 forints per month on food alone, so the average value is 30,500 forints, with a standard deviation of 32,000 forints. Based on the standard deviation value, which is also clearly visible in the graph, it can be said that the monthly average value of the amounts spent on food by the respondents ranges over a very wide spectrum. This may stem from the fact that many people still live in the same household with their parents, which has already been established several times, and therefore do not spend much on food.

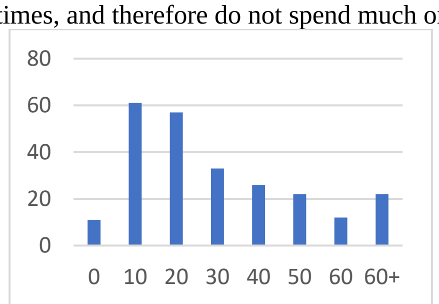

Figure 9

Food

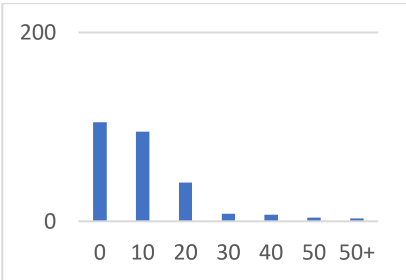

Figure 10

Clothing

The amounts spent on different clothes and outfits are surprisingly low. Again, this can be linked to dependence on parents, however it is important to note that most clothing is classified as durable goods. Thus, 38.9% of the respondents do not spend at all, that is, they do not spend an amount that can be broken down into months to renew their wardrobe. In addition to all this, the average spending is HUF 8,925, which shows that in addition to the overwhelming lack of demand, there are also those who spend a significant amount to update their clothing. Among the columns of data there are also a few blatantly large sums, which may indicate a couple of purchased luxury items. These values can explain the deviation compared to the average, which is HUF 13,000.

70% of the respondents still live at home with their family or with the support of their parents in a dormitory or sublet. Based on this, the 187 respondents who spend zero forints on maintaining their accommodation can be explained. Although a small number, there are also a few presumably university students who pay the monthly costs of the dormitory themselves. This means HUF 30,000 on average, while the rest of them live on their own in a sublet or in their own apartment, the maintenance cost of which is relatively different based on the diagram. The number of people living in the dormitory is likely to be significant due to the recent price increases in the real estate market due to inflation.

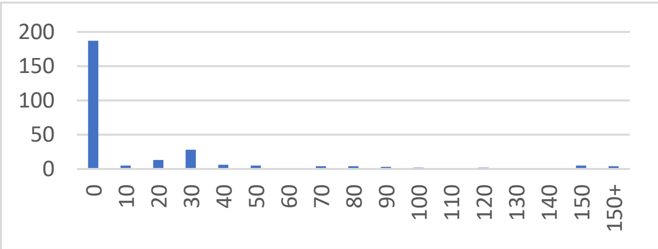

Figure 11

Accomodation

220 out of 270 respondents do not spend money on fuel at all, this can be for various reasons. The most typical may be that parking is not provided or very difficult in front of the schools, universities, and workplaces of the respondents, so they travel by using public transportation. This can also be seen from the diagram on the amounts spent on public transport, since the most common answers here are the prices of discounted monthly passes for students participating in public or higher education (HUF 3,450). Another reason could be that they don't even have a driver's license, so they don't even have a car. This can also be contributed by the fact that, due to inflation, obtaining a driver's license from the beginning of learning to the end of a successful driving test can cost up to half a million forints. In addition to all this, since a large percentage of the respondents do not even spend on real estate, it is likely that that their wallets would not even be able to maintain the vehicle. However, even those who spend on fuel spend an average of HUF 10,000-15,000, which roughly corresponds to the minimum monthly consumption.

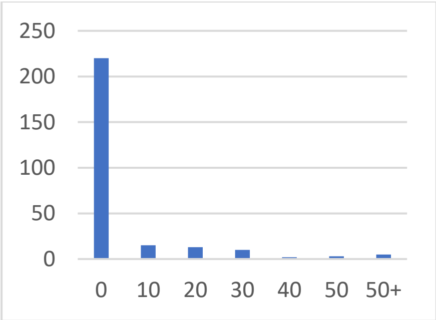

Figure 12
Petrol

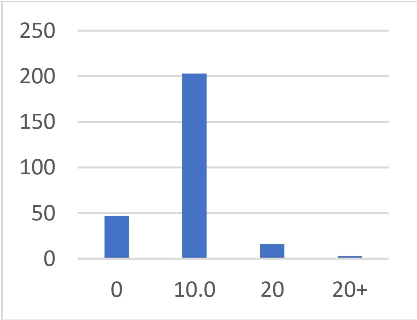

Figure 13
Public transport

The results of various electronic devices and services, as well as sports related answers, can be combined under one hat. In both cases, the vast majority of the respondents answered zero forints. This is probably due to the durability of electronics and sports equipment, as they do not pay such sums for them that we can break down over months. Furthermore, the amount of electronic services, such as telephone or internet packages, is also financed by their parents. In addition to all this, it is clear that the vast majority of respondents spend at least ten thousand forints on their leisure activities. This amount can be considered a bit high compared to the current rate of inflation, although it can easily be attributed to the lifestyle habits of young people.

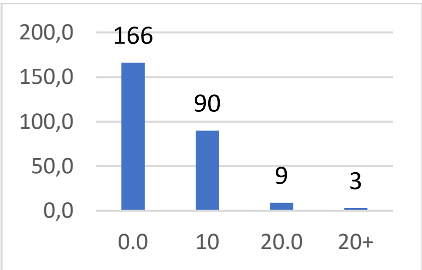

Figure 14
Phone, internet

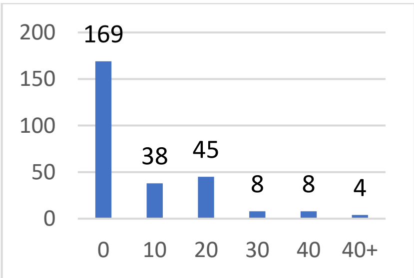

Figure 15
Sports and pastime activities

40% of the respondents have never studied economics, while 60% have. This result can be linked to the question asked at the end of the questionnaire, where, in addition to correct and realistic values, many surprising answers were received. We have asked the respondents how much economic knowledge they had on a scale from 1 to 10. As the diagram below shows, it appears that our questionnaire was not filled out by economists, no one was confident enough to write that they know economics very well.

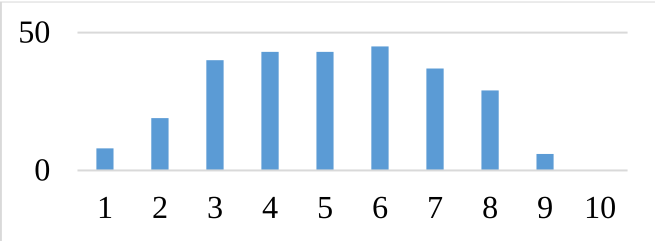

Figure 16

Economic knowledge (self reported level)

With the correlation test, we tried to find out which people guessed inflation best in their country, and we expected that it would correlate with various demographic or background variables, such as whether you have your own income or whether you work, but surprisingly, there were no significant correlations for most variables. Overall, there was a very low correlation with drug price and how much you spend in general in a month, but this correlation is 1.33 in the former case and 1.6 in the latter case, which can be considered a very weak correlation in both cases. So practically, the correlation study did not produce the results we expected.
In order to have a more in-depth understanding of the variances within our sample, we have conducted independent samples' T-test with the help of an SPSS20 program. In the coming paragraphs, only variables with significant differences will be displayed and analysed.

The first independent sample T-test examines the difference between men and women. We selected the cases in the table where there was a significant difference. There was a significant difference in his perception of the various causes, such as crime, climate change, oil, and the following consequence: GDP growth. Women thought that GDP growth was one consequence, men did not think so very often. About monopolies, oil and climate change, women thought it was typical, while men thought it was typical about criminal cases.

Table 1 Differences according to gender (male-female)

Differences according to gender (male-female)	**Difference of means**
Cause: Increase in criminal cases	,129
Cause: Climate change	-,139
Cause: Crude oil price fluctuations	-,077
Cause: Monopolies	-,201
Cause: Many abortions	,099
Effect: GDP growth	-,221

The men in the sample earned much more on average than the women. The female respondents in the sample earned an average of HUF 1,292,000 less during their lifetime than the male respondents, even though there is no significant difference between their ages. However, there is a significant difference in the ratio of the number of workers and non-workers. Men work in a higher proportion, so this is the reason for the difference, and a greater part of them are on the stock market, manage their finances alone and independently, and a greater part of them also have management skills. In fact, the fact that they have already worked, manage their finances on their own, and that they have knowledge of management can also influence the fact that they earned HUF 1.292 million more on average than the female respondents. However,with the following independent sample T-test, we examine significant differences between foreigners and Hungarians.

Table 2 Difference according to citizenship (Hungarian-foreigner)

Difference according to citizenship (Hungarian-foreigner)	**Difference of means**
Cause: Increase in criminal cases	-,340
Cause: Climate change	-,377
Cause: Increased money supply	,529
Cause: Unemployment	-,305
Cause: Many abortions	-,423
Cause: Excessive money issuance	,226
Effect: Outbreak of epidemics	-,659
Effect: Increase in product prices	,129
Effect: New inventions	-,520

There are a couple of foreigners in the sample, so we also wanted to see if there is a significant difference between them and the Hungarians. Of course, there is a difference in the level of education, as all of the foreign respondents are university students, while among the Hungarian respondents there are also high school students. Interestingly, however, foreigners have already worked in a higher proportion than Hungarians. Hungarians, on the other hand, earned radically more income on average. While domestic shoppers prefer to shop alone, foreigners spend more on food, which probably stems from the fact that most Hungarians live at home and therefore have to spend less on food. In the same way, foreigners also spend more on clothes, because because the majority of Hungarians still buy their clothes from their families. Regarding the amounts spent on sports, the proportion is reversed, because foreigners spend less than Hungarians, probably because they operate on a limited budget, and it is not certain that large-scale expenditures can fit into this. We received different answers for different reasons. Foreigners are much more likely to think that criminal matters, climate change, unemployment, and abortion are among the causes of inflation. While the Hungarian respondents believe that the increased money supply and excessive money issuance may be the cause of inflation. The opinions of Hungarians also differ from those of foreigners regarding the effects, according to foreigners outbreaks of epidemics and new inventions are among the effects of inflation, while Hungarians prefer to believe that that the increase in product prices is the effect of inflation. Both Hungarians and foreigners were asked to state how much they thought inflation was in their country, and interestingly, Hungarians gave a higher average inflation rate than the foreigners in the sample. There are foreign countries where the rate of inflation reaches up to 80%.

Table 3 Difference according to education (university-secondary)

Difference according to education (university-secondary)	**Difference of means**
Cause: Increase in criminal cases	,117
Cause: Climate change	,170
Cause: Unemployment	,286
Cause: Many abortions	,157
Effect: Outbreak of epidemics	,156
Effect: Increase in product prices	-,044
Effect: Overpopulation	,112
Effect: New inventions	,153

With the next independent sample T-test, we tried to compare the difference between students in higher education and students who have only graduated. Among those studying in higher education, for example, engineering informatics students also come across macroeconomics subjects and learn about inflation within their framework, so hypothetically they have more knowledge than those who go to secondary school.

Obviously, the level of education correlates with age, since the higher the level of education, the older someone can be. It is clear that the majority of the scholarship holders are students of the Faculty of Information Technology, as there are mostly students participating in state-funded education there. Since it is related to age, university students are more likely to have their own bank account than non-university students, and they tend to have a regular income and, of course, more often have work experience. What will be related to marital status is that more and more young people are moving away from their families and, in parallel, the value they spend on food, public transport, and entertainment will increase significantly, and overall, how much they spend on a monthly basis will change, compared to those who are still with their families. they live. This is both the real amount of the sub-expenditures and the claimed amount.

We also examined what they think about its causes and effects, and there were significant differences regarding the causes of criminal cases, climate change, unemployment, and many abortions. In all 4 cases, the university students thought it was more likely to be the root cause than the high school students, which is surprising, since they should know through their studies, that none of them belong there. Despite the answer options, which included the option of "I don't know" in addition to yes and no answers, in several cases they marked an incorrect answer and did not refrain from answering. Regarding the effects of inflation, in three cases, the university students said that it would be an influencing factor: epidemics, overpopulation, new inventions, and in one case terrorism was nominated as a potential inflationary consequence. So, in several cases, those with official economic qualifications were wrong that it would be an influencing factor: epidemics, overpopulation, new inventions, in one case terrorism was indicated as a potential inflationary consequence.

Table 4 Difference according to economic studies (not studied-studied)

Difference according to economic studies (not studied-studied)	Difference of means
Cause: Crude oil price fluctuation	,103
Cause: Unemployment	-,190
Cause: Many abortions	-,111
Effect: New inventions	-,153

Those with higher education are older and have a greater knowledge of management, at least according to their own statements, these respondents (perhaps) due to their age already prefer to work and deal with the stock market, there is a greater chance that they have their own bank account and a regular daily income, as well as work experience. Also, in terms of their monthly expenses, they indicated higher values for food, entertainment and all monthly expenses. There were significantly higher values in relation to those already studying economics and those not studying it.

We also examined what they think about the causes and consequences of inflation. Despite their economic studies, they are not aware of the actual reasons, therefore, according to the majority of them, the number of abortions and the level of unemployment can be classified among the root causes of inflation. Among the consequences was an increase in new inventions, which is also incorrect. Those who have studied economics are no more aware of inflation than those without economics, a surprising finding.

Table 5 Difference according to work experience (no-yes)

Difference according to work experience (no-yes)	Difference of means
Cause: Price increase	-,153
Cause: Increase in criminal cases	,134
Cause: Lack of supply	-,171

Cause: Increased money supply	-,229
Cause: Many abortions	,212
Effect: Unemployment	-,159
Effect: Decrease in real wages	-,158
Effect: New inventions	,120

We compared the work experience and the status of those currently working (from now on referred to as “workers”) with those who have not yet worked. The results depend on age, so it can rather be said that those doing the work have more economic knowledge. They are more likely to attend a higher education institution, and they mostly manage their finances on their own. They are less dependent on pocket money, so they have secure resources, they are more likely to have a bank account and a regular monthly income.

In parallel with their age, in accordance with their social embeddedness, they move away from their families more often, spend more on food, clothes, public transport, sports, medicine, and overall, on a monthly basis. This can be explained relatively well by their living situation. It was examined what they think about the causes and circumstances of inflation. Those who work, the price increase, they see the lack of supply and the increased money supply more among the causes of inflation.

In contrast, non-workers associate inflation with crime and abortion. This is a variable that predicts relatively well how much they perceive the effects of inflation, or at least how well they are aware of them. It is interesting that not education, but work experience was the first variable that provided a good basis for comparison. We found that the workers indicated unemployment and a decrease in real wages as the effect of inflation, while the non-workers associated it with an increase in the number of new inventions, so again our previous statement is true, that regardless of the studies, the already working full-time workers see the causes and consequences of inflation better. they see the increased money supply as one of the causes of inflation.

Table 6 Difference according to regular income (no-yes)

ifference according to regular income (no-yes)	**Difference of means**
Cause: Unemployment	-,168

The increase in age among the respondents makes the prevalence of regular incomes more likely. Older people have greater economic knowledge, so they manage their own finances, have their own bank account and work experience. Of course, their total earnings to date are considerably higher, as salaries from full-time jobs are added to these numbers. In line with what was said earlier, the monthly costs are also higher in the various segments. They spend far more on food, real estate, public transportation, gasoline, entertainment, medicine, health care, and overall than those with no income. As for the inflation factors, there was only one case where there was an outstanding difference between their answers. Unemployment, as a cause of inflation, appeared more frequently among those who have an income. Regular monthly income does not have reliable predictive power as to how well someone knows the causes and consequences of inflation.

Table 7 Difference owing to preferred method of payment (card-cash)

Difference owing to preferred method of payment (card-cash)	Difference of means
Cause: Lack of supply	,210
Cause: Climate change	,168

With the last independent sample T-test, we examined whether there is any difference between those who prefer card or cash payment. Card holders prefer to manage their finances independently, spending more on food, clothes and everything in general each month. In general, those who have bank cards belong to the older age group. There was a decisive difference between the causes of inflation in the case of two factors, which were the topics of lack of supply and climate change. The lack of supply does, while climate change cannot be classified as one of the root causes of inflation, so we cannot clearly say that it is a predictive factor. Regarding the effects of inflation, there was no significant difference at all between the two trained groups, so overall it can be said that this cannot be considered a predictive variable either.

Conclusions

In present article, we have looked into inflation, its causes and consequences with the help of international literature. We then prepared a survey with the help of the students of Óbuda University. We started with a snowball method and wanted to explore young people's knowledge of inflation. In the end, there were 270 people in our sample, of which 23 were foreigners and 247 Hungarians, but as mentioned before, the only difference between foreigners and Hungarians was that the Hungarian sample included people younger than 18, while the foreign sample did not, as foreign we addressed university students.

We examined a total of 7 factors, how much they influence people's knowledge about inflation and, surprisingly, in the case of many factors, the factor had no predictive power, such as higher education or management knowledge. So, although we expected at the beginning of our research that those who already have management knowledge, training, and subjects, will probably know what the cause and consequence of inflation are, but basically, not only were the answers not significantly better for the respondents belonging to these groups, but in addition, in many cases they gave more incorrect answers, who, according to their own admission, did not have economic knowledge or training.

We managed to identify only one variable with the help of the sample, where it is a variable with a significant and clearly good predictive power, and this is work experience. Those who have work experience achieved significantly better values in recognizing and identifying both the causes of inflation and the consequences of inflation. Hence, we can say that regardless of education, age, or economic knowledge, the relevant work experience itself is what brings people closer to the subject of inflation and its knowledge. In the future, of course, we would like to continue our research, as currently we have unfortunately managed to reach a very limited number of sources. Since the countries in the sample had very different inflation rates from a low of 7-8% to 85%, it may be interesting in the future to explore whether other factors influence the knowledge of causes and effects of inflation in countries with very high inflation.

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Assessment of the financial performance of companies included in the BET index of the Romanian stock market during the Covid-19 pandemic

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Abstract: In this paper, we intend to assess the impact of the Covid -19 pandemic on the Romanian stock market, by analyzing the financial performances of the main companies listed on the Bucharest Stock Exchange, more precisely those included in the Bucharest Exchange Trade index. Our aim was to check how resilient the companies listed on the BSE were during these difficult times of the Covid-19 pandemic. We chose the BET index because we consider that this includes a very representative basket of companies from diverse areas, such as energy, utilities, finance and banking, communication, the food industry, the medical sector and transportation. Moreover, from this diversity, we can identify if some sectors were more resilient than others.

Keywords: Stock market, financial performance, Covid-19 pandemic, ratios

1 Introduction

The Covid-19 pandemic which started at the end of 2019, and exploded in 2020, was largely viewed as a *black swan* event for human society. A black swan can be defined as an event that is rare, coming from nowhere, has massive consequences, and when it happens, can appear, retrospectively, as explainable and predictable (Taleb, 2007). Though, the same author of the book "Black Swan", stated quite clearly in several interviews that the Covid-19 pandemic was not a *black swan*, underlying that it was expected and predictable, and some people even predicted it (Avishai, 2020). Nevertheless, in whichever manner we characterize this event, disaster risk management systems, public health systems, as well as the economies around the world, in general, were challenged and stretched to the limit (Mishra, 2020).

In this paper, we intend to assess the impact of the Covid -19 pandemic on the Romanian stock market, by analyzing the financial performances of the main listed companies on the Bucharest Stock Exchange. It is well-known that the stock exchanges are often regarded like as a barometer for the economy and society. Were the stock exchanges able to predict this event or was it a *black swan* for them and they reacted only afterwards? What was their reaction after Covid-19 was confirmed in Europe and in the US, and what was their evolution during the pandemic? From the all-time high, set on February 12, 2020, at 29,551 points, the Dow Jones Industrial Average (DJIA) index dropped around 11,000 points in the next five weeks till March 23, 2020, when the index reached a low of 18,591 points, according to data from Yahoo Finance and statista.com.

Though this Covid-19 crash (over 37% in just one month and a half) was one of the worst in the history of the US stock markets, there were no previous signals on the markets to announce it, but on the contrary, the DJIA made new highs at the beginning of February. However, once the pandemic began to spread at the beginning of March and the governments from different countries started to discuss and implement the shutdowns of the economy and the lockdowns, the panic suddenly installed and led to a stock market crash that included the three worst point drops in U.S. history (Frazier, 2021):

March 9, 2020, known as “Black Monday I,” the Dow Jones Industrial Average

1. dropped 7.79% or 2,014 points;
2. March 12, 2020, known as “Black Thursday,” the Dow fell 9.9% or 2,352 points;
3. On March 16, known as “Black Monday II,” the Dow dropped even further, losing 12.9%, almost 3,000 points. It was so dramatic that the New York Stock Exchange had to suspend trading several times.

The Romanian stock market was showing a strong correlation with the US market at that time, and through the Bucharest Exchange Trade index (BET) followed a very similar scenario:

1. On March 9, 2020, Monday, the BET Index dropped 7.53%;
2. On March 12, 2020, Thursday, the BET index fell 5.15%;
3. On March 16, Monday again, the BET dropped even further, losing 9.58%.

This strong correlation between the US and the Romanian stock market can be seen very well, also, in the following two charts picturing in parallel the DJIA and the BET index (figure no.1).

Figure 1

DJIA versus BET index

Source: Yahoo Finance, Tradingview.com, Bucharest Stock Exchange

2 Materials and Methods

This paper aims to check how resilient were the most important companies listed on the BSE during this difficult time of the Covid-19 pandemic. The data that we used are from the company's financial reports sent to the Bucharest Stock Exchange and/or from the National Company Register and the Ministry of Finance. In order to better serve our analysis, we used the financial data from the last three years, including the pre-pandemic year of 2019 and then the years 2020 and 2021.

We have opted for the BET index because is the most representative of the Romanian stock market, including twenty of the most important and traded Romanian companies that are accounting for about one-quarter of the total market capitalization.

The analysis that we performed goes on two layers. Firstly, we analyzed the price evolution of the shares from the BET index, and secondly, we performed a financial analysis of these companies. For the first layer, we used mostly charts and elements of the technical analysis method. For the second layer of our analysis, we used ratios from the financial statement analysis method, both on the dynamics and on a horizontal level. The assessment of the financial performances of the companies can be achieved with the help of market ratios and profitability ratios. More precisely, we used some market ratios like the dividend yield, as well as, profitability ratios like the Return on equity (ROE) or Return on sales (ROS), in order to see how profitable these companies were before and then during the two years of the pandemic. ROE was calculated as the net profit divided by equity, and we consider that is the most relevant ratio for any investor because it shows the ability of the company to find good investments and, ultimately is showing how profitable are these investments. A high ROE indicates a good use of shareholders' capital. For the operating performance of the company, return on assets – ROA is a better measure (Brealey, Myers 2020) because it measures the profitability compared to all the assets. Another performance indicator for a company that we used in our analysis is the return on sales, which measures the percentage of revenues which is converted into profits and is calculated by dividing the operating profit by the net sales.

We have also calculated the dividend yields, to check if the analyzed companies are not just able to be profitable, but if they have enough free cash flows in order to pay out part of the profits to reward the shareholders. Measuring the cash flow can be as important as measuring the profit when we assess the financial performance of a company.

3 Results and Discussion

The Covid-19 pandemic had an impact on the analyzed companies but mostly on their market capitalization, not so much on their financial performance. While it is true that all of them suffered severe depreciation of their market values at the beginning of the pandemic in February and March 2020, most of them were not affected on their financial performance at the end of the year 2020 compared to the previous year. It is also true that, even regarding their market value, most of these companies started to rebound from their lows already from April 2020, making a very rapid and surprising “V shape” recovery (see Figure no.2). By the end of the year, recovery was already completed, and some of these shares even made new highs. Then, this upward trend continued throughout 2021 and for the beginning part of 2022, being interrupted only by the outbreak of the war in Ukraine in February this year.

Figure no.2 BET “V Shape” Recovery

Source: Bvb.ro, Tradingview.com

In what was concerning the evolution of these companies' financial performances, things were a little more nuanced during the pandemic. We analyzed their income statements and balance sheets for the year previous to the pandemic and the next two years, and then we extracted the profit and calculated the variations from one year to the other (see table no.1).

Table no.1 BET companies profits variation during the pandemic

BET Company	Net Profit 2021	Var. Δ 21/20 %	Net Profit 2020	Var. Δ 20/19 %	Net Profit 2019
TLV	1,782,703,612	49%	1,197,304,582	-26%	1,620,511,500
FP	5,012,644,707	profit	-102,978,968	-103%	3,129,870,912
SNP	2,688,416,594	95%	1,381,578,837	-61%	3,563,589,092
SNG	1,962,509,237	53%	1,278,884,673	22%	1,046,406,623
BRD	1,279,256,000	34%	951,565,000	-38%	1,528,523,000
SNN	1,036,261,626	48%	699,322,229	31%	535,667,264
TGN	186,941,472	7%	175,000,764	-50%	348,259,016
M	55,484,430	33%	41,842,280	651%	5,573,007
DIGI	325,373,400	397%	65,496,630	-67%	199,338,300
EL	321,819,884	8%	298,378,536	16%	257,774,731
ONE	40,714,517	-56%	93,001,566	114%	43,537,969
TRP	323,510,441	877%	33,104,139	242%	9,669,152
TEL	449,891	-100%	144,956,820	51%	96,030,957
TTS	32,610,965	9%	29,799,807	5%	28,399,270
ALR	35,209,984	-88%	295,206,223	-293%	-152,901,053
WINE	51,371,926	-13%	59,229,766	46%	40,473,465
BVB	8,206,560	-10%	9,118,697	31%	6,962,791
AQ	63,308,307	14%	55,737,979	1620%	3,240,306
COTE	51,928,770	-15%	60,846,759	3%	58,876,719
SFG	29,798,823	-55%	66,375,340	107%	31,998,285
Total	**15,288,521,146**	**124%**	**6,833,771,659**	**-45%**	**12,401,801,306**

Source: own calculations based on data from bvb.ro

At first glance, we can observe that only one company from the twenty analyzed had registered a loss during the two years of the pandemic. The loss was just in one year and, moreover, this company is not very relevant because it is actually an investment fund and the loss was not related to the operational activity but, partially, to some delays in dividend payments from several companies from its portfolio.

All the other companies, with no exceptions, remained profitable during the two years of the pandemic. The differences between them appear when we look at the profit variations from one year to another. Compared to 2019, 7 out of the 20 analyzed companies registered a decrease in their profits. Unfortunately, we can notice that these companies were the largest ones from the group because when we look at the sum of all the profits, we can observe that at the end of the first pandemic year, the total profits decreased severely by -45% compared to 2019. This sharp decrease in the total profits was caused, predominantly, by the national oil company that was affected by the oil price and the restricted mobility from the first half of the year, together with the two banks that were affected by the provisions they had to create for possible non-performing loans (and, by that investment fund, that we mentioned previously). The rest of the companies increased their profits compared to the pre-pandemic year. The situation improved significantly in 2021 when the total profits were 124% larger compared to 2020 and, 23% larger compared to the pre-pandemic year. Therefore, quite a spectacular recovery was seen, also in the profitability of these companies as it was anticipated by the “V shape” recovery pictured in the charts.

If we look at the next table (see table no.2), we can observe that these companies from the BET index were not just profitable, but were able to distribute significant dividends, a fact that was showing that they had also good cash-flow positions during the pandemic years. Even more, the average dividend yield increased constantly during these three years, from 2.9% in 2019, to 3.3% in the first pandemic year and to 4.6% in 2021, almost double compared to the pre-pandemic level. In absolute terms, more than half of these companies (11 out of 20) managed to pay dividends higher than 5% in 2021 compared to just seven companies in 2019.Table no.2 The dividend yields of the BET companies

BET Company		**DivY**		
Symbol	**2021**	**2020**	**2019**	Weight in BET%
TLV	5.1%	2.9%	4.8%	20.97
FP	6.1%	4.0%	5.2%	20.2
SNP	7.2%	6.6%	8.5%	16.91
SNG	7.5%	5.5%	5.1%	9.58
BRD	8.0%	0.5%	0.0%	7.55
SNN	4.4%	5.6%	8.9%	5.23
TGN	6.1%	2.9%	5.1%	3.01
M	na	na	na	3
DIGI	na	2.0%	1,9%	2.56
EL	5.1%	5.7%	6.4%	2.07
ONE	1.2%	1.1%	na	2.02
TRP	13.5%	5.9%	na	1.38
TEL	na	3.4%	2.4%	1.24
TTS	3.3%	na	na	0.98
ALR	na	na	na	0.71
WINE	5.4%	4.2%	na	0.58
BVB	3.5%	4.2%	3.2%	0.56
AQ	6.0%	na	na	0.54
COTE	9.4%	7.5%	8.3%	0.48
SFG	na	5.1%	na	0.44
Average DivY	**4.6%**	**3.3%**	**2.9%**	100

Source: tradeville. ro, bvb. ro

If we go further and calculate the return on equity for the BET companies we can observe (see table no.3) that, for the two pandemic years, more than half of the companies had an ROE greater than 10%, which is a level that investors are expecting most of the time. Furthermore, one-quarter of the companies obtained an ROE greater than 20%, and most of the values improved compared to the pre-pandemic year of 2019. The average ROE improved gradually and significantly from 10.93% in 2019 to 14.43% in 2021 and 15.40% in 2022. To make a comparison, we can look at the database created by Aswath Damodaran, from the Stern School of Business at New York University, and we can find that the average ROE at the end of 2021 in Western Europe was lower, situated at 12.39% (Damodaran, 2022). These results show again the good resilience of most of the BET companies during the pandemic and better financial performance compared to the average of the companies from Western Europe.

Table no.3 The evolution of ROE for the BET companies

Return on equity (ROE) for the BET companies

Year	2021	2020	2019
	Number of companies		
Negative	**0**	**1**	**1**
Under 10%	**9**	**8**	**10**
Between 10% and 20%	**5**	**6**	**5**
Higher than 20%	**6**	**5**	**4**
Average ROE	**15.40%**	**14.43%**	**10.93%**

Source: own calculations

Furthermore, we wanted also to check if the operational efficiency of the BET companies was affected by the pandemic. For this scope, we calculated the net profit margin by comparing the profit with the sales, and the results are presented in the table no.4. We can observe that in all those three years, just one company had a negative margin, while more than half of them, obtained each year a net profit margin bigger than 20%, level than is considered very good for almost all sectors of economic activities. If we look at the average net profit margins, the situation is even brighter, because we had levels that overpassed 30% in all these three years, even reaching a level of 48% during the first pandemic year. Looking again at the Aswath Damodaran database, we can find that these net margins are much bigger compared to those of the companies from Western Europe, where for example, at the end of 2021, the average net margin was at only 8.08%

The net profit margin for the BET companies			
Year	2021	2020	2019
Number of companies			
Negative	**0**	**1**	**0**
Under 10%	**6**	**7**	**6**
Between 10% and 20%	**2**	**2**	**2**
Higher than 20%	**12**	**10**	**12**
Average Net Margin	**33.96%**	**47.78%**	**35.11%**

Source: own calculations

These findings concerning the net profit margin are not surprising because they align with the calculated ROE levels. However, it might appear as a surprise the fact that these financial ratios were actually improving during the pandemic years. As a possible explanation, we have to take into account that we are discussing here the financial results of some of the largest and most representative companies from Romania, the so-called blue chip companies. Therefore, these good financial performances and the quick recovery, cannot easily be extrapolated to the whole economy and, especially to the small and medium-sized enterprises (which deserve a separate analysis). These blue-chip companies from the BET index benefited from the fact that they are well-known, well-established, often have a well-respected brand and have popular products and services and so on. Often these companies are market leaders or might have even some quasi-monopolies, like in the energy transport sector, to give one example. In addition, these blue chip companies can get much faster, easier and cheaper access to financing compared to other companies or to SMEs, they benefit from good liquidity in the stock market, and they are very attractive to large investors like, for example, the pension funds or sovereign funds, and bottom line, some of them might be "too big, to fail", as we saw during the financial crisis in 2008.

Conclusions

The impact of Covid -19 Pandemic on companies listed on the stock markets was very strong, at least at a psychological level. The panic was installed by the end of February and, especially in March 2020, conducting to crash in the quotations (as much as -37% for DJIA in the US for that period of time, for example). But very soon, the governments and the central banks from around the world stepped in and managed to calm the markets by pumping money into the economies, cutting the interest rates and/or keeping them close to zero and providing other financial incentives, both for companies and for the population. These measures seemed very good at that moment, therefore the markets started to rebound soon after and made a, rather unexpected, "V shape" recovery. With the interest rates very close to zero, the bank deposits and treasury bonds were completely unattractive. At the same time, with more money at their disposal due to the savings during the lockdowns and more time available, new investors came into the stock market. This trend was amplified also due to the rapid developments in the fintech area and the explosion of online trading platforms, very friendly, low-cost and easy to use, like for example Revolut, E-toro, Robin Hood, Trading 212 and so on, which additionally, determined the regular banks and the traditional brokers to offer online and cheaper trading solutions.

The situation was very much similar in Romania on the Bucharest Stock Exchange, where we saw a quite fast "V shape" recovery, after the initial selloff from February and March. These developments were possible because the stock prices became quite cheap after that market crash, while the financial performances of the studied companies remained solid with the average ROE and net profit margin even improving in 2020 compared with 2019. In line with what happened in other stock markets, the number of investors grew significantly, also in the Romanian stock market during the pandemic, from 53,550 in December 2019 to 65,637 in December 2020 and reaching a number of 81,793 investors by the end of 2021, according to a report from Fondul de Compensare al Investitorilor (FCI,2021). This was an increase of more than 50% in the two years of the pandemic. One more specific factor was added to support these developments on the Romanian stock market, namely the fact that the BSE was promoted from a frontier market to an emerging market status in that same pandemic year of 2020, by the FTSE Russel agency (Duma, 2015).

Last, but not least, all these large companies from the BET index, not just remained profitable during the Covid-19 pandemic crisis, but even more, their financial performances, reflected by the financial ratios, improved significantly, as we saw from our analysis. However, we need to emphasize again the fact that these blue chip companies, due to their size, notoriety and special positions in their markets, might not be representative of the whole Romanian economy. Therefore, we consider that a useful future research direction would be to analyze the financial performances and the Covid-19 pandemic impact on the small and medium enterprises in Romania.

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Missing values and NULL mark problems in relational databases

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Abstract: The relational approach of database management has developed a lot since its creation and also the SQL language. In spite of the fact that Codd the founding father of relational database management did a huge and nearly perfect job even without antecedents, there are some problematic points in SQL standard(s) and/or RDBMS software(s), such as the possibilities of dealing with missing values. Codd (1990) in his original book argues in favor of the necessity of introducing the I and A marks instead of the NULL mark. In this paper I'm investigating from the point of view of both theory and practice whether or not the only NULL mark is proper and enough for its purpose.

Keywords: relational database; missing values; NULL mark

1 Background

The first examples and experiments to handle larger amounts of data are nearly as old as the computers themselves. According to the first publicatons (Childs, 1968.) (Codd, 1969.) (Codd, 1990.) it is the relational approach in which case the development of the full theory was ready before developing the first database management softwares. From this point of view the relational approach is the first one, it outstrips the other, rather empirical or practical, experiments, such as the hierarchical approach.

This is quite obvious for the first database management softwares were sort of further development of file management tools. These systems didn't satisfy the requirements of a real database management system (Halassy, 1995) (Tóth, 1999)

At IBM in 1976 Codd, Chen and Date starts the SEQUEL project that becomes later the well-known SQL (Structured Query Language). (Date, 1981.) The first standards are the ANSI (1986) and the ISO (1987) ones, only for the basic commands. First standard for the pre-compilers and dynamic SQL commands is the ISO 9075:1989. The ISO 9075:1992 (SQL2) describes the extended data types and the key definitions, etc. In 1998-99 the SQL3 standard includes the recursive and object-oriented data structures as well as additional relational operations, such as the outer join, natural join, difference, intersection, etc. Catalog and schema conception is also introduced here. The date/time types are also introduced only in SQL3. (Raffai, 2003)

2 Missing values: NULL and EMPTY

2.1 Two different cases

There are two different reasons of which data elements may be missing from a database. The first case is when a whole row (tuple, record) is missing, i.e, one (or more) entity occurance is missing in spite of the fact that it ought to be present. This is *not* a problem of the relational approach, it can originate either from data modelling or operational errors or mistakes.

The other case is when the row is in the database table but there are some empty fields in that row. It means that some data elements of the given entity occurance are missing, e.g., we don't yet know the age of the respondent. This kind of missing values cause different problems to be handle and, in ideal case, solved somehow.

Data model, in general, can be defined (Halassy, 1995, 2000) as: for the *elements* of some parts of the world we name and define their important *properties* and, following given rules we describe their *contents* and *relationships*. We can conclude from this that each property has its own value in each case. At least theoretically, because sometimes we can face with problems here in practice. The expression “we describe their contents” does not necessarily mean that we know the value of the given property in all cases. What is more, it does not necessarily mean that the given property would have a value at all.

A good example for that if we assume a medical center and its adminstrative tasks. We can assume that in such a case it is important to know and register how many times (till present) the patient gave birth. The value for this property is a non-negative number, obviously. The value of this property, in different cases, can be either a positive number (doctor knows that the given lady gave births, e.g., four times yet) or it can be a definit zero (doctor knows that the given lady has not yet any children at all – significant zero). These are the simple and problem-free cases.

In addition to these two cases there are two problematic cases as well. What to do in case of a lady patient when the doctor does not (yet) know how many times she gave birth(s)? In case of a paper-based register the cell for this data element would be left empty (insignificant zero). In case of male patients the cell for this property (no. of giving births) also ought to be left empty, but the meaning of the two cases are totally different. In case of the male patients the number of giving births is not applicable (n.a.) in a traditional world. These two different cases must be distinguished somehow, e.g., for statistical reasons.

2.2 The NULL mark

SQL (and relational database management softwares) use a special NULL mark to indicate if a data element is missing. Most unfortunately we have this one and only NULL mark for the two different cases.

The technical part of the problem is that while we have empty strings but there are no empty numericals. So we can leave a string typed value empty (insert into Table1 set Field1=''; – two apostrophes and nothing between them). But there are no such possibilities for numeric types. Numerical values are always definit numbers, whithin the constraints of the given type. E.g. if the numeric type is a one-byte unsigned the possible values it can hold are between 0 and 255 (inclusive) and there are no such bit samples that could denote the "empty" case.

This problem is as old as the relational approach itself. Ullman and Widom discuss in their excellent book that NULL values are very useful in SQL in spite of the fact that they are not included in the relational approach (Molina, 1998)

Ted Codd the founder of the relational approach discusses this problem very carefully in his book. The whole Chapter 8. (Codd, 1990) is dedicated to the investigation and discussion of this problem. In addition to that Chapter 9. Response to Technical Criticisms Regarding Missing Information (Codd, 1990) deals with different critics related to this problem. Requirement 13. states that "Throughout the database, the fact that a database value is missing is represented in a uniform and systematic way, independent of the data type of the missing database value. Marks are used for this purpose." (Codd, 1990) It other words: the signal that indicates that a value is missing is *not* a value but a *mark*. Codd says that two marks ought to be used, an A mark for the applicable and an I mark for the inapplicable cases. The only NULL mark seems to be not enough for that.

2.3 NULL tautology

There are some cases when the results of some queries won't satisfy our human logic. Let's see an old example (Codd, 1990) There is a single table to store employees' personal data, including the year they were born: EMPLOYEE(<u>EmployeeID</u>, …, Year_of_birth). There are four rows in the table with the years 1939, 1940, 1940, NULL, respectively. Let's run this query on the table:

```
select * from EMPLOYEE
where Year_of_birth<1940 or
Year_of_birth=1940 or
Year_of_birth>1940;
```

In such a case the result set ought to contain all the four rows representing four employees. The value of the fourth employee's year of birth may be unknown but exists for sure and if it is not exactly 1940 we may be sure that it should be either less or more than that. According to Codd relational database management softwares ought to be able to deal with such simple tautologies.

It is also a good example for the previous point, for the difference between the case of the existing but not yet known value and the case of the value not applicable. It is obvious that each employee has a year of birth (even if we don't know it yet).

2.4 Possible solutions

The very first suggestion would be to develop the SQL standard by introducing an EMPTY mark in addition to the NULL mark. In that case the EMPTY mark could denote the insignificant zero (value exists but not yet known) while the existing NULL mark could be used for the not applicable cases. The probability of this solution seems to be very low.

There may be a technical solution as well what wouldn't need the modification of the SQL standard. If the relational database management softwares stored numerical values as text/string we would have not only empty strings but empty numericals as well. This solution won't need themodification of the SQL standard but it would mean a serious modification of the RDBMS softwares. What is more this solution would need significantly more resources for the same tasks because of the type conversions – you cannot do calculations efficiently with string like numericals.

Earlier, when I was younger and I thought I know everything better I myself suggested one of these two solutions. Nowadays I see this problem a bit differently.

If we returned to the ideas of the founding father of the relational approach, Ted Codd, and introduced the A and I marks finally, we also could eliminate the problem. If we think it over we'll see soon that this is sort of solved by having the only NULL mark. Simply we should state that the default case is the applicable one so the NULL mark can be used to denote the not applicable (inapplicable) case.

There could be a technical solution as well. Using the existing data elements of our model in most (if not all) cases we can easily find a workaround. Returning to the previous example of the number of giving births: female patients and NULL mark means an insignificant zero (value exists but not yet known) while male patients and NULL mark means the not applicable case. If necessary one could introduce an extra property for auxiliary purposes as well.

If we look at the problem from a different point of view we can find a better solution. Let's see this problem from the point of view of modelling. A good model, including data models as well, is realistic, full and minimal. If we develop a (data) model of a given part of the world in a realistic way it means that we should find the important phenomena and their important properties to describe them. In such a case the existing property of an existing phenomenon cannot be “not applicable”. In other words: if we face with a “not applicable” case it means that our model is not realistic enough. Refering to the example above if modelling a medical center in a realistic way we must make the difference between male and female patients using, e.g., subtypes: there are properties for the patients generally and there are some properites that are speicific for the male and the female patients.

Conclusions

In this paper I introduced some problems and described less or more adequate, possible technical solutions. Then I pointed out that there is a better solution of higher quality, when we deal with the problem not t the technical level but at the modelling level. The quality of models, in our case the quality of data models, is always a necessary (but not satisfactory) pre-requisit for the quality of the resulting system.

Acknowledgement

Many thanks goes to my colleagues with whom I discussed such problems so many times and first of all I'd like to send a big “Thank you” to Tivadar Karay, my brother-in-law, who, many years ago, asked me to come to Bánki College to start to teach data modelling and database management.

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Fake News Detection by Using RecurrentNeural Network

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Abstract: Along with the development of the Internet, social networks and different communication channels, people can get information quickly and easily. However, in addition to true and useful news, we must also receive false and untrue information. The problem of fake news has become a difficult and unresolved problem. In this paper, we present research results on building a tool to support the fake news detection by using RNN. Our idea is to apply text classification techniques to fake news detection. We have built a database of 4 groups of 2 topics about politics (fake news and real news) and about Covid-19 (fake news and real news). Then use deep learning techniques of RNN to create the corresponding models. When there is a new news that needs to be verified, we just need to apply the classification to see which of the four groups they label into to make a decision whether it is fake news or not. In the future, besides using classification techniques (based on content analysis), we can combine many other methods such as checking the source, verifying the author's information, check the distribution process,... to improve the quality of fake news detection.

Keywords: Fake News Detection, Text Classification, Machine Learning, Deep Learning, RNN

1 Introduction

On the Internet, especially social networking sites, there are more and more fake accounts, posting unverified information related to many topics about politics, epidemics, natural disasters, hydrometeorology, literature, superstition, false advertising, etc. This causes confusion, disturbance, and greatly affects people's daily life.

Not a new concept, "fake news" refers to purported and largely verifiable false stories that are disseminated through formal or informal media. The prevalence of fake news has increased with the recent rise of social media, especially the Facebook, and this misinformation is gradually seeping into the mainstream media. Several factors have been implicated in the spread of fake news, such as political polarization, post-truth politics, motivated reasoning, confirmation bias, and social media algorithms. It can be very persuasive and therefore it is necessary to develop strategies to identify and critically assess news we read on social media. Around the world, a particularly large wave of fake news has attracted millions of people's attention such as news related to the US presidential election in 2020, the Covid-19 epidemic and recently, news about the war in Ukraine...

Similarly, in Vietnam, fake news appears more and more and has become an unresolved social problem. To correct the above situation, Vietnam's Ministry of Information and Communications has opened a portal to receive reports, publish fake news, and launch reception channels to receive fake news. Accordingly, the portal to receive fake news notices has the domain name www.tingia.gov.vn, operated by the Vietnam Fake News Processing Center (VAFC) under the Department of Radio, Television and Electronic Information and managed by the Ministry of Information and Communications. The tasks and functions of the VAFC include: Coordinating with relevant authorities to appraise and publish fake news; Assess the trend of information sharing, large interactions to label fake news warnings; Receiving, detecting, appraising and labeling fake news; Disclosure of authentic information; Instructions on how to recognize, prevent and deal with fake news. The Center focuses on the following areas of information: policy, law; economic, financial; medical field, health products related to human health; natural disasters, epidemics; national security, social order and safety; fake accounts; phishing links; other fields (https://tingia.gov.vn).

However, the detection of fake news in Vietnam is currently done entirely manually by humans, as the VAFC's published philosophy of action "Fake news is created by humans, so only humans can recognize and processing fake news".

In this paper, we present the results obtained when researching and applying fake news automatic detection techniques and testing at VAFC to support fake news detection on Vietnamese news. The method we choose to use is based on the text classification technique by deep learning. For each topic, for example news about politics or Covid-19, we build 2 datasets, one containing fake news and the other

containing real news. Next, we train to build a feature model, and when there is a news that needs to be evaluated we will perform a classification module to lablel into the real or fake news category. This is a method of detecting fake news based on content analysis and initially applied has yielded quite good results.

The paper is organized into the following main sections: Section 2 presents a summary of some problems related to fake news detection and the reasons for this research, especially for Vietnamese language; Section 3 introduces the aim and objectives of the study, which is towards a tool to support fake news detection and implementing for Vietnamese language; Section 4 is devoted to presenting the background related to this research including the concept of fake news detection, fake news classification, and how to detect fake news by humans or automatically; Section 5 is the most important content for introducing the solution that we propose that is using deep learning classification technique based on RNN to support fake news detection; Section 6 presents the test implementation steps, results and comments; The paper ends with a conclusion, which presents the analysis of the significance of the obtained results and proposes new research directions in the future.

2 Literature review and problem statement

For Vietnamese, there are very few published studies on detecting fake news. The paper [1] presents an approach to detect fake news on social networking sites (SNS - Social Network Sites), by synthesizing linguistic features used by PhoBERT. The paper [2] presents the tasks shared on ReINTEL including three phases: initiation, public testing, private testing related to fake news. These results are very preliminary and not yet applicable.

Around the world, current research often connects fake news with terms and concepts such as scam news. The challenges of fake news research begin with identifying what is fake news. Until now, no general definition has been provided for fake news, where it is considered "an article that is intentionally false and difficult to verify" [3].

The fundamental theories of human cognition and behavior developed across various fields, such as the social and economic sciences, provide invaluable insights for the analysis of fake news. These theories may introduce new opportunities for qualitative and quantitative studies of fake news data. These theories can also facilitate the construction of plausible and interpretable models for detecting and intervening in the dispersal of fake news, which has been rarely available [4]. News-related theories reveal possible characteristics of fake news content compared to real news content. For example, theories imply that fake news is likely to differ from the truth in certain points such as writing style or statistics and emotional expressions [5]. However, these theories are difficult to implement into real-world software/systems that automatically detect fake news.

Currently, some scientists have proposed the application of neural network models and deep learning (Deep Learning) for fake news detection and have obtained some results [6][7]. Furthermore, researchers have combined many models and methods to improve the quality of fake news detection. Combinations of CNN- RNN have been shown to be successful in a number of classification and regression tasks, as they are capable of capturing both local and sequential characterization of the input data. For example, they have been used to detect emotions [8] or to extract features by combining models [9].

In summary, compared with Vietnam, the world has conducted research on detecting fake news in recent years and initially proposed some solutions and models with good results. However, the identification and detection of fake news is still a big mystery to be discovered, is a new research direction of artificial intelligence.

3 The aim and objectives of the study

The aim of this study is to develop a tool to assist in detecting fake news for Vietnamese news.

To achieve this aim, the following objectives are accomplished:

- Proposing a solution for detecting fake news for Vietnamese based on research, analysis and evaluation of methods currently being applied to other languages.
- Creating a dataset to serve research on detecting fake news for Vietnamese. This dataset includes real and fake news that are classified by humans and pre-labeled for modeling and testing.
- Building a tool to support fake news detection for Vietnamese based on deep learning.
- Proposing new research directions in the field of fake news detection in general and for detecting fake news in Vietnamese in particular

4 Background

4.1 The concept of fake news

Building a data warehouse for testing, we identify fake news based on the Oxford dictionary definition as follows: "False information that is broadcast or published as news for fraudulent or politically motivated purposes" (https://www.lexico.com).

4.2 Classification of fake news

Typical cases of fake news include deceptive advertising (in business and politics), government propaganda, original edited or misused images, fake documents, fake maps , Internet fraud, fake websites and untrue Wikipedia entries, etc. Fake news can cause significant harm if people let it lie. To address this threat to information quality, we first need to understand exactly the types of fake news.

There are many studies on fake news and fake news classification, one of the most referenced and cited reports on fake news classification is by Claire Wardle and Hossein Derakhshan [10]. They therefore introduce a new conceptual framework for examining information disorder, identifying the three different types: mis-, dis- and mal-information. Using the dimensions of harm and falseness, they describe the differences between these three types of information:

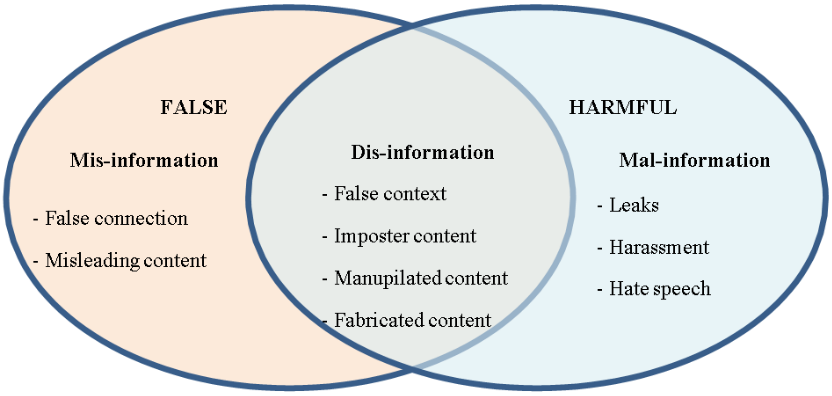

Figure 1

Classification of fake news

- Mis-information is when false information is shared, but no harm is meant.
- Dis-information is when false information is knowingly shared to cause harm.
- Mal-information is when genuine information is shared to cause harm, often by moving information designed to stay private into the public sphere.

4.3 Detecting fake news by humans

Before researching and developing an automatic fake news detection system, we can take a look at the methods that people use to detect fake news. There are many ways for us to detect fake news and this depends on many factors such as knowledge, experience, analytical skills, judgment ability, critical thinking,... [11].

Below, we summarize some common ways that people use to detect fake news online:

1) Check the source: Check the web address for the page you are viewing or where the content is distributed. Sometimes, fake news sites may have typos in their URLs or use less common domain name extensions like ".infonet" or ".offer".

Determining the source of the distribution of content will help assess the credibility of the content.

2) Check the author: Research on authors to see if they are trustworthy, e.g. if the author is real, does the author have a good reputation, does the author write about a particular area of expertise of distributed content? In particular, consider what the writer's motives might be.

3) Check other sources: Did the media or other reputable organizations cover this story? Check the reliable sources cited in the story? Professional news agencies around the globe have editorial guidelines and plenty of resources for fact-checking, so if they're also reporting the story, that's a good sign.

4) Maintain critical thinking: A lot of fake news is cleverly written to provoke strong emotional reactions like fear or anger to manipulate readers. Maintaining critical thinking by asking yourself: Why was this story written? Is it promoting a particular cause or agenda? Is it trying to make us visit another website?

5) Check the fact: Credible news stories will include lots of facts like data, statistics, quotes from experts, etc. If these are missing, ask why? Reports with false information often contain incorrect dates or altered dates, so it's a good idea to check when the article was published and the logic of the content.

6) Check the comments: Even if the article or video is legitimate, the comments below can help us find the truth. Note, links or comments posted in response to content may be automatically generated by network robots or people hired to deliver misleading information.

7) Check personal bias: We are all biased and should avoid letting bias overwhelm reason when evaluating content. Social media can create feedback chambers by recommending stories that match an individual's browsing habits, interests, and existing views. The more diverse sources and perspectives we read, the more likely we are to draw accurate conclusions.

8) Check if it's a joke: Satire sites are common, and it's not always clear whether a story is just a joke or parody. Check the website and author of the article to see if they are known for their satire or humorous stories to understand the true nature of the content.

9) Check the authenticity of the image: The illustrations we see with the content may have been edited or manipulated. Possible signs include warping where lines in the background now appear wavy, strange shadows, jagged edges, or skin tones that look too perfect. Also keep in mind that an image can be accurate but simply used in a misleading context. We can use tools like Google's Reverse Image Search to check where the image originated from and if the image has been altered.

For humans, depending on skills and analytical ability, we can combine all the above factors to come to a decision whether a news report is trustworthy or not.

However, for computers to do all of the above, it still takes a long time to research and develop tools that can completely replace humans.

4.4 Automatic detection of fake news

Manually detecting fake news usually involves all the techniques and processes that one person can use to verify news. However, the amount of online data generated daily is overwhelming. Furthermore, information spreads so quickly online that manual checking quickly becomes inefficient and impractical. Manual testing has the greatest difficulty when scaling the verification due to the large volume of data generated and fast. Therefore, the task of automatic detection of fake news is an urgent and important need.

An automatic fake news detection system will help verify whether a news is fake or real without direct human intervention. There are different techniques and approaches used in fake news detection research. These techniques and approaches depend on the developer's point of view and tracking goals.

5 Proposal solution

Within the scope of this paper, we present our proposed solution to detect fake news on news articles written in Vietnamese and based on text classification techniques by deep learning, specifically by RNN.

5.1 Text classification

The problem of text/document classification can be stated as follows [12]: give a set of documents D={ d1, d2, ..., dn }, di is the ith document and class set C= {c1, c2, ..., cm}, cj is the jth class. The purpose of the problem is to identify and assign the text di into the class cj.

The objective is to find the function

$f\colon D \times C \rightarrow \{True, False\}$

Inside:

– f(di,cj)=True, if the document di belongs to class cj

– f(di,cj)=False, if the document di does not belong to class cj

There are many cases of text classification such as binary classification (just need to determine a text belongs/does not belong to a given class), multi-layer classification (a text belonging to a certain class in the list of given classes), multivalued classification (a text can belong to more than one class in the list of given classes).

If there are 3 classes c1, c2, c3 then we will have the combination (c1, c2), (c1, c3), (c2, c3). If there are n classes, there are n*(n–1)/2 combinations.

Example:

There is text d through a combination (c1, c2)→c2; d through a combination (c1, c3)→c3; d through a combination (c2, c3)→c2; → d belongs to class c2 because the result is that c2 which it appears most often.

5.2 Proposed model

The general model of this approach is as follows:

- The first step in this model is the data collection phase to build the training datasets. This datasets includes news that have been labeled as fake or real. In the case of supervised learning, all the data used for training must be labeled, in the case of semi-supervised learning, both labeled and unlabeled data.
- The preprocessing stage allows natural language processing techniques to be used to clean the data, remove unhelpful information, and represent the data.
- Training stage allows to extract the necessary linguistic features to create models for content classification and identification. On the basis of the extracted features, perform training according to the selection algorithms to build feature models. This model will be used for predicting whether a news report is fake or real.
- The prediction phase has the function of comparing the features of the news to be verified with the feature model created in the training phase to decide whether the news is fake or real.

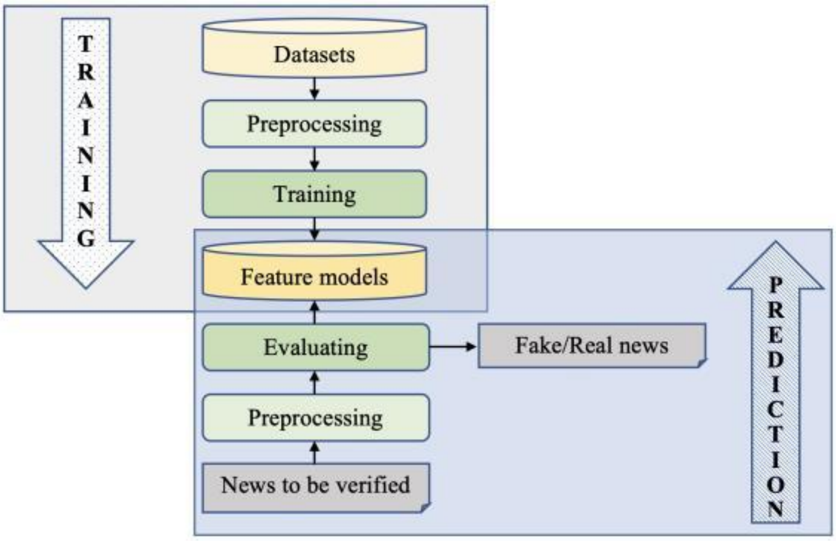

Figure 2

Fake news detection process model

5.3 Classification by using RNN

RNN (Recurrent Neural Network) is an algorithm that has received a lot of attention recently because of its good results obtained in the field of natural language processing [13].

The main idea of RNN is to use sequence of information. In traditional neural networks all inputs and outputs are independent of each other, that is, they are not chained together. This model is not suitable for many problems. For example, if we want to guess the next word that may appear in a sentence, we need to know how the previous words appear one after the other (recurrent) because they perform the same task for all elements of a sequence whose output depends on previous calculations, in other words, RNNs are capable of remembering previously computed information. In theory, the RNN can use the information of a very long text, but in practice it can only remember the previous few steps.

The RNN is designed as Figure 7. As shown in the previous section, neural network consists of 3 main parts: Input layer, Hidden layer and Output layer. We can see that the input and output of this neural network are independent of each other. Thus, this model is not suitable for string problems such as description, sentence completion, etc., because subsequent predictions such as the next word depend on its position in the sentence and the words before it.

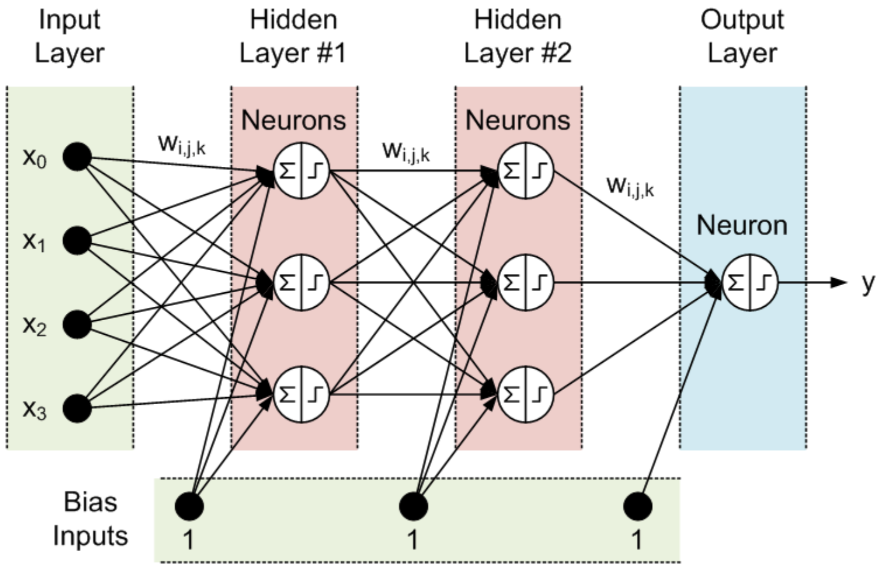

Figure 3

Architecture of RNN

Therefore, RNN was born with the main idea of using a memory to store information from previous computation steps so that based on it, it can make the most accurate prediction for the current prediction step.

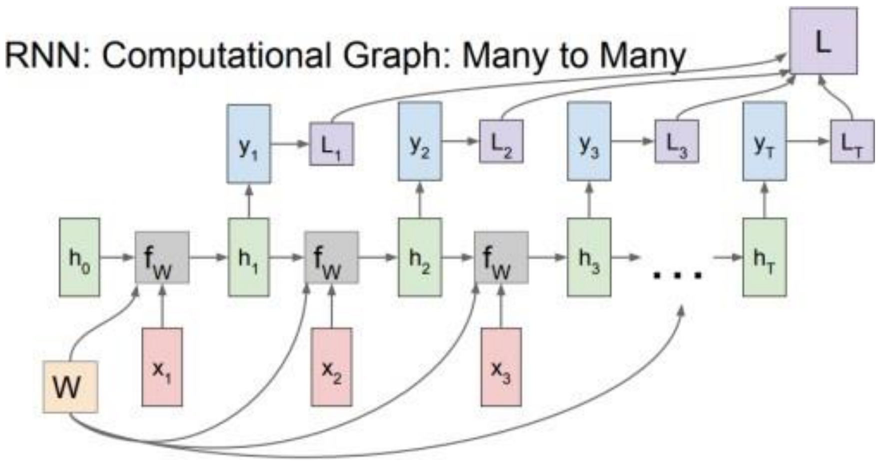

Figure 4

RNN for Many to Many

If the Neural Network is just input layer x going through hidden layer h and results in Output layer y with Full Connected between layers. In RNN, input xt will be combined with hidden layer ht-1 by fw function to calculate the current hidden layer ht and the output yt will be calculated from ht. W is the set of weights and it is obtained in all clusters, the L1, L2,..., Lt are the loss functions which will be explained later. Thus, the results from previous computations have been "remembered" by adding ht-1 to calculate ht to increase the accuracy of current predictions. Specifically, the calculation process is written in mathematical form as follows:

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$h_t = \tanh(W_{hh}h_{t-1} + W_{xh}x_t)$

$y_t = W_{hy}h_t$

At this point, 3 new things appear: W_{xh}, W_{hh}, W_{hy}. For NN using only a single weight matrix W, for RNN it uses 3 weight matrices for 2 computations: W_{hh} combined with "pre-memory" h_{t-1} and W_{xh} combined with x_t to calculate "current step's memory" ht from there combined with Why to calculate y_t.

Thus, RNN is a specialized neuron-based method that is effective in sequential information processing. An RNN recursively applies a computation to every instance of the conditional input sequence based on previously computed results. These sequences are usually represented by a fixed-size vector that is supplied sequentially (one by one) for a periodic unit. The following figure illustrates a simple RNN framework below.

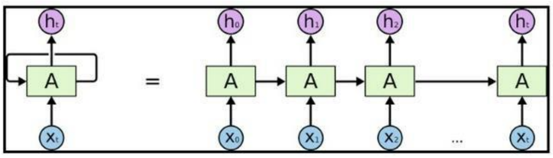

Figure 5

Frame of RNN

The main advantage of an RNN is its ability to remember the results of previous

calculations and use that information in the current computation. This makes RNN models fit the context-dependent model in inputs of arbitrary length to produce an appropriate layout of the inputs. RNNs have been used to study various NLP tasks such as machine translation, image annotation, and language modeling, among others.

When compared with the CNN model, the RNN model can have similar or even better performance at natural language processing tasks.

6 Experiment

To build and test Vietnamese fake news detection software, we follow these steps:

- Data preparation (including training data and data for testing the evaluation);
- Data preprocessing;
- Model building (through training to model and refine);
- Build software and test to evaluate text as fake news or real.

1) Data preparation

To prepare training as well as testing data for fake news detection, we downloaded news from Vietnamese government websites (assuming they are real news) and news from anti-communist opposition websites (assuming these are fake news sites).

We divide downloads into 8 categories:

Table 1.
Data used for testing fake news detection system

N°	Category	Number of files
1	Real political news (for training)	500
2	Political fake news (for training)	500
3	Real news related to Covid-19 (for training)	500
4	Fake news related to Covid-19 (for training)	500
5	Real political news (for testing)	100
6	Political fake news (for testing)	100
7	Real news related to Covid-19 (for testing)	100
8	Fake news related to Covid-19 (for testing)	100

Each news contains about 1000-2000 words and the size of each file is about 5KB on average.

2) Data preprocessing

First of all, we need to remove special characters in the original text such as periods, commas, opening and closing brackets,... by using *Gensim* library. Then we will use *PyVi* library to separate Vietnamese words. A special feature in Vietnamese text is that a word can be combined by many different languages, for example: chính_trị, xã_hội... different from English and some other languages, the words are separated. We will import the necessary libraries to process the data:

```
from pyvi import ViTokenizer, ViPosTagger # Library NLP forVietnamese
from tqdm import tqdm
import numpy as np

import gensim # Library NLP of Python
```

The command `lines = gensim.utils.simple_preprocess(lines)` is used to process the deletion of special characters and the command `lines = ViTokenizer.tokenize(lines)` is used to separate words in Vietnamese documents. The results achieved at this stage are "clean" documents in the form of TXT.

3) Text vectorization

To convert text into a vector, we will convert each word in the dictionary into an element of an n-dimensional vector, using the Bag-of-words algorithm. In this model, each document will be represented by an n-dimensional vector (n is the number of words in the dictionary used). In which, if the text contains the word corresponding to the dictionary, the vector element carries the frequency of occurrence of that word in the text, if it does not appear, the value is 0. Here we will continue to use the *Gensim* library:

```
from gensim.models import KeyedVectors

dir_path = os.path.dirname(os.path.realpath(os.getcwd()))
word2vec_model_path = os.path.join(dir_path, "Data/vi/vi.vec")
w2v = KeyedVectors.load_word2vec_format(word2vec_model_path)
vocab = w2v.wv.vocab

wv = w2v.wv

def get_word2vec_data(X):

      word2vec_data = []

      for x in X:

            sentence = []

            for word in x.split(" "):

                  if word in vocab:

                        sentence.append(wv[word])

            word2vec_data.append(sentence)

      return word2vec_data

X_data_w2v = get_word2vec_data(X_data)

X_test_w2v = get_word2vec_data(X_test)
```

Thus, we have converted all training and testing documents into vectors. From here, we can use them for Deep Learning models for text classification.

4) Model building and evaluation

To test the construction of RNN models as well as evaluate the classification on the evaluation datasets, we used Keras. Keras is a model-level library, providing high-level building blocks for developing deep-learning models. It doesn't handle low-level operations such as tensor manipulation and differentiation. Instead, it relies on a specialized, well-optimized tensor library to do so, serving as the backend engine of Keras [14].

For example, to create custom models, we only need to adjust the parameters when building the model:

```
model = Sequential()
model.add(layers.Embedding(input_dim=vocab_size,

output_dim=embedding_dim, input_length=maxlen))

model.add(layers.GlobalMaxPool1D())

model.add(layers.Dense(10, activation='relu'))

model.add(layers.Dense(1, activation='sigmoid'))
```

To test the classification on datasets, we just need:

```
history = model.fit(X_train, y_train,

epochs=50, verbose=False,

validation_data=(X_test, y_test), batch_size=10)
```

5) Results and comments

Based on the classification results of the messages used for testing in the comparison between CNN and RNN models, the correct classification results for the newsgroups are as follows:

Table 2.
Experimented results on CNN and RNN

Nº	Topics	Correct ratio	
		CNN	RNN
1	Real political news (for testing)	85 %	89 %
2	Political fake news (for testing)	86 %	88 %
3	Real news related to Covid-19 (for testing)	80 %	82 %
4	Fake news related to Covid-19 (for testing)	81 %	82 %

Through the test results, we observed:

- The detection of fake news through content analysis for classification based on deep learning is positive, but the results are not high. In particular, the classification is mainly based on word usage and writing style rather than on the intention of the writer. Using only content-based classification makes it difficult to tell if it is fake news or not.

- RNN is a well-suited model for natural language processing because its iterative structure is well-suited for variable-length text processing. The RNN-based text classification method improves the accuracy of text classification to a certain extent, however, it still has some shortcomings and can be improved. During neural network training, how to efficiently tune the parameters in each algorithm is a matter that needs to be studied further.

Conclusion

Fake news is a global problem, not specific to any one country. Identifying fake news is very difficult and so far, scientists are focusing on research to have better solutions. In particular, research on detecting fake news for Vietnamese is an urgent issue, but the research results are still very limited.

In this paper, we present a solution to apply deep learning technique of RNN to support fake news detection for 2 fields of politics and news related to Covid-19 in Vietnamese. For testing, we built a dataset with 2000 news for training and 400 for testing. Fake news detection simply uses text classification to see if a news is classified as fake news or true news. The detection/classification rate is over to 80%. Classification rerult depends on the topic, for example political news results are often higher than Covid-19 news.

In the future, issues that need to be researched to improve the quality of fake news detection may include the following main directions: 1) Combining multiple evaluation forms such as checking the source, verifying the author's information , check the distribution process, ... besides just analyzing the content; 2) Study how to update the model through continuously updating the training data warehouse as more content is generated every day; 3) Continue to propose new methods and improve the existing ones towards the application of deep learning and Big Data techniques.

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Explorative study of the quantum research groups in Hungary

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Abstract: According to the market forecast of P&S Intelligence (2020), the quantum computing market is supposed to surpass 65 000Million USD by 2030, hence is one of the most rapidly growing industries of the 21st century. In line with this, after shortly presenting the basic quantum phenomena that revolutionaries the IT world and providing an overview of the international quantum industry, I will introduce a research that aimed to explore the Hungarian quantum sphere.
To explore the situation, I use both secondary and primary research. In the framework of the secondary research, I collect information about the players in the Hungarian quantum field, and then in the framework of primary data collection, I explore their opinions about the current state of affairs and the future prospects. Since our aim is to understand the prevailing thoughts and attitudes of the players, our investigations were initiated form an interpretative viewpoint and the data and results presented in the paper are also rather descriptive than indicative or prescriptive by nature.

Keywords: quantum computer;, hungarian research group;, quantum; research

1 Introduction

According to the market forecast of P&S Intelligence (2020), the quantum computing market is supposed to surpass 65 000 Million USD by 2030, hence is one of the most rapidly growing industries of the 21st century. With quantum physics, a completely new world has opened up to the eyes of researchers, which requires a completely new worldview to explore and understand.

The classical physics of Newton, Galileo and even Einstein had one thing in common: all physical quantities could not only be measured, but also their subsequent changes over time could be calculated with any degree of accuracy. The behaviour of any complicated system and the movement of bodies of any mass and size could in principle be predicted in advance. Quantum mechanics shows us a completely different system of laws governing the world. The first micro-objects they examined - atoms, electrons and photons, which categorically did not want to behave in a classical way - forced physicists to radically change the methods of describing natural phenomena. In classical natural science, great difficulties arose during the explanation of many phenomena. The understanding that the microcosm lives according to special laws was developed gradually and with great difficulty, since these laws were very unusual.

Measurement problems in quantum mechanics will no longer be problems if we understand that the world does not have to be described by a single universal approach. This means that following the path marked by quantum mechanics, one can understand all the amazing richness and uniqueness of the structure of the surrounding world. it was formed gradually and with great difficulty, as these laws were very unusual.

2 Quantum computers

Until the appearance of quantum computers, quantum was only a special field of physics, where new discoveries could be made mostly with the help of theoretical models. However, by the 1990s, technological progress made it possible to study quantum physics phenomena not only in theory, but also in practice. A quantum computer can be created in many ways with the help of different parts with their own spin. The importance of self-spin can be derived from the foundations of quantum physics. However, the type of particle used to create a computer operating on the quantum principle depends mostly on the design of the operating conditions and the control process (logic gates). Some particles only show the properties required for quantum calculations in extreme environments,

There are three main types of quantum computers, those working with quantum annealing, analogue quantum simulators and universal quantum computers. Quantum annealing uses tempering, a process used in metallurgy, within the framework of which the system is able to find the lowest energy state, the global minimum (adiabatic calculation method). It is effective for solving problems for which researchers are still trying to discover the most efficient configurations among multiple combinations of variables. However, quantum annealing is the least efficient and narrowest use of quantum computing technology and is most suitable for optimization calculations. (Buisnesswire, 2022)

Analog quantum simulators, on the other hand, can help solve physical problems that are far beyond the capabilities of classical systems. Analog quantum simulators can therefore also be considered as an extension of continuous variable computing, which also include stochastic, non-uniform circuit elements, making it possible to support a wider range of engineering tasks associated with technological development, such as the approximation of stochastic maps and neural networks and new forms of intelligent control. Quantum simulators can model even the most difficult biochemical problems, such as simulating protein folding. With their help, researchers will be able to test which drugs can be used for treatment. However, in order for all of this to be possible, analogue quantum simulators still need to be developed in three areas: (1) system-level information technology, algorithms, and architectures; (2) methods for dealing with decoherence, separation, and dissipation; and (3) basic device design, including modelling, required to build large quantum systems (Werbos, Domatova, 2016).

The most commonly used quantum computers are the most difficult to build. The goal behind general purpose computing is to get a machine to solve any complex computational problem and still get the best solution quickly (IBM, 2019; Orhan, 2021). The downside of the technique is that such a system would have to be able to handle nearly one million qubits, compared to current systems with a maximum of a few hundred (Brainstormingbox, 2020).

Quantum computers are also grouped in terms of the physical implementation of qubits; according to which there are systems affecting individual photons, trapped ions, superconducting circuits, semiconductor quantum dots, individual defects in diamond, individual atoms in silicon, carbon nano-spheres behaving like metals, and inorganic crystals contaminated with rare earth ions (Ladd et al., 2019). In addition, there are specially designed systems (logic gates), such as the system using isotopically enriched silicon (Veldhorst et al, 2015).

Based on the quantum technology timeline of the MTA (2018) WIGNER Physics Research Center, the challenges of the present age go beyond the creation of quantum technology and the creation of systems. The task of the present and the future is to develop systems and applications that can improve the lives and living conditions of everyday people.

Therefore, the most reliable quantum computers represent only one segment of the challenges facing quantum computing. In this area, in the next few years, it is necessary not only to create new quantum computer algorithms, but also to create a small-scale quantum processor capable of solving technologically relevant problems. In addition to all this, it is essential to create a logical quantum bit protected by topological quantum error correction. According to WIGNER's forecast, only medium-term (5-10 year) plans include the development of quantum computers capable of solving chemical or material science problems, and the development of general-purpose quantum computers that exceed the computing capacity of classical computers can only be set as a long-term goal.

In addition to computers, quantum physics research will also be able to bring new things in the fields of sensors, simulators and communication. At the moment, research is focused on the development of the most accurate target devices necessary for quantum measurement, possibly on the development of atomic clocks. In the future we can expect a much wider spread of quantum sensors, the spread of quantum portable navigation devices, or even a more accurate mapping of the earth's magnetic field with quantum sensing, or creation of quantum sensor systems integrated into consumer devices.

At their current level of development, the simulators can be made capable of modelling the movement of electrons in solids, but the goal is to create new, versatile simulators that are suitable for examining magnetism, electricity and other elementary phenomena, as well as the creation of quantum simulators that enable the action mechanism and dynamics of chemical reactions investigation.

In the field of communication, the creation of signal stations (quantum signal repeater technology) is of most concern to specialists, as well as the possible ways of implementing quantum encrypted communication. However, future application possibilities include a quantum protected credit card, a quantum encrypted signal repeater and a system that detects its eavesdropping, as well as quantum encrypted communication connecting distant cities, or even a quantum pan-European network.

3 The quantum community

Today, many universities, research centres, companies and communities deal with the quantum topic. There are some for hardware design, some for creating simulations, some approach it from the direction of the programming environment or encryption problems. Accordingly, there are many types of groupings and related rankings. The Quantum Insider (Swayne, 2022) ranked the best universities in its April article, according to which the following institutions (university research centres) were included in the top 12 in order:

1. The Institute for Quantum Computing — University Of Waterloo
2. University of Oxford
3. Harvard University — Harvard Quantum Initiative
4. What — Center for Theoretical Physics
5. National University Of Singapore And Nanyang Technological University — Centre For Quantum Technologies
6. University of California Berkeley
7. University of Maryland — Joint Quantum Institute
8. University of Science And Technology Of China (USTC) - Division Of Quantum Physics And Quantum Information
9. University of Chicago — Chicago Quantum Exchange (CQE)
10. University of Sydney — Australia
11. Quantum Applications and Research Laboratory at LMU Munich (QAR-Lab)
12. University of Innsbruck – Quantum Information Computation

Unfortunately, the ranking criteria were not specified, so the list can be considered somewhat arbitrary.

CEOWorld (Miller, 2019), on the other hand, ranked countries in 2019, not individual organizations, based on a clear criterion – amount invested in quantum research. The leading countries in the list were then:

1. USA
2. Canada
3. Germany
4. France
5. United Kingdom
6. The Netherlands
7. Russia
8. China
9. South Korea
10. Japan

Not only have 3 years passed since the list was created, but the pandemic and the Russian-Ukrainian war may have significantly redrawn the balance of power.

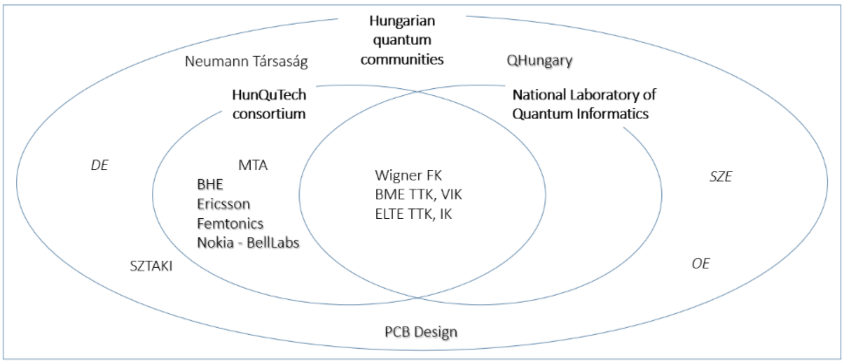
According to Business Magazine's 2021 list, the following 10 companies are at the top of the global quantum rankings today. The list includes not only computer technology companies that look back on a longer history and also deal with traditional ICT devices, but there are also players such as D-Wave or Rigetti, which only appeared on the market at the same time as quantum computing, proving that that although the development and research of quantum computers is a resource-intensive and, of course, time-consuming task, the smaller players do not necessarily have to be left out of the process either.

1. Microsoft Quantum Computing
2. Google AI
3. IBM Quantum Computing
4. D-Wave Systems
5. Intel Quantum Computing
6. Hewlett Packard: Quantum Information Processing
7. Toshiba Quantum Information Group
8. Alibaba Quantum Computing Laboratory
9. 1QB Information Technologies
10. Righetti: Quantum Computing

4 The Hungarian quantum community

Although Hungary was not included in CEOWorld's previously introduced list, this does not mean that there is no relevant research in our country. The purpose of this chapter is to present the biggest Hungarian actors.

Although the size of the Hungarian quantum community is not yet decisive, it already includes many research sites and small and large manufacturing companies. The most significant of these is the HunQuTech quantum technology consortium.



The HunQuTech consortium is an umbrella organization of outstanding domestic research groups, which enables domestic research and development communities to participate in the development of quantum technologies. The purpose of the consortium is to produce, share and create a quantum information network (MTA, 2018)

The common goal of the members is to realize the technological potential. In this context, the research group is attempting to create a single-photon source and an entwined photon pair source, which is essential for secure communication guaranteed by the principles of quantum mechanics. In addition, quantum physics research requires the creation of one- and two-bit quantum logic gates, as well as a measuring device capable of optically detecting magnetic resonance. The plans also include the creation of a quantum communication system and quantum memories based on various physical principles. The goal of the systems is the development of new algorithms and the efficient simulation of quantum physics systems.

In accordance with the provisions of the 2016 Quantum Manifesto (QUROPE, 2016), the consortium strives to make Europe, and of course Hungary, an active player in the second quantum revolution unfolding worldwide, to develop a competitive quantum industry and quantum research potential; create a knowledge-based industrial ecosystem. However, this is not just a self-serving process. The goal is to increase the efficiency of critical infrastructures and basic processes – energy, health care, safety and environmental protection – which enable effective management of the new problems of the changing world. In addition, not only academic, but also industrial members are strongly interested in making Hungary an attractive destination for innovative enterprises and quantum investments,

Among other things, the consortium is also responsible for the National Quantum Technology Program launched in 2018, which was launched with a grant of 3.5 billion from the state.

The National Laboratory of Quantum Informatics, which was established with the cooperation of ITM and NKFIH with the support of Hungarian physicists, engineers, mathematicians and computer scientists, also set the goal of domestic quantum development. The research areas (as well as the members) overlap with those previously presented in connection with HunQuTech. The goal of the National Laboratory is to create elementary building blocks for quantum informatics, and then use them to create a quantum communication network suitable for quantum calculations and simulation of quantum systems. The leader of the consortium is the Wigner Physics Research Center, the other members are the Budapest University of Technology and Economics and the Eötvös Loránd University. The Laboratory hosts many theoretical and practical projects. Its current projects based on the website (qi.nemzetilabor.hu/hu/projektek):

- The interaction of quantum computing and classical informatics
- Atom-photon interface
- Development of a single-photon source at telecommunication wavelengths
- Semiconductor-superconductor hybrid quantum bit
- Development, testing and qualification of quantum computing resources for quantum algorithms and quantum computing architectures
- Theoretical analysis of quantum communication tasks
- Quantum random number generator
- Quantum computer emulator laboratory
- Development of intelligent memory networks operating in the quantum domain
- Topological spin structures applicable in magnetic data storage
- Construction of an optical quantum informatics laboratory
- Development of optical fiber quantum network
- Optimization algorithms, quantum machine learning and the application of artificial intelligence in quantum computing
- Entangled pairs of photons at telecommunication wavelengths
- Post-quantum cryptography
- Spin-photon interface
- Creation of a free-air quantum network
- Software technology for programming quantum computers
- Creation and manipulation of telecommunication wavelength compatible quantum bit storage
- Numerical simulations based on tensor factorization for complex quantum systems

The projects have resulted in numerous international publications in the past short time, 18 in 2021 alone.

Of course, quantum computing and related research are not only organized in consortia. Many smaller companies and groups work on related topics and technologies. Based on the data of doktori.hu, 7 doctoral schools of 4 universities in Hungary deal with quantum topics, of which only one is a member of the above umbrella organizations (doktori.hu). The University of Debrecen Doctoral School of Physical Sciences has the most topics related to quantum, however, BME, which also plays a role in HunQuTech, is represented by two doctoral schools, and the University of Szeged is also represented by two doctoral schools. Of course, the above list does not mean that quantum research is not taking place in other higher education institutions, only that they do not appear in the doktori.hu database.

5 Research

After trying to identify the members of the Hungarian community with the help of secondary data, I also carried out a primary research in order to be able to not only identify the actors, but also understand their motivations and their attitudes towards quantum computers.

I have conducted a research with interpretive approach using targeted (convenience) sampling (HunQuTech, National Laboratory of Quantum Informatics, University of Debrecen). I tried to reach as many members and participants of the quantum community as possible to help us present the Hungarian quantum community and introduce us to their point of view.

Accordingly, I try to present two different views in this paper, one is the manufacturer's perception of the situation, the other is the researcher's approach. The approach from the researcher's side - perhaps because quantum as a topic can be researched and examined from more than one way or direction - is more fragmented. There are those who focus on the physical implementation, and there are also those who focus on theoretical models, or algorithms and programming.

Since the quantum community seems to be a well-defined community in Hungary, the sampling procedure was targeted sampling. In the first round of inquiries, I initiated contact with HunQuTech on the one hand and the Hungarian National Laboratory on the other, but since these two are intertwined, the Wigner Laboratory, which is the main player in the Hungarian quantum community, was the recipient of the inquiry in both cases. This research centre fulfils the role of coordinator in both umbrella organizations and is also the scene of significant quantum physics and IT research. Based on these reasons, I conducted most of the interviews physically at Wigner. Overall, in addition to physical interviews, it was also possible to organize an interview online and obtain answers.

5.1 Community of researchers

From what was presented in the theoretical part, I already knew that among the doctoral schools: the BME, Doctoral School of Informatics and Géza Pattantyús-Ábrahám Doctoral School of Mechanical Sciences, the PTE Doctoral School of Chemistry, the SzTE Doctoral School of Mathematics and the Doctoral School of Theoretical Medicine, but mostly the The Doctoral School of Physical Sciences of the Faculty of Informatics of the University of Debrecen deals with quantum topics. That is why I contacted Prof. András Kruppa, a member of the Doctoral School of the University of Debrecen, at the suggestion of Prof. György Bazsa, which is a targeted sampling procedure. Furthermore, used a snowball process, - the starting point of which was the two main umbrella organizations and the University of Debrecen - and I asked all the research participants to share the questionnaire and send the email addresses of the people they suggested.

I was able to reach a total of 14 people in the interview. All of the respondents agreed to use their data with their names, except for one person, so I will refer to this person as Anonymus, and the others by their own names.

It is interesting, and perhaps also characteristic of the topic, that all the respondents are men, and there is only one female respondent in the sample, I could also observe this phenomenon when I visited the Wiegner Laboratory, that there are very few women working in this field.

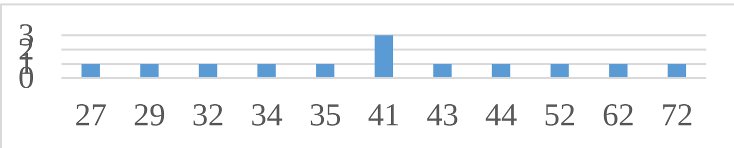


Figure 1

Distribution by age

The age of the interview subjects varies. The average age of the respondents was 42.5, with Std Dev. of 10.681. While the youngest respondent was 27 years old, the oldest was 72 years old, and there is one respondent who did not want to give his age, but overall it can be said that quantum physics and quantum theory are not only of interest to young people, but to a wide are of interest to all age groups. Besides Hungarian interviewees, I also had two foreign interviewees among the respondents.

The next question was what education the respondent had. Overall, it can be said that one out of 13 respondents has an IT degree, and dominantly almost all of them are physicists or have a physical education. Within this, there are two respondents, both foreigners, who either have a PhD in quantum physics or a PhD in atomic physics-optics, so they do not have a PhD in general physics.

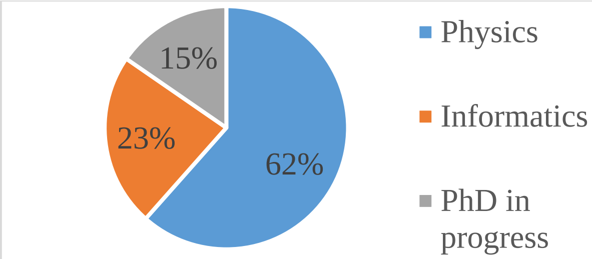


Figure 2

Distribution by PhD

I asked the interviewees how long they have been dealing with quantum topics. There was only one person who said that since 1994, the others mainly started dealing with it after 2000. In the following graph, yellow colour indicates quantum physics and blue quantum informatics related topics as focal points of interest.

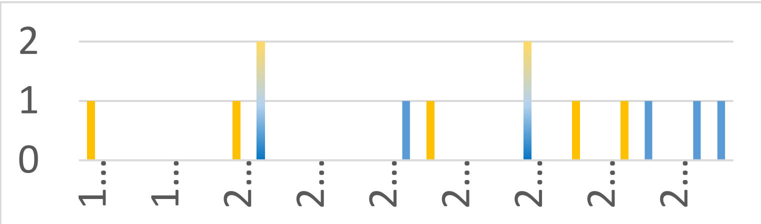


Figure 3

When did the researchers start working with quantum physics/ quantum computers?

What was interesting to us, in addition to how long they have been interested in the topic, is why the researchers started working on it. For many, it was a hobby at first, and they got to know it during their studies at the university and got interested in it. Like Bence Gábor, for example - "the theoretical physics training at the University of Szeged was very good, and the best teachers dealt with quantum physics".

The next question was whether the interviewees had access to quantum computers. Just as the paper begins with the foundations of quantum physics and then moves on to quantum computers, the Hungarian quantum community is also characterized by the same. Many people are more interested in quantum physics research, so they do not deal with quantum computers themselves, but with quantum physics or fields related to the quantum topic. Accordingly, more than half of the respondents (7 people) have access to a quantum computer, but many interviewees stated that it is not absolutely necessary for their research. This question therefore divides the community and supports the previous statement that if someone is connected to quantum, they are not necessarily programming the machines, even if they have access.

The respondents have access to different quantum computers on a relatively wide spectrum. This wide spectrum mainly includes IBM machines. For many, the important thing was not the manufacturer, but the particle on which the quantum computer works, which can be traced back to the logical model described in the paper. Some of the researchers are conducting research in the direction of adiabatic machines, while others are conducting research in the direction of universal machines. Depending on the answers, I can determine that for some researchers the quality of the particle is decisive, for others it is also important which company is the manufacturer.

I also asked the interviewees what programming language they used to create the programs. Based on the answers, predominantly everyone uses Qiskit, Python or C++, but in only one case did someone use the Java programming language to solve simulation tasks.

In line with the first hypothesis, I tried to understand, if the researcher side of the quantum community actually consists of two subgroups. Here are the basic data, that I have uncovered

8 Wigner employees (2 foreigners)	**5 university research centre members**
Average age: 37.7	Average age: 49.6
Have been dealing with quantum topics for an average of 11 years	Have been dealing with quantum topics for an average of 15 years
25% has access to a quantum computer	60% has access to a quantum computer
50% IT, 50% Physics	60% IT, 40% Physics

All in all, I can conclude, that researchers working at HunQuTech or in smaller research centres were not radically different from each other. Hence, in the following paragraphs, the responses of these two groups will be presented together.

In the course of the interviews I have asked the respondents what they think are the main technical difficulties of quantum computers. According to András Bóbics - "any good physical system is only approximately a qubit, because it is more complicated, and this will cause problems in computing applications. The superposition state is sensitive to external influence (decoherence) and this is difficult to control, universal operations cannot be performed quickly enough (shorter than the decoherence time).

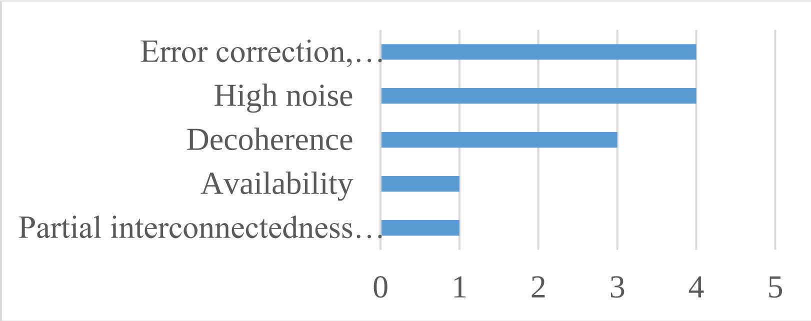


Figure 4

What are the main technical difficulties of universal quantum computers?

After that, I examined what problems quantum computers could be used to solve according to the members of the research groups. Here, I can basically form two main groups of respondents. According to some, quantum computers are not yet suitable for solving real problems, only for solving experimental problems. However, others mentioned the typical problems, which are basically characteristic of adiabatic computers, optimal calculations, and cryptographic problems for universal type computers. But what the answers of the two groups agreed on was that what the quantum computer is really good at is quantum physics and modeling the functioning of itself.

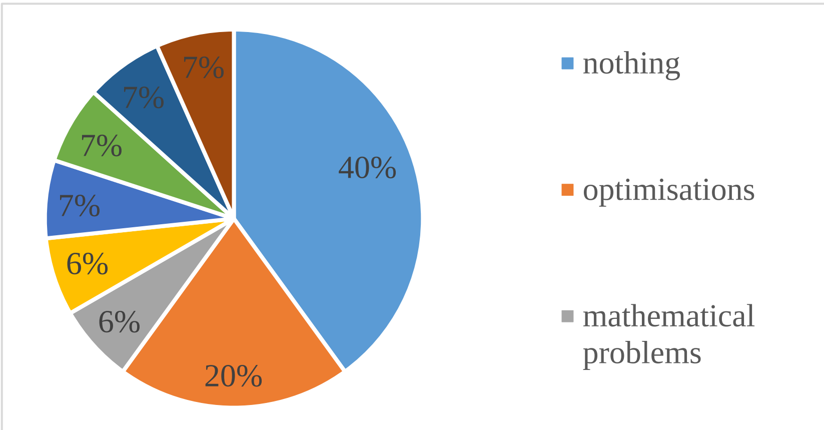


Figure 5

In what fields are quantum computers superior?

The next question was "What problems are quantum computers more efficient at solving than Neumann computers." What is it currently used for and are you aware of what else it could be used for? The picture was much clearer here, many people are aware that quantum computers do have a very wide field of application, if not in the present, in the future. But here too there are several people - who drew attention to it - who believe that the quantum computer currently has a very limited field of use. Further thinking about this question was the next question.

Even if it is limited now, what will happen to it later "in what problems is the quantum computer already effective in solving?". The answers are almost unanimous in that even if we produce universal quantum computers, they will not be able to perform everyday computing tasks, but will be special purpose devices, there was only one respondent who said that they will be good for everything only much later, say 50 years from now. The following question is in line with this.

Many people in the literature say that the quantum computer is more of a target tool in the future and will not take the place of classical, traditional computers, so I asked "what is it that a quantum computer will not be good for later?". The vast majority of the answers agreed with what was written in the literature, and they unanimously said, as Orsolya Kálmán also said: "we will not use quantum computers for problems that can be solved efficiently classically.".

The next question was a more technological question, the starting point of which is that it currently operates at cryogenic temperatures due to noise reduction, and this imposes size limitations on the machine. The question is when a quantum computer will be the size of a personal computer, when it will not require full standard cooling equipment to run. The community here is very divided. There are those who say that it will be in the 22nd century, there are those who say that they already exist, or at least the solution is very close, and there are those who say that we will never reach that size, and that it is not inevitable because of the limitations , but because there is no need for it. Péter Domokos put it this way: "It is important to see that this is not necessary. Even in the case of traditional computers, fewer and fewer people have their own PC at home or at work.

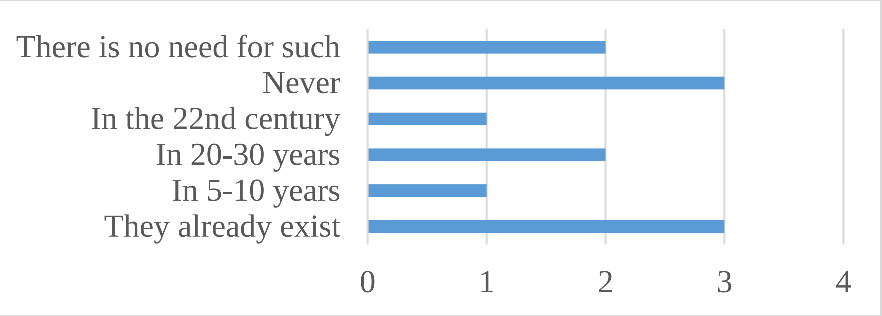


Figure 6

When will quantum comupetrs be PC sized?

Quantum supremacy is a fact repeatedly discussed and mentioned in the literature.(Tung, 2015) By definition, quantum supremacy would mean that quantum computers are already better than classical computers in terms of their performance. they can solve tasks that classic computers cannot, or only with extremely long runtimes. Although in the literature it is mainly Google that has announced it many times (Arute et al., 2019; Reddy et al., 2021), Chinese research groups also have similar articles (Pan, Zhang, 2021).

Two of the respondents did not answer this question, but the majority of the community said no, - I would like to quote András Bóbics' answer that "no, there is a certain advantage only for special problems" - and a total of two respondents said yes, but they they also add that they have only been achieved in relation to specific tasks. So the community basically thinks that quantum supremacy, depending on how we define it, has not yet been achieved, computers are very target devices, and only in the case of very theoretical well-defined mathematical problems or algorithmic problems could they perform better than classical ones computers.

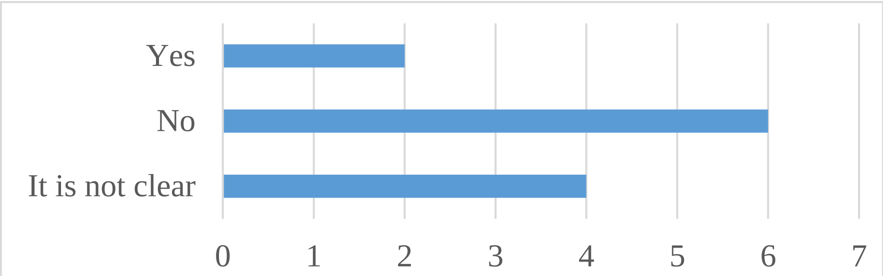


Figure 7

Have we already reached quantum supremacy?

Since the problems of current quantum computers, as described earlier, are of a technological nature, I also asked a question about how to increase the stability of the system, i.e. how to build more accurate and more useful quantum computers. Here, I really thought about the physical implementation, and in this regard I asked for feedback from the respondents. Several of the respondents mentioned noise reduction, isolation, error correction, and cooling implementation. In addition, the development of technology was also mentioned.

My consultant recommended the use of quantum computers in the field of biotechnology, so my next question specifically asks whether in the literature (Weerd, Lassche, 2021) a minimum of 128 qubits are needed to model the physiological effects of penicillin as the simplest antibiotic, and when do they think this is will be possible. I received interesting answers, because while some people said that the 128qubit is actually here, we are not very far from it, according to an optimistic estimate, the others predicted it in 10 years, but there are also those who do this in a completely unforeseeable time, in decades likely. So it really divides the community. As Thomas Clark recalled Einstein, "of course, Einstein (1905) also predicted 100 years, and he was not prepared for the fact that after his death the 2. what accelerating effect will World War II have on technological development". So who knows exactly when it will happen, which we predict s100 years from today.

I also asked whether there is a barrier to the development of quantum computers, because there were those who even put the development of a 128-qubit computer on 10 or 100 years. To this question, the majority said that there is no theoretical barrier to this, so if the theories are correct, then I get different answers, someone says that there is no barrier, only time and money are needed for its core implementation, which is an unrestricted growth. Others say that technological solutions are a real limitation.

As I presented in the paper, here HunQutech and the National Quantum Laboratory are basically two such large umbrella organizations, in addition there are 7 Doctoral Schools that deal with this, and the manufacturing companies or the corporate sphere is limited to what is in HunQutech there are: BHE Bonn Hungary, Eicsson Hungary, Femtonics and Nokia Bell Labs. This is basically reflected in the answers. Several could only talk about what they themselves were members of, A Wigner, or Bme, the affiliation of the people in their immediate environment. But there were also those who were able to give a fairly broad list, for example Ottó Hanyecz: "ELTE Faculty of Informatics, ELTE Faculty of Natural Sciences, BME", or András Dombi: "almost every university where physics is a subject. For example: Szeged, Debrecen, BME, ELTE, but in different research centers where mathematics or informatics also appear"

The respondents were almost completely unanimous regarding whether they know companies or manufacturers that produce quantum hardware. There were those who stated that "there are no companies in Hungary that are serious about it", and András Bóbics also stated why there are none: "there are none, because even in Hungarian experimental research they only got to the point of producing quantum bits".

5.2 Corporate actor

Just as in the world rankings, not only countries and research centres were ranked, but also companies that work in the field of hardware and/or software design, development, and production, I also tried to include this aspect in this research. Unfortunately, I did not manage to involve the corporate members of HunQuTech in the research, but the company of the managing director of a small Hungarian company agreed to participate in the research. Even this can be considered fortunate, since the researchers were almost completely unanimous regarding whether they know companies or manufacturers that produce quantum hardware here in Hungary. There were those who stated that "there are no companies in Hungary that are serious about it", and András Bóbics also stated why there are none: "there are none, because even in Hungarian experimental research they only got to the point of producing quantum bits".

This is why it is important that the 14th interview was with the head of a company that manufactures quantum computers, or at least its central control unit. János Lazányi, who has a degree in electrical engineering, started working with PCB

Design on a commission two years ago to design and build (a part of) the hardware of quantum computers. The questions were the same to him as to the members of the research groups. He deals with the creation of a universal controller, which can control all kinds of elements - "we deal with the process of excitation, reading and controlling impulses".

He was asked the same questions as the researchers, so that his answers can be easily compared to that of the researchers'. Regarding the efficiency related question he said that quantum computers and complex algorithms are better for optimization tasks and tasks that cannot be solved by sequential search, tasks that require human interaction, and a quantum computer will not be good at solving more complex tasks. About PC-sized quantum computers he stated that this has several physical limitations, and the first and most important difficulty is "the increase in the number and type of quantum elements". However, since the cryogenic temperature is not necessary everywhere, it will probably be possible to manufacture a quantum computer on a smaller scale in the future with the current sizes.

Like the majority of researchers, he also said that we have not yet achieved quantum supremacy. He supported his claim by saying that the problems that quantum computers can be used to solve are very limited. "It is not an advantage that mathematicians find an algorithm that can be implemented faster with a quantum computer than with a traditional computer". According to him, we will be able to say that we have achieved it when the quantum computer is more effective in solving an ordinary problem than a classical computer cluster - and this can be validated by an independent third party.

According to him, to increase the stability of the system, the annihilation time needs to be extended. He added that there has been a huge improvement in this in recent years, and now - in the case of some systems - it even reaches 10 seconds. In addition, with the help of QEC - quantum error correction -, the noise can be reduced statistically by repeating the experiment.

Conclusion

In present article I focused my attention to quantum technology and examined what types of quantum computers exist today and what physical qubits are used to simulate quantum physics relationships during their operation.

Afterward, data on the competition of quantum science industries of various countries, companies and research centres have been introduced, and the Hungarian representatives of the field were also introduced. I found that there are several national-level initiatives and that their participants significantly overlap.

In the frame of the primary research, I examined how the members of Hungarian research groups and the head of a quantum technology company think about the possibilities and limitations of the application of quantum computers, what they see as an obstacle to the development of the field, and when they predict the appearance of either a quantum computer that can be successfully used in biotechnology or a PC-sized one.

On the basis of the interviews, it became clear that although the community does not share nearly the same opinion, they still predominantly see that quantum computing is still only in its initial stages, and that machines are more suitable for simulating their own operation than for solving universal problems. They see the opportunities for development and improvement in the discovery of new physical qubits, noise filtering, more effective error correction procedures and the solution of the decoherence problem. The opinion of the company specialist reflected a functionalist view in contrast to what was previously stated. He saw the tasks to be solved in the problems, and his answers reflect that quantum technology - although he believes it will never be universally applicable, the quantum computer that will replace the current PCs - is developing at breakneck speed,

Overall, I can state that a significant part of quantum science research in Hungary is still basic research, focused on the creation of physical qubits, the investigation of quantum phenomena, and only rarely focuses on the practical use of quantum algorithms. At the same time, although Hungary is a very small country, there are numerous and diverse research initiatives, and not only theoretical but also practical developments are taking place - as was revealed in the company interview.

Although it has been announced in many cases that we have already reached quantum supremacy, in fact there is still a long way to go for researchers and developers in the field, and there is a huge space for development, which I hope Hungary will not only be able to successfully join and become an active part of, but can significantly contribute to the research of quantum computers.I

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Dispute resolution in numbers - focusing on courts and consumers

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Abstract: The aim of the European Online Dispute Resolution (ODR) platform operated by the European Commission is to make online shopping safer and fairer by providing the possibility of high-quality dispute resolution. The purpose of this article is to present the European consumer protection online dispute resolution based on recently concluded statistics, as well as the Hungarian court dispute resolution in the light of the number of cases started and closed. We aim to discuss the situation of alternative dispute resolution in Hungary in 2022. It proceeds this aim on the basis of the EU ODR platform and the Court Mediation statistics of the Court of Justice. Mediation - which nowadays is organically integrated into European legal practice - strives for compromises, its goal is to find a common solution with the least "loss" for both parties. The main outcome of the article is to emphasize the dividing lines between dispute resolution, mediation and judicial mediation by presenting recent statistical results.

Keywords: dispute, resolution, court, consumer, mediation

1 Introduction

The consumer, as a legal category, is strictly regulated in Hungarian law, in return, the state "have a say" to a certain degree in these legal relationships. The definition of the consumer is clearly contained in the current Civil Code and the Consumer Protection Act, and if one of the parties is considered a consumer, a number of special rules ere also appicable to the legal relationship between him and the company.

In addition to the preliminary information burdened by businesses, the current legislator also provides certain guarantees to the consumer during consumer legal disputes. First of all, it is important to emphasize that the contract between the consumer and the business is also a private, civil law contract established on the basis of the Civil Code. If the business does not violate one of the laws protecting the consumer, the court is the forum entitled to make a decision in the legal dispute.

The conciliation bodies want to reduce the burden on the courts, which are also entitled to investigate and, where appropriate, decide on issues arising in connection with the contract. It is important to emphasize that cooperation with the conciliation board, such as appearing at the hearing, is an obligation of the enterprise. If it does not comply, the conciliation board reports this to the first-level consumer protection authority, which fines the company for this.

However, if the business violates the other party "in its capacity" as a consumer - for example, it does not respond to a consumer complaint within 30 days - then the already mentioned first instance consumer protection authority, which in Hungary are the district offices of the consumer's place of residence, is entitled to take action.

The rise of big data in the global economy has led to concerns about antitrust and consumer protection, but policy makers often treat the two areas separately. (Zhe-Jin&Wagman, 2021)

2 Court Mediation

Alternative dispute resolution procedure, court mediation, has been available in Hungarian courts since the second semester of 2012, and is an effective tool of enhancing customer satisfaction and timeliness in civil litigious and non-litigious cases. From 1 January 2018, the parties will have the possibilities to approve the mediation agreement in court in a settlement attempt at a very low fee to make it enforceable. Also from 1 January 2018, in administrative court proceedings, the judge may, with the agreement of the parties, impose a court mediation procedure in the cases in which the law does not preclude it. At the same time the order is suspended until the end of the proceedings, but for a maximum of two months. Its benefit is that the time and date of the hearings and the substance of the agreements reached with the participation of the mediator can be adjusted to the needs of the parties. In the court mediation procedure, the parties are not bound by the content of the application (except in administrative cases), however, if the parties so request, the part of the agreement that is in line with the application is approved by the court as court settlement, and therefore its effect will be identical to that of a judgment passed in a litigation. A further benefit of the procedure is that it is duty-free, and no hourly rates need to be paid or costs reimbursed for its performance. Depending on in which stage of the procedure the litigation is closed based on the agreement reached, the parties may also request a duty benefit. (birosag.hu/court-mediation, 2022.11.10.)

The role of the mediator is very important to resolve consumer disputes. Paper, as Dewi's et al (2022) discusses the role of the mediator in terms of the perspective of consumer protection law.

Arbitration – a binding private third-party adjudication – has been the primary legal way for resolution of consumer disputes. Consumers, however, rarely use arbitration to resolve their disputes while evidence suggests that their disputes remain unresolved. Contrary to the current prevailing emphasis on who is winning in arbitration, this study aims to establish that consumers believe that the court is more just than arbitration, regardless of the outcome. This study further establishes that consumers' perceived poor legitimacy and lack of familiarity, not cost calculation, are what drive their justice perception. (Ghodosi&Sharif, 2021)

3 Conciliation Board 2021

Although the human epidemic causing mass illness caused by the COVID-19 infection and the pandemic situation mainly affected the world and, of course, our country in the year 2020, but with this related challenges and difficulties also left their mark on the year 2021. Conciliation bodies however, the effective and functioning measures provided a great help in life. Digitalization, the Fourth Industrial Revolution have an impact on consumer protection. (Howells, 2020)

Such was the application of the "Emergency Procedures" developed in 2020, which provides an opportunity provided for conciliation bodies to receive by the parties by telephone or e-mail information, consumers can submit their complaints by post or electronically, while a with the majority of enterprises, it took place using the office portal/company portal or via e-mail contact.

These alternative solutions were specifically needed for private customers, since many consumers - referring to the virus situation - did not dare or could not appear in person at the hearing, the preliminary consultation, despite the fact that he wanted the complainant's case will be satisfactorily settled with the help of the work of the conciliation board.

In addition, Paragraph 29/A (2)-(3) of the Consumer Protection Act, effective from January 1, 2021, already stipulated that business organizations obliged to maintain electronic contact, and obliged to electronic administration according to the Electronic Administration Act, according to § 2 point a) to the consumer for qualifying organizations, the documents are sent electronically as defined in the E-Administration Act must be delivered by road. A natural person not obliged to maintain electronic contact and a consumer who does not qualify as a business organization according to the E-Administration Act has the right to choose electronic communication.

Accordingly, from January 1, 2021, the conciliation board must pass through the official gate maintain contact with businesses and initiate the conciliation board procedure also with the consumer, if the consumer requests this.

In order to smoothly transition to a new type of contact, the Innovation and Technology the Deputy State Secretariat of the Ministry Responsible for Consumer Protection and the MKIK as early as 2020 drew the attention of the presidents and secretaries of the county (capital) chambers in December to fulfill the obligation that each conciliation body is independent from the chamber, it must have an independent office gate.

In order to support the professional work of conciliation boards, involving board presidents MKIK continued the development of the bekeltetes.hu website in 2021, and the related professional consultation as well. By the end of 2021, there will be more bekeltetes.hu interface, ITM added a function requested by the State Secretariat of the Deputy Responsible for Consumer Protection, thus a conciliation bodies can now use an interface that better suits the user's needs fulfill their duties.

In addition to the website operated by the MKIK, all bodies constantly update their own content on its website, and accordingly, consumers interested in the topic you can find up-to-date information on these interfaces.

Professional report and analysis of the activities of the conciliation bodies in 2021

In the year 2021, a name change took place at one of the boards. The Csongrád County Conciliation Board in December 2021, informed the MKIK that the new Chamber was registered by the court name, so from the end of the year it will officially be the Csongrád-Csanád County Chamber of Commerce and Industry they continue to operate under the name, which change is of course the Conciliation Board it also appears in its name from now on.

Although the year 2021, burdened with pandemic periods, cannot be called an ordinary year either,

this year also had many similar and new challenges to the previous year, but overall it can be established that the conciliation bodies were efficient and effective in this period as well completed their work, since they continued their proceedings in a similar number of cases as in the previous year, because in 2021, a total of 10,016 cases were closed nationwide.

At the same time, it can also be stated that this is already the fourth year since the operation of the conciliation bodies, when the annual number of cases is slightly lower than the number of cases completed in the previous year (10,119) shows a decrease. While, in 2019, there were 2,480 fewer units compared to the previous year and in 2020, another 382 cases were closed, and in 2021, nearly 100 fewer cases were closed.

Out of the twenty boards, the number of cases decreased in twelve, among which the largest drop was experienced in SzabolcsSzatmár-Bereg county, where instead of 246 completed cases in 2020, in 2021 only 157 conciliation cases were closed, which is a decrease of almost 36 percentage points.

The number of closed cases increased in 8 counties: Pécs-Baranya, Budapest, Jász-Nagykun-Szolnok, Nógrád, in Pest, Somogy and Tolna counties. The largest increase in the number of cases was in Borsod-Abaúj-Zemplén occurred in the county, where more than 18 percentage points (+93 cases) were closed in 2021.

In 2021, among the procedures, conciliation bodies made recommendations in 1,415 cases, 1,915 settlement was reached in 27 cases, and the procedure ended with an obligation in 27 cases, 1,471 times was rejected.

There is some difference compared to previous years, as the conciliation bodies in 2021 the largest number in the post and telecommunications category (telephone, post, courier service, TV, internet) they acted in disputed cases, in a total of 1,053 cases. At the same time, for many years "at the forefront "walking" category was relegated to second place due to the number of complaints related to footwear -there were a total of 985 in 2021. (MKIK Szakmai beszámoló és elemzés a Békéltető Testületek 2021. évi tevékenységéről, www.bekeltetes.hu, https://bekeltetes.hu/tartalom/40/menu/56)

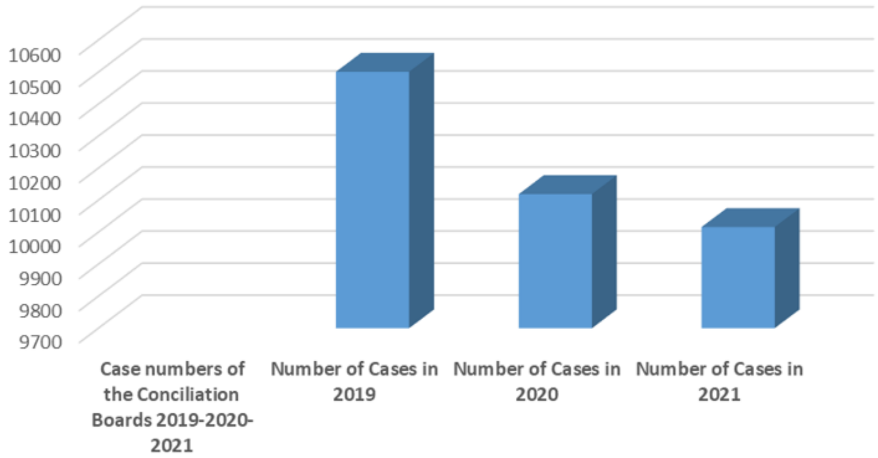

Figure 1. Development of the number of cases of Conciliation Boards in the last 3 years

Source: MKIK Szakmai beszámoló és elemzés a Békéltető Testületek 2021. évi tevékenységéről, **www.bekeltetes.hu**, https://bekeltetes.hu/tartalom/40/menu/56

4 Alternative dispute resolution for consumer disputes

The United Nations set a milestone in the development of consumer law when it adopted the United Nations Guidelines for Consumer Protection in 1985 (UNGCP), establishing for the first time a set of international consumer law principles. Since then, with the emergence of the digital era, the landscape has experienced dramatic changes, and consumers have been facing an expanding range of global challenges, especially in the financial services sector. To reflect this changing landscape, new provisions were added by revised Guidelines in 1999 and again in 2015, which included recommendations on good business practices, financial protection and e-commerce. However, the Guidelines are only soft law provisions, as they are not legally binding on Member States. The question therefore arises of how effective they can be in promoting consumer law at the national and global levels. This article will argue that a comprehensive international consumer law framework is essential in the current context, and that there has been some advancement towards this since the adoption of the Guidelines. (Benöhr, 2020)

Buettner (2020) argues, that European Union expends a lot of effort on institution-based consumer protection initiatives, so I have evaluated their effectiveness in terms of explaining the online shopping behavior of Europeans. By applying a logistic regression model analysis to a large official dataset from the European Commission, I found that user trust in consumer protection only had a limited influence on online shopping behavior, showing the ineffectiveness of past initiatives and strengthening the need for a Digital Single Market EU-strategy. (Buettner, R., 2020)

Directive 2013/11/EU on alternative resolutions for disputes between traders and consumers has the aim to ensure that EU consumers can submit their contractual dispute with an EU trader over a product or service to an alternative dispute resolution (ADR) entity — a recognised body whose role is to resolve disputes by means of ADR procedures, without going to court.

It sets out binding quality requirements for ADR entities and procedures to ensure aspects such as transparency, independence, fairness and effectiveness.

Compliance is ensured by national competent authorities designated by EU countries.

It obliges traders to inform consumers about ADR when the former have committed or are obliged to use ADR and when they cannot bilaterally resolve a dispute with the consumer.

EU countries must ensure that all contractual disputes that arise from the sale of goods or provision of services — between consumers residing in the EU and traders established in the EU — can be submitted to an ADR entity. It applies to both online and offline sales and services.

The goal of this legislation is to ensure the proper functioning of the EU's single market.

ADR offers consumers an affordable, simple and fast way of resolving disputes, such as when a trader refuses to repair a product or to make a refund to which a consumer is entitled.

ADR entities involve a neutral party, such as a mediator, ombudsman or complaints board, that attempts to resolve the dispute through an ADR procedure. Depending on the form of ADR procedure that a given ADR entity operates, the neutral party can either: propose or impose a solution; or bring the parties together to help them find a solution.

All ADR entities must meet binding quality requirements, guaranteeing that they operate in an effective, fair, independent and transparent way.

Each EU country must designate one or several competent authorities, which have national oversight over ADR entities and ensure their compliance with the quality requirements. The competent authorities establish national lists of ADR entities. Only disputes resolution entities that comply with the quality requirements can be included as 'ADR entities' in those lists.

Traders who agree or are obliged to use ADR must inform consumers about ADR on their websites as well as in their general terms and conditions. They must also inform consumers about ADR when a dispute cannot be settled directly between the consumer and the trader.

In the interest of transparency, EU countries must ensure that ADR entities' websites provide clear and understandable information. This includes contact details and the types of disputes that these entities can deal with, as well as costs, average length and legal effect of the outcome of the ADR procedure. ADR entities must also make publicly available on their websites the annual activity reports containing information on the disputes that they have handled.

ADR entities must cooperate in the resolution of disputes within the EU. They must also exchange best practices among themselves and with national authorities about the settlement of disputes.

This directive applies to all market sectors, with the exception of health and higher education.

NetNeutrals EU is an approved ADR entity, operating in the UK and EU. The information that follows is intended to provided consumers & traders with the means to electronically file a claim with the European Commission ODR Portal, should they so choose not to proceed using NetNeutrals EU. This information is in compliance with the European Union (Alternative Dispute Resolution for Consumer Disputes) Regulations 2015.

'Your Europe' portal gives individuals and businesses practical information on their rights and opportunities in the EU. It focuses on real-life, cross-border situations, e.g. European citizens wishing to work or study in another country in the EU, or European businesses wanting to move to or open a new branch in another country in the EU. (https://eur-lex.europa.eu/EN/legal-content/summary/alternative-dispute-resolution-for-consumer-disputes.html)

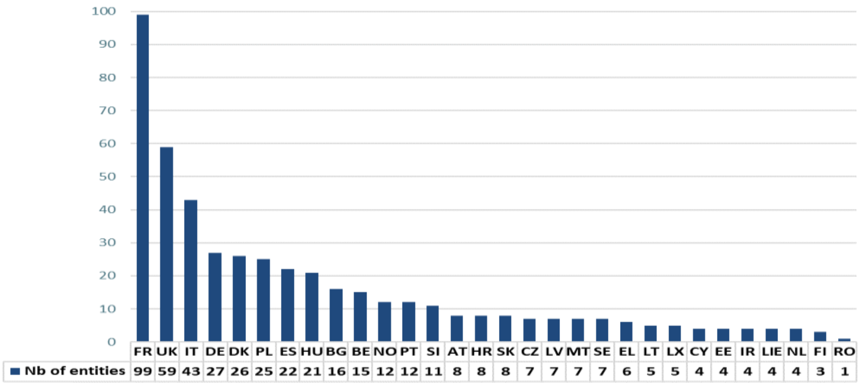

Figure 3.: Alternative dispute resolution coverage - number of notified alternative dispute resolution forums per country/ ADR coverage – number of notified ADR entities per country

Source: Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the application of Directive 2013/11/EU of the European Parliament and of the Council on alternative dispute resolution for consumer disputes and Regulation (EU) No 524/2013 of the European Parliament and of the Council on online dispute resolution for consumer disputes

Dispute type	Number of complaints (Domestic)			Number of complaints (Cross-border)			Totals
	Accepted	Rejected	Received	Accepted	Rejected	Received	
INCORRECT AMOUNT CHARGED							
Consumer Goods							
ITEM/SERVICE NOT AS DESCRIBED							
Consumer Goods		3	3		5	5	8
General Consumer Services		1	1				1
Electronic / Communication		4	4		3	3	7
Travel / Accommodation							
ITEM/SERVICE NOT RECEIVED							
Consumer Goods							
Travel / Accommodation		2	2		17	17	19
OTHER							
Consumer Goods							
Timeshare					1	1	1
Domain Names	5	4	9	3	2	5	14
FRAUDULENT TRANSACTION							
Consumer Goods							
General Consumer Services							
Leisure Services							
TOTALS	5	14	19	3	28	31	50

Figure 3: Types of disputes (2020)

Source:https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1569491348132&uri=COM%3A2019%3A425%3AFINNetNeutrals - CCPC-Annual-Report-2020 v1.1 Issued.docx

Conclusion

This article can draw the conclusion that according to the statistics of the year 2021, a decrease in the number of consumer protection cases initiated before the Conciliation Boards can be seen in Hungary. In a European context, based on the statistics on the availability of the online consumer protection dispute resolution tool system, Hungarians can assert their consumer protection cases in 21 forums - we belong to the forefront. Among the types of validated consumer protection cases, the data of the individual forum shows the most common types of cases in the travel and accommodation area, while the European Commission's report highlights that on the ODR platform - consumer complaints by top retail sectors: airlines, clothing and footwear, ICT goods.

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Examination of innovation and effectiveness in the case of family businesses

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Abstract: The role of family businesses is significant in both the Hungarian and European Union economies. The issue of innovation is crucial for the survival and development of family businesses. For the development of family businesses, which are typically small and medium-sized enterprises, the willingness to innovate is essential. Therefore, in the course of my research, I examine how innovativeness is characteristic of family businesses, do SMEs plan to implement some kind of innovation in the near or distant future, and if so, from what source do they intend to finance it? In the course of my research, I will also investigate whether there is a relation between the innovation activity of enterprises and the efficiency of enterprises. The effectiveness of family businesses is examined by various side, not only financial, but also the effectivity achieved in the field of customers, for example.

Keywords: family business; small and medium enterprises; effectiveness; innovation

1 The concept and characteristics of innovation

Looking at the theoretical literature and its practical economic application, we can come across many approaches to the concept of innovation.

The emergence of the concept of innovation in economics is attributed to Schumpeter. In Schumpeter's (1939) approach, innovation is nothing more than some new combination of production factors, the implementer of which is the entrepreneur. Accordingly, the following cases of innovation can be distinguished:

• production of a new product or commodity, or an existing one in a new quality
• introduction of a new production or sales procedure
• new placement option, appearance on a new market
• of new procurement sources of raw materials or semi-finished products
application
• introduction of a new organizational structure

The OECD and Eurostat (2005) also deal with the definition of the concept of innovation in the so-called Oslo Manual. Innovation in their approach

- "new or significantly improved product (goods or services) or process,
- new marketing method, or
- introduction of a new organizational method."

This is a significant change compared to previous formulations, because by omitting the term technology from the concept of innovation, it enables a broader interpretation of the concept and provides an opportunity to include smaller businesses and service sectors that offer lower research and development potential in the scope of innovation (MISZ, 2013).

The majority of researchers and economists interpret the concept of innovation according to a broader approach, including Chikán (1997), who says that innovation means a new, higher-quality satisfaction of consumer needs. This broad approach sets virtually no limits on how this "innovation" should take place. Not all economists agree with this approach, Kotler (1999) considers something to be an innovation only if it is a strategic novelty representing a high novelty value. Porter (1989), on the other hand, is satisfied with smaller innovations, which include the essence of innovation in the form of continuous improvements.

According to Pakucs (1999), innovation does not have to be new from a scientific point of view or reveal a completely unknown result, it is enough if it represents something new in a given market or area, it can even be a methodological procedure.

Rohács (2001) highlights that innovation does not only affect the scope of research and development, but can be interpreted in a significantly more extensive way: research - development - technical design - production.

Rohács (1997) points out that the product development cycle has now been significantly transformed, in the past the product was developed based on the developer's idea, the production technology was defined for this, which resulted in a cost, on the basis of which the price of the product was established, which price was tried to be accepted by the market . Nowadays, during product development according to the modern concept, they start from market conditions and needs. They assess what needs need to be met, in what form, under what conditions and at what price. After that, they create the requested product and try to produce it at the price expected by the consumer.

2 Method and Sample

2.1 Method

The research was conducted using an online questionnaire, following the principles of the snowball method. In this study, 2,183 valid questionnaires were processed, the majority of which were based on surveys of micro, small and medium enterprises. The results obtained are not representative. The obtained data were processed using the SPSS 25 statistical program package.

2.2 Sample characteristics

Based on the examination of the enterprises according to the number of employees, 74% of the sample were micro-enterprises, 20% were small enterprises, and 5% were medium-sized enterprises. Based on the categorization according to the number of employees, large companies accounted for nearly 1% of the sample. (Figure 1)

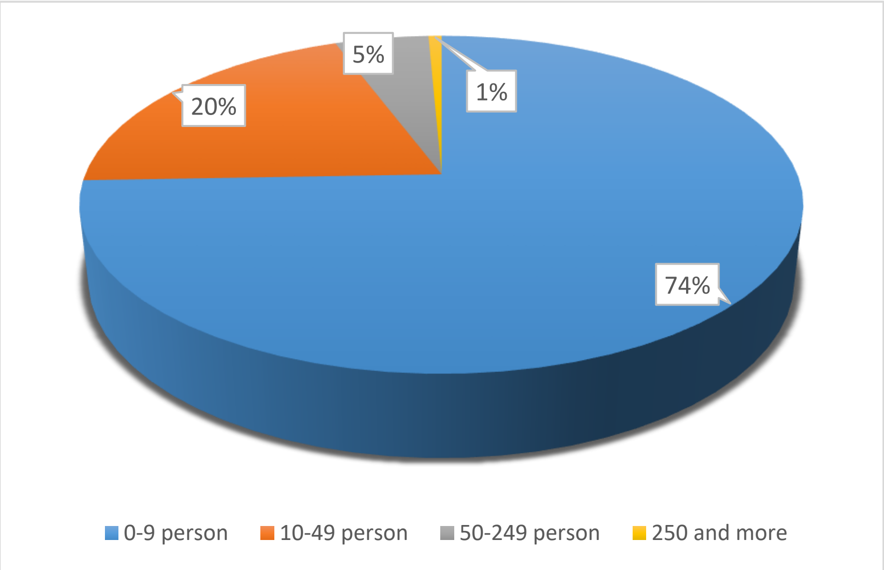

Figure 1
The number of employees of enterprises
Source: own research

The majority of the surveyed businesses are located in Budapest or Pest County (48.8%). The proportion of companies with locations in Northern Hungary is second largest (13.7%), followed by the Southern Great Plain region (9.6%). The region with the fewest businesses is the Southern Transdanubian region, with nearly 5% (4.7%). (Figure 2)

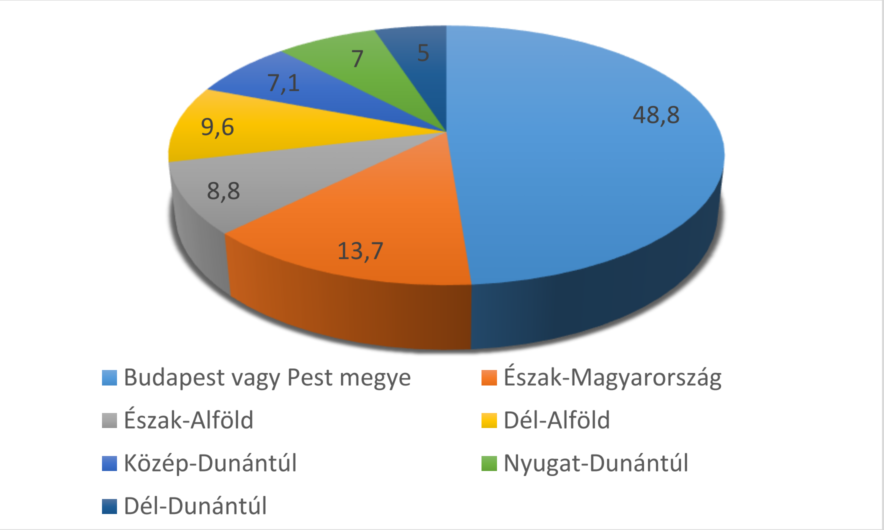

Figure 2
The region of activity of the enterprises
Source: own research

I also examined the composition of the sample based on the activities of the enterprises. According to this, a significant part of the enterprises (28.1%) are active in trade, 15.1% in the construction industry, and 14.7% in other services. The fourth most important is the manufacturing industry with 8.1%, followed by agriculture, fish and forestry with 7%. Accommodation services and catering account for 5.9% of the sample, financial services, real estate, economic consulting for 5.6%. Transport, storage, telecommunications and post accounted for 3.9%.

In terms of market presence, the dominant part of the examined enterprises (33.9%) is present in the market of consumer services, and 18.8% in the field of industrial services. 12.2% of them are involved in the production of consumer durables, and 2% of raw materials and components. 9.9% of the surveyed SMEs produce consumer goods. 3% of the enterprises dealt with the production of market production equipment. (Figure 3) The others marked the other category, but they had a problem identifying the market area, so in fact a significant part of the other category also belongs to the services market. Categorizing these businesses would have been a disproportionately large task, so I didn't do it.

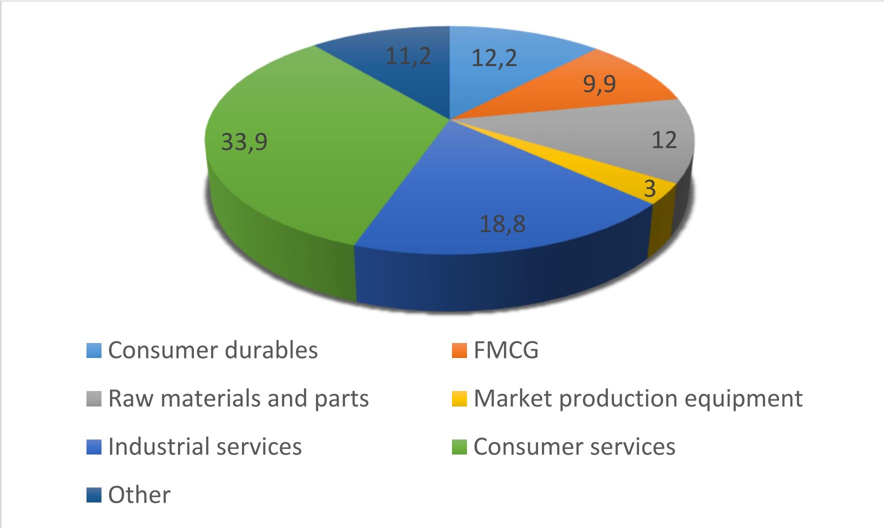

Figure 3
The market of the enterprises
Source: own research

3 Results of the examination

3.1 Examination of innovation in the case of family businesses

In my research, I also asked what entrepreneurs mean by the concept of innovation. The answers clearly indicate that the managers of SMEs are aware of the meaning of innovation, however, as is typical in professional circles, there is no agreement on the definition of the term.

Only 1.8% said they did not know what it meant. According to 41% of them, it means a major innovation in any area of the business, according to 37.2% of them, a minor innovation can also be considered an innovation, while 19.1% of them said that it is a revolutionary innovation in the technical area of the business. (Figure 4) The remaining respondents, who marked the other category, actually provided additional possible definitions of innovation.

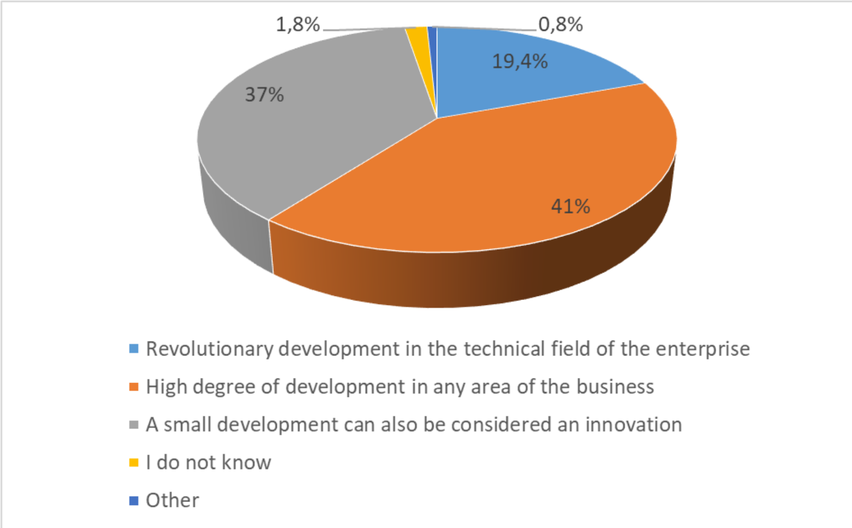

Figure 4
Innovation according to enterpreneurs
Source: own research

When asked whether their company plans to innovate in the near future, most respondents (38.7%) answered that within 2-5 years, 26.6% planned innovation within one year, 3.3% within 6-10 years within, and 1.2% of them saw reality beyond 10 years or formulated an intention in this regard. (Figure 5) From these answers, it can be deduced that a significant number of SMEs have already expressed a serious intention regarding the need to create innovation within their company. The innovation you want to implement in the short term, within a year, obviously already means a strong determination, but the intention expressed in relation to the medium-long term (2-5 years) already suggests a more serious consideration/determination. The intention of planning for a period beyond 6 years is still weak, it still carries a lot of uncertainty. 29.9% of enterprises do not plan to innovate. The reason for this may be that the company did not recognize the necessity or advantage of this for the business, but it may also be because the SME does not have sufficient resources to implement this, or does not want to get into debt if it had to use external resources.

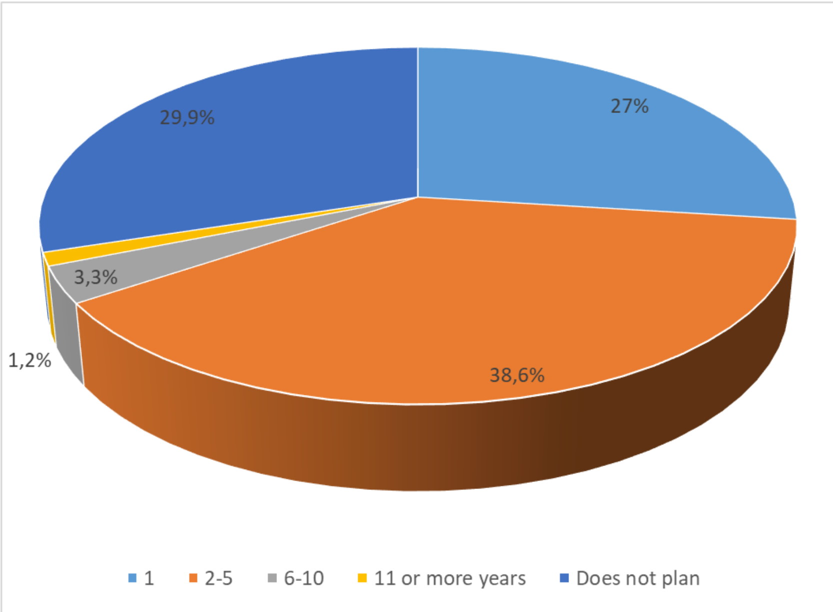

Figure 5
When do businesses plan to implement innovation?
Source: own research

It is also interesting to examine the source of those who plan innovation. Respondents could indicate several answers, but it is worth noting that only 12.8% of respondents were those who would at least partially finance the planned innovation with a loan. (Figure 6) 38.7% of the interviewed entrepreneurs were expecting some form of grant funding, and 13.9% were also expecting subsidies. The majority saw the solution for SMEs in their own capital. 49.7% of the entrepreneurs would like to solve the innovation at least partly from the profit previously generated and accumulated by the business, and 26.1% of them also plan to raise new capital for the purpose.

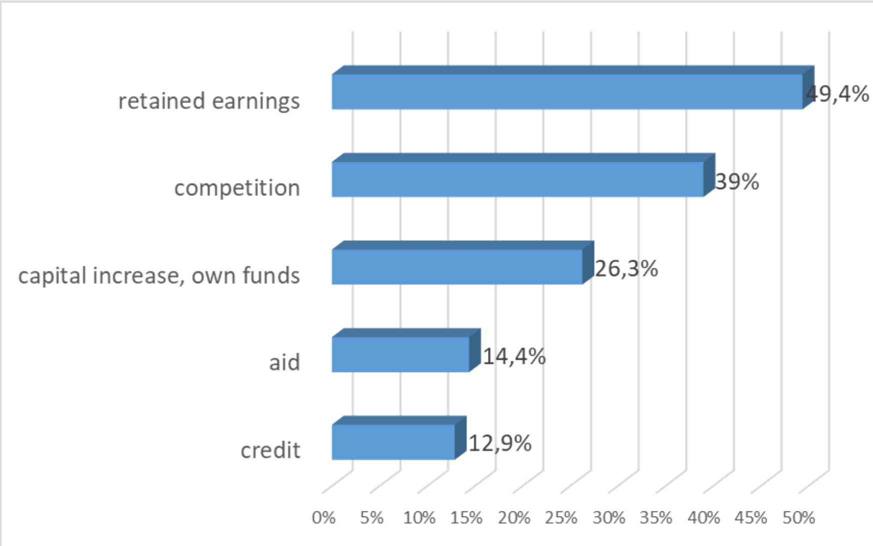

Figure 6
Source of planned innovation
Source: own research

3.2 Examination of effectiveness in the case of family businesses

Another area of my research is the effectiveness of family business. In this context, I examined the effectiveness in several aspects, creating 12 financial and non-financial indicators to examine the effectiveness. Using a five-point Likert scale, respondents were able to rate the performance of their own business (5 = much better, 1 = much worse). The indicators include some that measure the profitability of the business and others that measure customer satisfaction. Four indicators evaluated the profitability/profitability of the company (profit, profit margin, turnover, return on equity), three indicators evaluated the performance towards the customer (customer satisfaction, customer loyalty, customer trust), four indicators examined the performance of the producer/service provider (productivity, lead time, turnaround time, unit cost of goods/services) and I also asked about the growth of market share.

However, there was one question, separate in the later part of the questionnaire, which was aimed exclusively at how the entrepreneur judges the performance of the previous years of the company: did the company perform better or worse. This question also served as a control for the group of questions examining previous effectiveness, that is, whether the entrepreneurs' answers were consistent with each other.

In the case of the independent question, we can see that entrepreneurs typically judge their company's performance to be better compared to the previous period. According to 54.5% of the respondents, their business is performing better than in the previous period. According to 38.8%, their market situation has not changed. In contrast, only 6.7% of SMEs said that they perform worse.

So I used different indicators to examine how well the company performed in the last financial year compared to the previous year? (1 – much worse, 5 – much better)

The first indicator examines the profitability of the business, in sum: profit achieved. Based on the obtained results, we can see that the profits of the majority of enterprises have increased in recent years, compared to the profits of the previous year. 40.8% of them performed better in this area, while 15% of them admitted that they did much better. (Figure 7) So, more than 56% of them see a positive change in profits. More than a third of the respondents (35.7%) said that their company's profitability is in a similar situation. A total of 8% of entrepreneurs said that their profits had worsened in the past period, of which 1.8% said that they achieved a much worse result. (Figure 8) It should not be forgotten that the research covers a period of several years starting from May 2017, that is, the answers received show the trends of the previous few years.

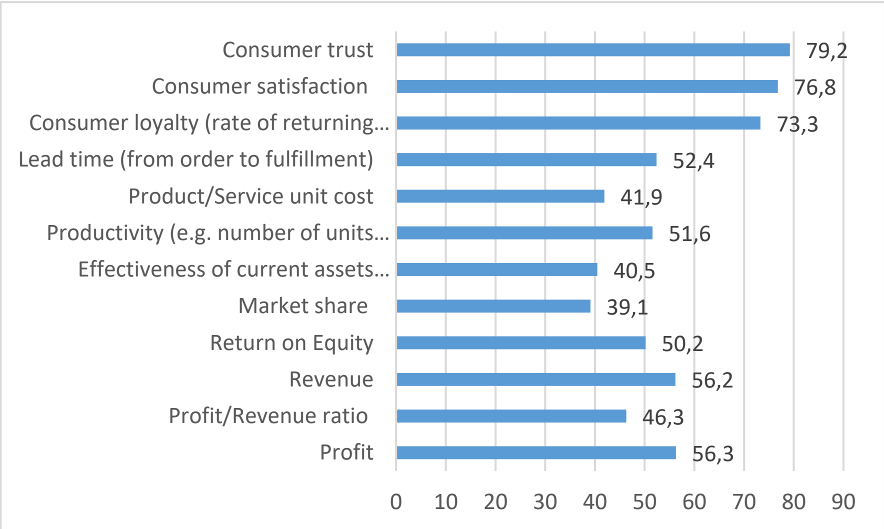

Figure 7

The proportion of those who perceive an improvement in their effectiveness

Source: own research

In the case of the profit margin, only 46.3% see that the situation has improved, while 45% say it has not changed, and 8.6% perceive a deterioration (of which 1.5% perceive a much worse result)

If we look at the development of sales revenue, we see that entrepreneurs paint a similar situation in the case of sales revenue as in the case of profit. More than 56% of them feel that sales have improved compared to previous periods, of which 13.5% see that the situation has improved significantly. According to 35.2%, the situation is similar to previous periods. Only 8.6% perceive that the situation has worsened, of which only 1.6% see it as significantly.

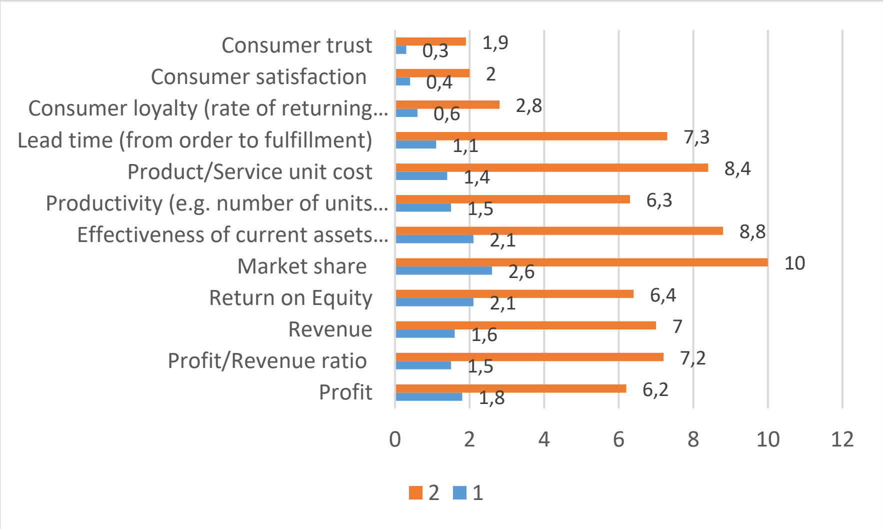

Figure 8

Percentage of those who perceive that their effectiveness has decreased

Source: own research

In terms of return on equity, 50.2% of enterprises perceive an improvement, 41.4% perceive neither an improvement nor a deterioration. 8.5% perceive deterioration.

In terms of market share, 39% perceive an improvement in SMEs, 48% see no difference compared to previous years. This category is much more difficult to define than profit or sales.

Regarding the efficiency of current asset management, the respondents consider that their money was tied up in current assets for a shorter period of time.

Regarding the production processes, I examined the evolution of three indicators: Productivity, product/service cost and order lead time. Entrepreneurs perceive an improvement in all three indicators. Business leaders (51.6%) perceive the greatest improvement in terms of productivity, 52.4% in terms of turnaround time, and 41% in terms of the cost of products and services.

I also measured the performance of businesses in relation to customers using three indicators: customer trust, satisfaction and loyalty. The majority of entrepreneurs view these indicators very positively, however, it should be noted that we can only talk about real measurements in the case of SMEs in a very small proportion.

More than 73% of businesses, for example, notice an improvement in customer loyalty, of which 33% report a significant improvement. SMEs would perceive an even more significant improvement in terms of customer satisfaction, nearly 78% of them, and more than 79% of them in the case of customer trust, and even 41% of them a significant improvement.

3.3 Examining the relationship between performance and innovation activity

In the next step, I examined whether a relationship could be established between the planned timeframe for innovation implementation and SMEs' perception of their effectiveness. I hypothesised that firms that plan to innovate at a closer time horizon would be more likely to be perceived as more effective. In terms of effectiveness, I examined the 12 indicators mentioned earlier and their relationship with the planned timing of innovation. Significant relationships were found for all 12 indicators, with a weak but verifiable closeness. The results of the tests are summarised in Table 1.

Table 1 Relationship between the effectiveness indicators and the time frame of the planned implementation of the innovation

Metric	Cramer V	p
1. Profit	0,95	0,000
2. Profit/Revenue ratio	0,81	0,000
3. Revenue	0,108	0,000
4. Return on Equity	0,78	0,000
5. Market share	0,107	0,000
6. Effectiveness of current assets management (payback period of money tied up in current assets)	0,97	0,000
7. Productivity (e.g. number of units produced per unit of time)	0,97	0,000
8. Product/Service unit cost	0,78	0,000
9. Lead time (from order to fulfillment)	0,065	0,001
10. Consumer loyalty (rate of returning customers)	0,066	0,004
11. Consumer satisfaction	0,071	0,001
12. Consumer trust	0,062	0,012

Source: own research

3.4 Examining the relationship between the time horizon for the introduction of planned innovations and the demographic characteristics of firms

In my research, I hypothesised that certain demographic characteristics of firms have an impact on their propensity to innovate. For example, the geographical location or the area of activity of a business influences the intensity of innovation activation in family businesses.

Only in a few cases is there a link between the demographic characteristics of enterprises and the timing of planned innovation. Thus, a weak but highly significant relationship was found between the size of the enterprise and the time interval of the planned innovation (CV=0.111; p=0.000). In other words, the size of the enterprise may influence the time interval within which the enterprise plans to innovate. This may also be related to the capital strength of larger firms, for example, as a medium-sized firm is more likely to have the opportunity to innovate earlier than a micro or small firm.

I also looked at the relationship between the market of enterprises and the field of activity. Here, I have assumed that the sector of activity of the enterprise also influences the frequency with which enterprises undertake new development due to differences in the technological cycles of the industry. Unfortunately, I was unable to confirm this significantly on the basis of the research data.

Conclusions

My research has shown that the majority of family businesses recognise the need to innovate in their activities and that they are planning to innovate in the short to medium term. The majority of enterprises plan to finance the majority of their future development from their own resources, with a significant proportion of them being reluctant to borrow. A significant proportion would still rely on grants and subsidies.

My research has shown that there is a significant relationship between the performance of enterprises and their propensity to innovate. In other words, family businesses with a higher propensity to innovate were perceived as more successful than those with a lower propensity. Of course, we must take into account the limitations of the research, namely that the sample is not representative.

The link between demographic characteristics of family businesses and innovation propensity has been demonstrated in only a few cases. In other words, in the majority of cases, the propensity to innovate is not significantly influenced, for example, by the geographical location of the enterprise or its field of activity.

I also examined the time to innovation in relation to the market situation. Here I basically assumed that firms in a more favourable market situation innovate more often. No significant relationship was found here either.

In conclusion, I consider that there is a need to further investigate and explore the innovation activities of family businesses in order to show that innovation has a positive impact on the performance of SMEs, and that it is important for family businesses to recognise the need to innovate in their operations, whether in the form of small improvements or novel solutions.

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Results upon two samples of university students on safety consciosness in smartphone usage

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Abstract: At the 2022 MEB conference I have shown my preliminary results from a research on safety consciousness in smartphone usage of university students. I have conducted research on a group of university students in spring 2022 with the repeated usage of a scientific questionnaire that I have created and used in 2016. In 2016 I have created a questionnaire and made a survey on the safety consciousness of the smartphone users in the group of university students and have shown my results in conference papers and have shown interesting results. This year I have repeated the survey on a different set of students in order to measure their safety consciousness and I will show the results in this paper. The groups differ in many points, thus we can not directly create a comparison of the results, but with the usage of literature review I will be able to show the current state of the topic. In this paper I will present my detailed results from the two groups, updated upon the feedback gathered at 2022 MEB conference.

Keywords: safety consciosness; university students' IT safety consciousness; DOSPERT; Modifeied DOSPERT questioner

1 Introduction

In 2022, we will be surrounded by modern technology at all levels. Smart devices in our hands, in our homes, in our cars.[2][4][7] We use them in our personal and professional lives.[9] They've played a prominent role before, but it was during the closures of pandemic COVID-19 that we were confronted again with how many areas of our lives these devices can help us to be.[6]

However, as in the other areas of life, we cannot ignore the issue of security.[5]

According to the European Union Agency for Network and Information Security [1] the top 3, high category risks for smartphone users are:

- Data leakage resulting from device loss or theft
- Unintentional disclosure of data.
- Attacks on decommissioned smartphones

In this research I have concentrated on the first two risk sources.

2 Methodology

In 2016, I compossed a comprehensive study on smartphone usage patterns and their impact on safety. I developed a questionnaire in a multi-step process. I tested it on a small sample, modified it, and then used it on a larger sample.

2.1 Structure of the questionnaire

The questionnaire consists of 42 questions, of which I created a total of 87 variables for statistical processing.Question groups were:

- Demographic questions
- Smartphone usage
- Security relatited questions

In 2016, students from three faculties of Óbuda University (Bánki Donát Faculty of Mechanical and Safety Engineering, Kandó Kálmán Faculty of Electrical Engineering, Keleti Károly Faculty of Business and Management) formed my research sample and I have presented the detailed results in several scientific publications.

In the spring of 2022, I conducted a research with the reuse of this questionnaire again because I was curious to see how my current students would respond to this questionnaire.

3 Data and results

3.1 Limitations

My aim was to build a sample that would make the results comparable with previous results. But unfortunately, neither the sample size nor the proportion of groups in the sample (in terms of gender, age and the degree course studied by the students) allow for a comparison of results without strong statistical constraints.

3.2 Findings

3.2.1 Software security awareness

All the answerers responded their phone that they mainly use is a smart phone.

Software usage behaviour of the answerers' is a crutial part of the usage of smartphones.[3] The respondents have answred that their phones are not rooted. Rooted operating systems could mean a higher level of risk of potential malware attacks. Thus this usage pattern can be translated as security aware usage. Also almost all the respndents (94%) answered that they are continuesly updating their smartphones operating system and software.

Also I have asked about the sources of their installed applications. Again, almost every respondent (87%) answered they are using only the official sources (google play, app store, huawei appgallery, galaxy store…) for installing applications.

3.2.2 Security aware usage of the smart phone

I have asked 'Do you restrict the access to your phone in any way?'[4][5][8] 100% of the respondants has answered yes. Mainly they use screen locks with pin in most cases but many use biometric authentication with finger prints or Face ID. Only a very small fraction, 2 respondents answered that they use 2 factor authentication for their phones.

3.2.3 Security awareness of the used networks

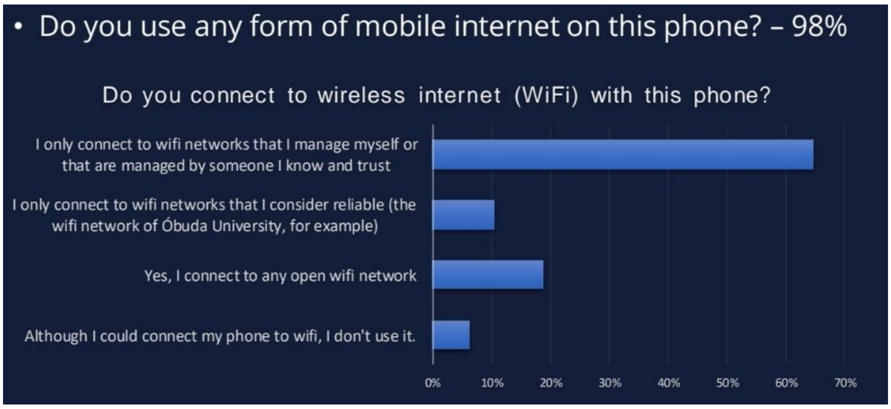

Figure 1.

Network usage of the answerers

3.2.4 Security awareness of the stored data

Figure 2.

Storing important data on the answerer's smartphone (source: own research)

In the questionair I have asked the answerers about the stored data on their smartphones. A high percentage of the answerers have answered yes, and they store a vide variety of data on their phones.

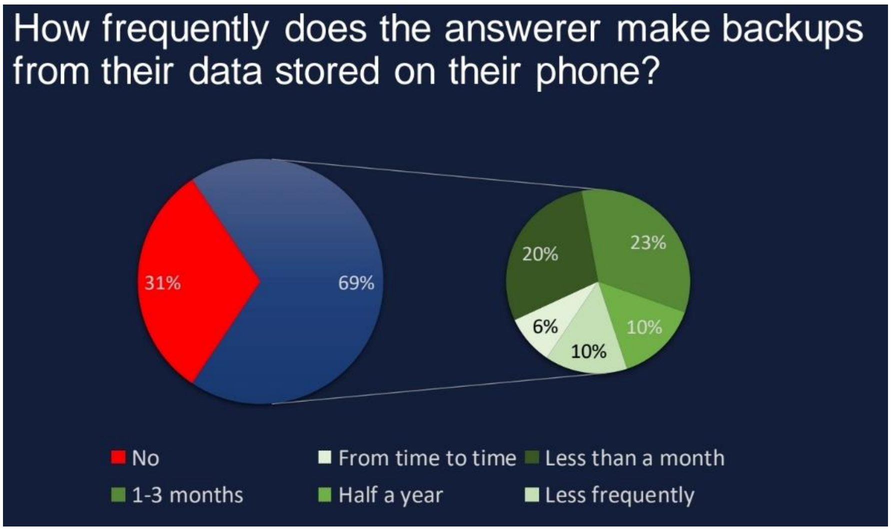

Figure 3.

Making backups from data stored on the answerer's smartphone (source: own research)

If we store data then it is a crutial question if they make bakcups from ther data. Almost a third part of the respondents said they are not making any backups from their data stored on their smartphones.

Conclusions

Altrough direct comparism could not have been conducted between the samples, there can be seen some interesting outcomes from this research.

First of all the smartphone penetration has grown to 100% in the sample.

Altrough almost all the respondents have answered that they store important data on their smart phones their usage patterns still show possible risks for loosing or compromizing stored data.

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Communication activities of tourism businesses in Szeklerland in a changing tourism environment

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Abstract: Changes in the tourism industry, such as the rise of digitalisation, the emergence of the new tourist and the spread of experience tourism, have created challenges to which tourism operators must respond. There has been a significant shift in demand in the tourism markets, changing consumer needs and expectations, changing communication tools and channels, and a need to rethink the whole marketing communication activity, as previously successful methods are now proving less and less effective. The paper takes a look at the communication tools and methods that can provide solutions in this changing environment and describes how tourism operators in a particular region (Szeklerland) are adapting to changing consumer habits and how this is reflected in their communication practices.

Keywords: digitalisation, new tourist, marketing communication, rural tourism operators

1 Introduction

The last decade has seen a number of social, economic and technological changes and transformations on a global scale, which have had a significant impact on the tourism industry and which are important to take into account from a tourism marketing perspective. Lőrincz-Sulyok (2016) highlights, among others, demographic changes, new travellers, changes in tourism transport, technological developments, the emergence of a new, more demanding traveller class and the increased interest and demand for sustainable tourism. In addition, the pandemic of spring 2020 has had a major impact on the tourism sector, bringing about significant changes. Raffay (2020) cites the rise and spread of digitalisation as a significant impact, as well as the increased importance of safety, changes in travel habits (individual travel, reduced spending) and the rise of alternative tourism. It is also mentioned that some of the previous patterns of consumption behaviour have been reinforced (increased demand for digital solutions, popularity of personalised solutions). Three key processes that have significantly transformed and continue to shape the entire tourism industry, including marketing communication activities, are described below. The rise of digitalisation, the emergence of the new tourist and the spread of experience tourism have created challenges to which tourism operators must respond.

1.1 Digitalisation in tourism

The rise of the internet and the developments in information technology, communications and IT over the last decade have also significantly transformed the tourism sector. Digitalisation, i.e. the application of modern infocommunication technologies, has changed the structure of sales channels, marketing communication practices, created new business models and given birth to e-tourism. E-tourism is the digitalisation of tourism, travel and hospitality processes and value chains, which allows businesses to maximise their efficiency (Buhalis, 2003). At the same time, digital technologies make it easier for tourists to participate in all stages of the tourism purchasing process (Happ et al. 2020). For them, e-tourism is implemented in three main areas: e-information, e-booking, e-payment (Beatrice-Mihălcescu, 2013). The e-information phase includes the process of gathering information through various tourism portals, blogs, reading electronic guides, publications, brochures, viewing real-time images, videos, interacting with virtual communities, etc. This helps mainly in the pre-travel phase, in decision-making and planning, but nowadays the various applications are even taking over the role of guides during the travel. Through e-booking, i.e. online booking systems, travellers can pre-book services of their choice, be it accommodation, air or train tickets, or even museum tickets. While the e-Payment facility allows payment by bank transfer or card, either online or on the spot. E-tourism is above all based on the dissemination of information, but its main objective is direct sales, eliminating physical and time barriers.

In addition to these three areas, I consider it important to mention e-communication and e-assessment, as an essential component of tourism services, such as personal communication, contact with tourism service providers, personalisation of services, can also be achieved through digital means, as well as post-assessment of services, which can be useful information for other tourists' travel decisions.

Digital tourism is the support of the tourist experience through digital tools before, during and after the trip (Benyon et al., 2014), i.e. it contributes to meeting tourists' needs while improving the competitiveness of tourism businesses.

Restrictions imposed to curb the coronavirus epidemic have had a significant impact on attitudes towards digitalisation and online solutions, and global economic and social changes have also put pressure on the tourism sector to shift even more towards digitalisation and innovative technologies. Businesses and travellers alike have become more open to incorporating digital solutions into their everyday practices (e.g. contactless solutions for ordering and paying, digital vaccination cards, etc.).

The impact of digitalisation is most visible in the transformation of the sales system, with the proliferation of online sites and applications for finding and comparing accommodation and other tourism programmes, which have reduced the use of traditional travel agents and tour operators. Statistics for the year 2017 show that more than 50% of Romanian residents used online platforms to book accommodation and select tourist packages (Lungu, 2018).

Moreover, online presence is now expected of even the smallest tourism service provider. There is a growing need for travellers to have a picture, to "see" where they are going, what services they will use and to contact service providers before they travel. The most obvious and fastest way to do this is through the online space. Destinations, accommodation and programmes that attract tourists will be those about which they can find the right amount of information. And for tourism businesses, the internet offers the opportunity to get information about them to any part of the world relatively cheaply and easily, thus increasing their sales potential.

In addition to websites, the use of social media platforms is becoming increasingly important as a way to search for offers and find guest reviews and opinions before travelling (Fotis et al. 2012, Mester 2013).

Social media influences the behaviour of tourists, service providers and stakeholders, but also affects tourist destinations. Not only do these platforms play an important role in the information gathering phase before choosing and buying a service, but also during the trip, when people share their experiences and photos, videos and last but not least at the end of the purchase process, when they write reviews and ratings in public online spaces.

1.2 The new tourist

There have also been significant changes in the consumer behaviour of tourists. The so-called new tourists have emerged, described by Pirnar et al (2010) as: eager to discover and learn, seeking real experiences and adventure, seeking authenticity, more flexible and independent, demanding better quality and value for money. They are more interested in sustainability, even willing to pay more for it, in experiencing local cultures and in alternative types of tourism (agrotourism, sports tourism, adventure tourism, gastronomy, etc.), where more personalised services are available. They are more technology-friendly and increasingly use the internet to select, buy and evaluate tourism products. They also have an increased concern for safety and health.

The main challenge for tourism operators is the increasing diversification of the interests, tastes and needs of these tourists, as the new type of travelling public influences the pace and direction of change in the sector. Businesses that wish to remain competitive in the long term cannot ignore these changes and need to incorporate them into their tourism marketing strategy, from product development to marketing communications and service process re-engineering.

1.3 The emergence of the experience economy

In developed societies that have been prosperous for several decades, there seems to be a significant shift in values, replacing the previous view of material wealth accumulation with a new experiential one. As Florida (2002:170) puts it, 'many people measure their quality of life by the quality of the experiences they consume'. Pine and Gilmore (1999) speak of the emergence of the experience economy, which refers to the increasing willingness of consumers to pay more for experiences over services and products. Tourism can be seen as one of the main sectors of the experience economy, where on the demand side, consumer behaviour is determined by the experience gained through consumer choice, service and destination selection, and on the supply side, the really significant competitive advantage comes from the intensity of the experience that a tourism or leisure service provider can offer its visitors or guests. Tourism experiences can be diverse and vary from one individual to another (Michalkó - Rátz, 2005): excitement, adventure, actual or perceived danger, acquisition of new knowledge, skills, abilities, companionship, aesthetics, novelty, exoticism. Zátori (2018) highlights that experiential tourism offers tourists (if they are open to it) the opportunity for emotional involvement and deeper immersion in services. This type of tourism is more focused on senses, perception, connections and stories, rather than on the product or service. The search for experiences by travellers starts at the information and consumption decision stage, seeking places and services that promise experience, authenticity and memories.

2 Marketing communication responses

As we can see, the above-mentioned trends and changes have led to a significant reorganisation of demand in the tourism markets, changing consumer needs and expectations, transformed communication tools and channels, and this also means that the entire marketing communication activity needs to be rethought, as the previously well-established methods are now less and less effective. It is necessary to address travellers directly, to arouse their interest and to win their anticipated trust, in a communication environment where the threshold of stimuli is extremely high and where competition is increasing. We will now look at the communication tools and methods that can provide solutions in this changing environment.

2.1 Social media marketing

Tourism research shows that 75% of travellers now say that the internet is the most important source of information when planning a trip. And the most common ways of gathering information are using destination websites, accommodation websites and social media sites (Lőrincz - Sulyok, 2017). But these platforms are not only used to find information, but also to share and evaluate travel experiences. In addition to their own networks of connections (e.g. Facebook, Instagram), they also use social platforms (e.g. Tripadvisor) specifically built around tourism experiences and services.

In addition to providing information, social media also offer businesses the opportunity to connect with their customers and to communicate more directly, thereby increasing their customer base.

Being present on the most popular social networking sites has become an expectation of users.

Facebook pages can effectively act as a second website, where content on the website can be redistributed and where interested parties can find all relevant information about businesses. It is important for businesses to have a business Facebook page on the social networking site, because it is linked to a number of tools that can help them to develop their business and reach their target audience more easily. For example, using the statistics available (who follows the page, demographics, when to share content, etc.) can increase reach and new followers. It is also possible to place paid ads, which are very well targeted both demographically and geographically. They are quick, easy and very flexible to manage. It is important for businesses to be easily identifiable on the social platform (this applies to all platforms), to use branding elements when setting up profile pictures and cover images, to have their own name on the pages. The description and introduction sections should also be filled in in detail, as is the case for websites, so that those who use the site can find all the relevant information. When sharing content, continuity and the use of call to action posts to engage followers are key. High quality photos, videos of tourism services, the service process, the destination, short descriptions of programme options, possible promotions are just some of the content that tourism businesses can use.

The success of Instagram is mainly due to the fact that users nowadays do not want to read long texts and are interested in visual content, which is the quickest and easiest to absorb (Guld, 2022). A consistent style, i.e. using selected photos that convey the mood you want to communicate, uploading high quality photos and using the right keywords (hashtags). In addition, sharing relevant content from other users can increase the visibility of the page and increase the number of followers. Instagram has become a prominent medium for tourists' content sharing, which is a great way to capture, record and instantly share experiences and memorable moments (Glózer cited in Fatanti - Suyadnya, 2018). The potential re-sharing of this content is also given a prominent role because it can influence other consumers' travel plans or decisions. Research has shown that consumers are more likely to trust information from other tourists when planning their trips and holidays than material published on service providers' websites (Fotis et al., 2011).

The constant presence of interactivity can be ensured by stories and highlights.

As the world's most popular video-sharing channel, YouTube is a source of information for many people, especially when they are looking for audiovisual content. It can be useful for tourism businesses to have a presence on this channel, especially if they have a number of high-quality presentation and promotional videos, but it is not enough to publish them only on this channel, they should also be shared on other platforms (Facebook, Instagram). For shorter, more personal video content, other channels such as TikTok may be more suitable.

The popularity of TikTok is growing, and this cannot be ignored: the platform is mainly used to share short video content, which can be used to showcase destinations and different tourist services. In addition to original videos, trending videos are also popular and can go viral much more easily. Here, the quality of the images is less important than the atmosphere, authenticity and entertainment or information value. The use of hashtags and location tagging, as with Instagram, can increase targeted reach.

Monitoring user reviews is also part of social media communication. Travellers are keen to browse reviews from previous customers about a destination, programme or accommodation. Facebook, Tripadvisor, Google and the various accommodation sites offer users the opportunity to share their experiences and rate services. These reviews have a significant impact on the image of a business, whether positive or negative, which is why it is important to respond to these reviews appropriately.

2.2 Websites

Corporate websites are the foundation of an online presence, even as social media platforms are becoming increasingly popular. They are still the primary source of information for tourists. The role of websites is not only to provide a wide range of useful and up-to-date information, but also to present the business online in a way that reflects its image, style and atmosphere. In addition to aesthetics, it is also important to provide a user experience, which Kovács - Csegezi (2018) described as follows for tourism websites: be easy to use (be transparent), provide relevant, accurate, up-to-date information, use high quality, expressive photography, be easy to navigate (few elements should appear within a page), provide interactivity (virtual tours, chat service), and easy, quick contact (contact details displayed, presence of an online help button, quick response). In addition, the presence of an online booking and payment system will improve the user experience.

For better accessibility, it is advisable to link and cross-link online platforms, and optimisation for mobile phones is essential, as it is increasingly common for people to use their smartphones to browse.

2.3 SEO (search engine optimization)

The majority of online searches only look at the first page of the results list, and within that, the top ten results are preferred, which is why it is important for businesses to rank their websites as high as possible in search engines. SEO is about improving the appearance of a website in search engine rankings in non-paid search results. It is a lengthy process that requires a lot of planning and work, but it is low cost and pays off in the long run. Three types of search engine optimisation strategies are recommended: technical and content optimisation and link building. Technical refers to factors such as the website being findable, the page to be loaded should be fast and search engines should be able to quickly recognise each element, the content should meet user needs and provide a good user experience, the website should be mobile friendly. In terms of content, it is important to have quality text content, photos (see content marketing), use appropriate and relevant keywords, short, relevant URLs. Backlinks, i.e. external links or references to the website, also increase the ranking in the search results. The more authoritative websites linking to your business, the more your search results will increase. It is a good opportunity for tourism businesses to be present on local TDM sites, various tourism aggregator sites, but guest blogging or recommendations and opinion columns written by influencers can also be effective.

2.4 Content marketing

Traditional advertising, which aims to persuade and convince consumers, is proving less and less effective, and new solutions are needed that are not perceived as intrusive or distracting by consumers. Content marketing is a technique for sharing interesting and useful content, making it easier to reach audiences who are turned off by advertising. It is a type of communication where companies do not aim to sell directly, but to create an emotional connection with consumers by informing and entertaining them, taking into account what the target audience is interested in (Sas 2012). In the field of tourism communication, this useful content can be very diverse, from travel tips and 10-point lists, to interactive maps, programme guides and presentation videos. The travelling public is increasingly looking for information in the online space, so company websites, blogs, social media sites are considered as appropriate content delivery channels. The continuous creation and updating of valuable and useful content is also an important task, because SEO and email marketing only work successfully with well-crafted messages and content.

2.5 Storytelling

Content marketing is a form of storytelling, which is very useful in tourism marketing. The essence of using storytelling in marketing communication is to create an emotional connection, to increase the level of consumer involvement (Mátyás, 2017).This is usually done by telling and presenting personal stories, so a more human, direct and authentic image can be created in the minds of consumers, which helps them to engage more easily. In tourism communication, storytelling can be used both in the process of presenting services or during the service delivery. The various introductory texts, photos and videos can be made more personal by telling the story of how the business came into being, by including the people who are linked to the service and by telling their stories. These stories help potential customers to get to know the service provider better and create an emotional bond. This can be further deepened when welcoming the guests, if the service providers also become part of this storytelling process.

2.6 Influencer marketing

Influencers, or opinion leaders, are prominent members of the community who, because of their personality traits, are able to influence the opinions of others and control the attitudes of others. It is their unique style, expertise, recognition and extensive contacts that make them stand out from the crowd (Papp-Váry, 2020). The use of influencers in various marketing campaigns has become a widespread practice, as their involvement is considered the most effective in reaching certain target groups. This is no different in the tourism sector, where tourism businesses are also working with macro and mega influencers with large followings, as well as travel bloggers and travel influencers who have gained visibility and a larger following through online content about their travels. Through these influencers, destinations, accommodation and programme options are communicated to target groups that would be very difficult to reach through other channels. Another important aspect is that their recommendations, opinions and published content are more credible for their followers than information from other sources, such as official sources.

2.7 CRM systems

Customer Relationship Management (CRM) systems have the advantage of being able to store all customer data in a single repository, enabling targeted customer acquisition and marketing, and also the ability to communicate effectively and quickly with customers across all channels. Automatic response letters, confirmations and information requests save time and make work more efficient, while customers also perceive that they have received an immediate response. It also helps targeted marketing communication, for example, by already allowing the data of visitors who click on a Facebook ad to be entered into the CRM system. The systems can be used to track the purchase history of consumers, allowing personalised offers to be made to them, for example in the form of online newsletters, a method also used by hotels and adventure parks (Lőrincz-Sulyok, 2017).

2.8 Virtual and augmented reality

While VR glasses are required to fully enjoy virtual reality, almost any traditional device (smartphone, computer) is now suitable for viewing 360º panoramic videos, for example. Perhaps one of the most popular VR solutions is the ability to tour different locations, allowing you to preview destinations, accommodation or even hard-to-reach places. Such virtual tours can influence the purchasing decision or add to the process of learning and acquiring information. VR technology can also be used to create worlds where real and fictional places, events and people, evoking the past or projecting the future, can be displayed. This opens up limitless possibilities for tourism service providers who seek to visualise and deliver information in an experiential way (e.g. exhibition spaces, museums, visitor centres).

One application of augmented reality is to provide travellers with additional information about their location. Various phone applications can be used to project information onto a live mobile screen. This can help with orientation (e.g. map apps) or to serve interests. It allows users to display information on the screen by pointing to specific locations using their smartphone. These can be textual information about what they are seeing or full extended virtual elements (e.g. a model of a building or a neighbourhood projected onto a live image of the user's device). But they can also be used by hotels, e.g. to provide additional information to their guests with informative maps with different interactive elements, or in the hospitality industry with the so-called "interactive maps". AR-menus, which allow guests to learn more about a particular dish (appearance, composition, allergens, expected quantity, etc.)

VR and AR technology cannot replace the travel experience in its entirety, but it can help to improve the overall experience and cognition.

It should be stressed that the communication tools and techniques described do not cover all the tools that can be used in tourism marketing communication, but rather can be seen as a selection of current communication trends.

However, it should also be stressed that these techniques are not a universal solution for all tourism operators. There are many factors that influence which tools can be effectively applied in practice by individual businesses. The nature of the services, the target audience, the size of the business, the area in which it operates and the immediate tourism environment are all factors that determine which solutions can and should be used in which form.

In the following, we will examine how tourism operators in a specific region (Szeklerland) adapt to changing consumer habits and how this is reflected in their communication practices.

3 Communication practices among tourism businesses in Szeklerland

Several analyses have dealt with the marketing communication activities of tourism operators in Szeklerland, and especially with the issue of online promotion and digital communication in recent years. Erős (2013) aimed at exploring the attitudes, opinions and practices of Szeklerland's hospitality units in relation to online communication. The results of the research showed that, although tourism operators consider and are aware of the importance of the promotion and visualisation possibilities offered by online tools, their use is not smooth in practice, which is attributed to a lack of ICT competences on the one hand and the economic situation on the other. Nagy (2019) looked for correlations between the intensity of the online presence of municipalities and tourism traffic data. One of the important conclusions of the exploratory research is that neither municipal websites nor Facebook pages play a particularly important role in increasing tourism traffic intensity, perhaps not yet for municipal websites (as they are less and less used) and not yet for Facebook pages, as they are not yet fully exploiting their content and potential applications. Székely (2021) also examined the role of online communication in the life of tourism businesses in Szeklerland during the pandemic, a period when online activity was even more prominent. The observations made in the analysis are in line with the results of previous studies in the region, which show that social networking sites operated by tourism operators are typically underdeveloped, do not exploit the advantages offered by these sites (interactivity, ease of contact, etc.) and are characterised by static nature, rarely identifying systematic, conscious marketing communication activities. A more specific group of tourism actors, the owners and operators of castles and mansions in Transylvania, have been analysed online by Horváth-Nagy (2021). Furthermore, Tóth-Batizán (2020) also touched upon the analysis of online and offline platforms that are present in the Szekler tourism market and promote Szekler tourism in her research. Vaida (2022) focused on the practices of online presentation of tourism actors in the context of building Harghita County as a tourism destination. The questionnaire research sought to answer how central, mainly destination development efforts contribute to the competitiveness and online presence of tourism actors.

Based on the previous research results, taking into account the changes that have occurred in the last two or three years, mainly due to the pandemic, our own research programme sought to find out whether there are any changes in the marketing communication activities of tourism operators in Szeklerland. On the basis of a series of interviews with the managers of enterprises operating in the tourism sector in Szeklerland, we examined the question of how they relate to online communication, the issue of digitalisation, how they communicate about their services, how they assess the situation of their business after the epidemic period. Our interviewees are either sole traders or operators of small and medium-sized enterprises. We considered it important to study this group because the number of small tourism-related businesses is significant in the Szekler region and they determine the practice of regional hospitality to a much greater extent than larger hotels in cities or larger businesses based on spa tourism. The research was complemented by an online questionnaire survey to measure the marketing communication practices and digitalisation level of the enterprises, as well as a content analysis of the tourism operators' websites and social media presence.

It is not possible to present the results of the research in detail in this paper, so only the main findings are summarised.

3.1 Communication practices

There is a change in the attitude of tourism entrepreneurs towards communication and promotion activities over the last few years (as confirmed by statements made during interviews), and the number of the people, who also consider this aspect of business management important, strive to develop a more or less coherent and distinctive image that allows them to be visually identifiable and increasingly accept the role of marketing communication in sales, is increasing. In practice, however, this is not always reflected, with intentions much stronger than actual implementation. The size of tourism enterprises in Szeklerland and their type of business (individual or small and medium-sized enterprises) also affect communication and sales activities, since in most cases these tasks are carried out by the owners or by a subcontracted employee who does not have the necessary professional skills, due to a lack of human resources and scarce resources. There is therefore a lack of conscious and consistent communication. According to them, little is spent on promotional activities and display tools, and online channels are the most common, partly because they are more cost-effective and partly because they are more effective in reaching tourists than traditional marketing communication tools.

The online presence is very diverse and variable, both in terms of intensity and content. Not all businesses have their own website, but almost all use the Facebook social networking site and some are trying new content-sharing channels (Instagram, Tik-Tok), but this is not the general practice. The communication on social networking sites is random, some entrepreneurs have not uploaded new content for years, others log in a few times a year, but there are also some where there is a desire to maintain a kind of continuity. Communication is mostly one-way, lacking interactivity, sharing engaging, mobilising content and, in general, independent, original content. Photographs are taken (also of varying quality), but there are no videos, animations or longer text descriptions. The photos are shared with a single word, a declarative sentence. This "terseness" is also a feature of the content of the websites, which are mostly limited to a minimum of general descriptive texts. In terms of their function, the websites are only suitable for display and information, as they do not offer any other online services (booking, payment, chat). Overall, the majority of sites are static, lacking in content and interactivity, and are merely informative. There is almost no personalisation, both in the content of websites and on social media channels. The identity of the owner, the "host", is completely hidden from the public. The language of communication is Hungarian, and some websites have content in English and Romanian, but there are many gaps. For non-Hungarian speaking tourists, the amount of information they can find online is therefore very limited. For them, the main sources of information are the accommodation websites (e.g. Booking, Travelminit, Tripadvisor), where most of the tourism service providers are present. The Visit Harghita or Visit Covasna sites, which are programmes initiated by the county municipalities, collect tourist attractions, places and accommodation in the area and promote the region's tourist services, mainly online and through a phone application. These sites offer information in three languages.

As already indicated, the willingness and practice of communication is very variable and is influenced by a number of factors, such as the professional skills and attitudes of entrepreneurs, their attitude to ICT tools, the size of their businesses and the resources available.

As far as the attitude towards digital tools is concerned, it can be noted that the level of digitalisation of most tourism businesses is still quite rudimentary. By the use of digital tools, most of them refer to online communication solutions, i.e. whether they have a website, a social media profile. Although most businesses have their own website and/or are present on at least one social networking site, it is observed that online information dissemination is the most prevalent. Advertising-oriented communication, a lack of personalisation, feedback, interactivity and static content all suggest that the potential of social media is not being exploited. And there is almost no possibility of electronic booking and payment on their own platforms. Operators use various intermediary sites (e.g. Booking, Travelminit) to make reservations and pre-payments, but often are not up to date with these booking systems, which leads to unpleasant situations (e.g. overbooking, unexpected guests, lack of communication).

Tourism operators in general consider the introduction of modern digital tools important and perceive a growing demand, but report barriers that make the process of digitalisation more difficult. Lack of financial resources, trained professionals and the right technologies and digital skills were the main barriers mentioned by most respondents

Based on the interviews conducted during the data collection, as well as our field experiences and preliminary investigations, we have classified the tourism operators into five groups according to their communication practices.

- The *passive* ones, i.e. those operators who do not or only to a very small extent deal with communication and presentation - mainly because they believe in word-of-mouth advertising, that a satisfied guest will bring more guests and that if it has worked so far, it will not change in the future. For them, it's important to build a personal relationship with the guest, but that only happens after the guest arrives on site.
- Another group are the *struggling* operators, those who also spend little or no money on communication, but this is not a conscious decision, it is more a matter of them being small businesses, doing things individually and lacking the professional skills, time and resources.

- A separate group are the so-called "*harriers*", who meet the "obligatory minimum", i.e. they operate a website, are present on social media, have a coherent image, but lack consistency, awareness and professionalism in their communication practices. They are also the ones who expect a third party (e.g. local or county government, tourist offices, TDM organisations) to actually show their presence and attract tourists. They do not see destination marketing as a task in its own right, but they expect it to provide a solution.
- Among tourism service providers, there is a younger group of entrepreneurs who are also small and medium-sized enterprises, they are *innovation-oriented*, the most active in terms of communication, and are characterised by constant experimentation, testing and applying new tools and technologies. They have a multi-platform presence, and their communication and sales practices reflect a fresher, more dynamic approach.
- Although the majority of tourism businesses in Szeklerland are small and medium-sized enterprises, there are a few larger hotels and tourism service providers whose activities are significantly different from the majority, and this is also evident in the level of presentation. The *implementers* use both traditional and modern tools, working with professionals, and as a result the communication content is more conscious and planned, but lacks personality.

4 Summary

The various economic, social and technological changes have a significant impact on the tourism industry, constantly shaping it. In this study, we have highlighted three of these key changes: increasing digitalisation, changing travel habits and needs, and the growing importance of experiences. In this new environment, the role of communication, personal contact with target groups and image enhancement is becoming increasingly important, as the emotional and irrational character of consumer decisions is typically high and the external appearance, the state and quality of the physical environment are decisive in shaping first impressions. Communication activities also need to be adapted to the new, changing needs, i.e. to become digital, personal, experiential and less advertising.

The globalisation of tourism means that these changes are everywhere, and if tourism operators are to remain competitive in the long term, they must take account of and adapt to these new expectations. This is no different for tourism operators in Szeklerland. Our research has shown that they are increasingly aware of the changes and recognise the need to change their communication practices, but this is still less evident in practice. Lack of resources, time, skills, digital technology and competences are cited as barriers, and many expect external help and support.

If we take stock of the communication solutions described, we can see that most of them require tools that tourism operators in Szeklerland already have and do not require significant financial investment (websites, intermediary sites, social media platforms). What is lacking is the production and display of appropriate personalised content, interactivity and ICT competences. Personal content and stories exist, are present, but are not displayed, and are usually known and experienced by tourists during the service provision period. Digital competences are also present in the area, but they can be developed and learned. Involving the younger generations, who already have the appropriate ICT competences, can facilitate changes in the use of tools and display practices. It would be important to complement the existing county-level tourism support programmes with further professional advice and training (even in the form of webinars to make them more accessible), A digital tourism code (containing good practices, international trends, training materials, guides) could be useful for many tourism operators who are willing to change but lack the necessary skills. The further development of the current county-level tourism platforms (visithargita, visitcovasna, visitmures) could strengthen destination-level visibility, which could support the activities of smaller tourism operators.

While adaptation to the new tourism environment is a challenge for tourism operators in Szeklerland, it is not impossible to achieve significant changes, even in a short period of time, with the right professional support and a change of attitude.

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A project-based evaluation of cryptocurrencies using the example of the Sand Dollar project

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Abstract: The greatest achievement of the 21st century is embodied in the advancing digitalisation efforts. Digitalisation is taking hold in all aspects of life and is also bringing significant relief to all economic actors. But to reap these benefits, we need to be comfortable in the online space and in the digital world. Banks and Fintech companies are among the most visible players in digitalisation. In addition to Fintech companies, there are also Regtech companies and Bigtech companies, which are bringing innovative solutions not only in banking but also in various payment solutions. Following this line of thought, this paper aims to present an evaluation of a project from the users' perspective that is related to digitalisation, crypto money, and yet represents innovation and novelty value. The aim of the paper is to present the Sand Dollar project, a project of high importance and exemplary, the evaluation of the scope by users, the assessment of the usefulness of the project and its purpose.

Keywords: Project, scope, users, cryptcurrencies, Sand Dollar

1 Introduction

Thanks to today's advancing digitalisation, more and more financial innovations are appearing in every sector of the economy, and the financial sector is no exception, where the digitalisation imperative is perhaps the strongest. With the emergence of new players, traditional banking players have faced a competitive challenge that they have never seen before. New players have emerged as competitors, from services to payment instruments. In contrast to organisations that are flexible and able to adapt quickly, the traditional financial sector, which is rigid and heavily influenced by rules, can only compete with great effort (Pintér-Bagó, 2020; Pintér et al, 2021). In this paper, I will present a project that aims to introduce a money substitution tool in the wake of digitalisation efforts, drawing attention to its novelty and message. Before discussing the topic, however, it is worth saying a few words about money, clarifying its many functions and explaining in detail the concept of cryptocurrencies and the most important things to know about them. Before we go into these factors in detail, it is important to mention the importance of regulatory issues. One of the major problems of the crisis that escalated in 2008 was that financial markets were left to their own devices by regulators who relied on the self-regulating nature of the market, at a cost of huge losses (Bunikowski, 2015; Lentner et al, 2011; 2015). Cryptoassets, including securities, currencies and other instruments, are not well placed to be regulated. Many studies and research have already drawn attention to the lack of regulation, which poses a threat to the practical functioning of these instruments in many respects.

Money plays a role in the economy like blood in the human body - it moves it, keeps it alive, and controls transactions (McLeay et al, 2014). For money to fulfil its role in the exchange of goods and payments, it must have four basic characteristics (Lee, 2009): it must be durable, sharable, portable, and have intrinsic value. If we look at the traditional functions of money, this is reflected in four characteristics based on the classical economic grouping. Money has the functions of a general measure of value, a medium of exchange, a means of payment, and a medium of circulation (Gillányi, 2006). This means that the instrument called money is capable of all or most of these functions. In the course of the development of money, many instruments have fulfilled the functions of money, ranging from the exchange of goods to money with no intrinsic value. However, the common feature of all money was that it was accepted by members of society and for which they were willing to exchange value. When commodities fulfilled the function of money, the use-value dominated, and in the case of precious metals, their metallic content. In the case of money without intrinsic value, it is trust that keeps the medium of exchange moving and in circulation. It is important to note, however, that confidence requires the state to play an active role in the process. Market participants must have confidence in the issuer of the money and accept that the issuer, even if it is the state, is able to preserve the value of the money by all means. In addition to all this, money has other functions, such as the function of world money, the function of an accumulation instrument and the function of credit. Very few types of money can perform the function of world money, which is significantly limited to the dollar and the euro. However, the credit money function is very important, as commercial banks can increase the amount of money in circulation by creating credit money through their lending activities. This can only be done in the form of banknotes and coins, as central banks are the only ones authorised to issue cash. The accumulation function is also very important, since the treasury function of money is also essential, as it is the basis for the formation of savings (Clower, 1984). It is perhaps with regard to this latter feature that the nature of digital money raises the greatest question. The price of digital currencies, cryptocurrencies, is capable of significant movements, not only over time, but also within days. All these features make it very difficult for the function of accumulation to be exercised, which is also very difficult to control, since the value of the money saved in this form is constantly changing and fluctuating, making it impossible to determine the exact value of the assets. In favour of cryptocurrencies as a store of wealth, it is argued that they are independent of states and are not affected by inflation (Margo, 2016), as their value is entirely determined by supply and demand.

If we take a closer look at the functioning of cryptocurrencies, we can see that among the above listed functions of the monetary instrument, not only the world money and the accumulation instrument functions are in trouble, but all other functions are limited. If we understand money in the function of a means of payment, we have to see that their acceptance is very limited, even though the general consensus is that they are valuable and tradable financial instruments (Kelly, 2014). It is also important to state that the value of cryptocurrencies exists only in a specific ecosystem, as we have seen in the case of the kaori shell. A significant barrier to widespread adoption is also the technological background itself, as well as the various restrictive measures that have been put in place by states (China and India have taken and are taking significant steps to restrict the use and spread of these monetary instruments). When looking at the value-measurement function of new financial instruments, it is important to mention their volatility (Desjardins, 2016), which limits their potential even as a short-term value-measurement function. If we look at their exchange function, we have to see that these funds are very difficult to break down into smaller units, which calls into question their ability to adapt to their commodity value. This is compounded by the existence of the necessary infrastructure. The possibility of a power cut, which could lead to a failure of transactions, would also work against acceptance.

Nevertheless, significant steps are being taken towards the spread and adoption of cryptocurrencies, but it is important to recognise the risks that these solutions entail. Many believe that blockchain-based technology makes fraud and counterfeiting impossible. However, this is not true, and has been confirmed by a number of studies and studies. There are invisible actors behind these solutions, there is no customer insurance behind the assets, which can also be a problem, especially if there are large assets behind these funds. The shirking of the regulatory backdrop also reduces confidence in financial solutions. It is also important to note how different generations of customers perceive these solutions. The use of digital tools is a fashionable and innovative solution for young people from Generation Z (Pintér - Bagó, 2021; Csiszárik-Kocsir, 2022a; 2022b; Garai-Fodor, 2022a; 2022b). Young users are often unaware of the risks and pitfalls of crypto tools. Older users, however, are more cautious, prefer traditional solutions, are more aware of the risks and are more cautious about the purchase and use of alternative payment instruments. The financial literacy and awareness of the user is very important here. It is precisely for these reasons that it is important to assess the project presented below.

2 Material and methodology

The project presented in this paper is one of the top 50 projects published by the Project Management Institute (PMI) (PMI, 2021). The cryptocurrency presented in this paper, the Bahamian Sand Dollar, is unique in that it is the result of a joint collaboration between the government and a card issuing company. It is designed to counter the criticisms made above by providing greater security to the cryptocurrency thus created. The evaluation of the selected project was carried out from the perspective of ordinary people, i.e. there was no prerequisite for inclusion in the sample, neither educational qualifications nor previous knowledge of project management, so that the questionnaire on which the evaluation was based could be completed by anyone. Respondents were asked to rate the selected projects on the basis of some of the factors of project scope (novelty, relevance, feasibility, etc.). Respondents rated the factors listed above on a scale of 1 to 4, with a score of 1 indicating a very weak factor and a score of 4 indicating a very strong factor. There were 172 evaluable responses to the questions. 39.5% of the respondents in the sample had a tertiary education, while 60.5% had a secondary education. 12.2% of the respondents are Generation Y, 23.3% are Generation X and 64.5% are Generation Z. The survey was conducted in April and May 2022.

3 Results

The sand dollar is the first government-backed digital currency. The motivation behind the creation of the currency was that the Bahamas, as an archipelago of more than 30 islands, was a particularly dangerous place to transport cash due to the atrocities that were being committed against shipments. Another objective was to guarantee the security of tourism through the use of digital currency. The introduction of the currency itself is the first government-backed, blockchain-based digital currency. The sand dollar allows citizens to receive and make payments electronically from a digital wallet created for them. All they need is their mobile phone or they can make these transactions using a physical payment card. The project itself was launched in 2018 amid considerable bank resistance. The future goal of the project is to fully integrate the digital currency into Bahamian tourism. The aim is to have widespread acceptance by hotels, taxi companies, cruise operators, tour operators and to be able to pay at major attractions. The sand dollar project could also serve as a learning experience for other countries. There are countries such as China and Sweden that are testing digital currencies, and the lessons that can be learnt from the project could be of interest to them. Mastercard has also joined the project, working with the government to issue prepaid cards that allow users to convert their sand dollar into Bahamian dollars and pay anywhere.

As a first step, we asked users involved in the research to describe the scope of the project in their own words. The result of the word cloud of responses is shown in Figure 1. The most frequently used term, according to the respondents, was digitalisation, followed by the appropriate adjective and the innovative rating. The terms currency, means of payment, cryptocurrency and Bahamian dollar also appeared in many cases. In addition, the project was rated by a smaller number of respondents as secure, goal-oriented and good. There were also respondents who rated the project as rudimentary and redundant.

Figure 1

Interpreting the scope of the sand dollar project

Source: own research, 2022, N = 172

Next, we asked respondents to rate which characteristics of project scope on a four-point scale. Future focus received the highest rating, with respondents giving an average score of 3.66. In addition, novelty was also highlighted with a score of 3.35, as well as utility (3.24) and environmental awareness (3.17). All other scores are mostly below a 3, but none of the attributes falls below 2.5. This shows that the initiative was positively received by potential future users and that its scope was ranked highly.

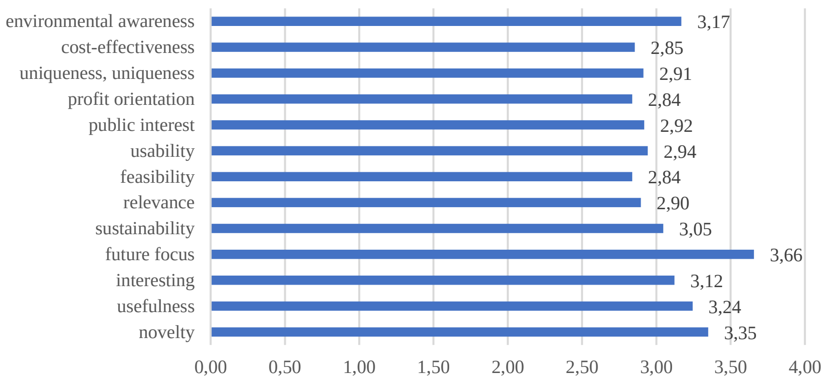

Figure 2

Assessment of the sand dollar project scope along each factor

Source: own research, 2022, N = 172

From a project management perspective and considering the project cycle, the stages of the project are also important. Every project starts with an initiation phase, followed by a planning phase, as recommended by PMI, which must be very thorough to ensure the success of the project itself. With good planning, the third stage, implementation, is a relatively easier task to manage on a day-to-day basis. In addition, continuous monitoring and feedback is very important, and finally, closure is essential, as it is there that we can draw the conclusions that are important for future projects. Respondents also consider that the most important stage of a project is its implementation, rated on a four-point scale. Next to this, they also ranked control as essential, with design ranking only third on average. Initiative, which is the birth of the project idea, scored even lower. These are the stages on which the fate and success of a project depends. This is an important message, as these stages need to be given more prominence in educational activities in order to ensure that future projects can be successful.

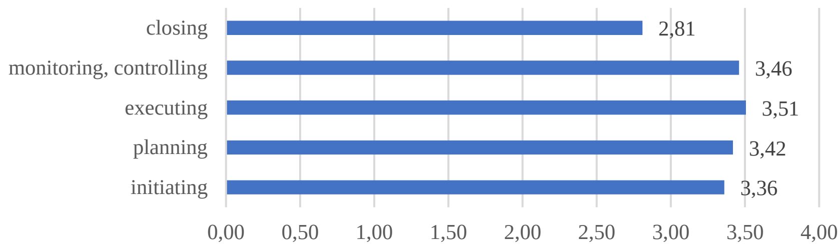

Figure 3

User evaluation of each project phase

Source: own research, 2022, N = 172

4 Summary

Overall, the results of the survey show that the sand dollar project, which is considered to be unique, was well evaluated by the respondents. They understood the essence of the project and also rated its scope positively. However, it is very important to reinforce the importance of planning in the project management phases, as this is not only essential in project management, but also in everyday life. It can also be seen that the vast majority of Generation Z respondents were very positive in welcoming the essence and purpose of the project. This means that young people are open to innovation. However, this puts an additional burden on their education system, where financial literacy is key. Young people need to be made aware of the risks of the digital world in order to become informed users and managers in their future lives and work.

Acknowledgements

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Employer Branding from the Perspective of a Growing Family Business

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Abstract The problems of human resource management of SMEs are examined in this study. Imbalances between labour supply and demand are making it increasingly difficult for companies to find suitable labour. While large companies have already recognised this problem and invested considerable effort in developing their recruitment and employer banding strategies, undercapitalised family businesses with poorly developed corporate structures but growing size are facing serious difficulties in retaining employees and recruiting new staff. In our study, the focus is on family businesses and the impact of the labour market situation on these businesses is examined. Based on the literature reviewed, on the one hand, an in-depth interview with the owners was conducted with the aim of identifying the critical factors affecting the competitiveness and sustainability of the business. On the other hand, based on an analysis of the results of a structured interview of the company's employees, we propose solutions to the problem and identify key efficiency indicators that can be used to monitor the success of the measures. The aim of the study is to assess the perception of the employer brand (Mosley, 2014) and to propose solutions for family business managers to improve the employer brand of the business.

Keywords Family business, employer branding; SMEs; human resource management;

1 Introduction

Family businesses play an important role in the economy (Vágány et al., 2016). In terms of size, most of them can be classified as SMEs and thus their contribution to GDP and their role in employment are significant (Wieszt - Drótos, 2018). The internal factors of economic competitiveness and competitiveness based on resources and capabilities undoubtedly have a significant impact on the success of a company (Barney, 1991).

Domestic firms are facing increasing problems in attracting and retaining the right quantity and quality of labour. Large companies have already recognised this problem and have tried to respond to it in a timely manner. Companies that are consciously planning for the future and have the right strategy are investing considerable energy in developing their recruitment and employer banding strategies. However, family businesses, which are undercapitalised and have poorly developed corporate structures but are growing in size, face serious difficulties in retaining employees and recruiting new staff.

In our study we focus on family businesses and examine the impact of the labour market situation on these businesses.

2 Literature Review

By reviewing the literature, the concept and purpose of employer branding, the specific characteristics of family businesses, and possible means of influencing employer branding are presented.

2.1 Concept and objectives of the employer

Employer branding is the activity of companies that can largely determine the public perception of the organisation among its employees and external stakeholders. By building a successful employer brand, the employer can experience, among other things, improved performance and reduced turnover (Dajnoki - Héder-Rima, 2020). (Dajnoki - Héder-Rima, 2020) The concept of employer branding was first formulated by Ambler and Barrow (1996), who defined employer branding as a tool that can help when a company is suffering from a shortage of staff. (Ambler - Barrow, 1996) Barrow and Mosley (2005) formulate the relationship between the concept of employer brand and brand as follows: 'Employer brands are also based on functional benefits and performance promises. For example, pay for work provided, a safe working environment, the provision of tools for roles and responsibilities. These elements can be taken for granted, but they can also be an important part of the employer brand" (Barrow-Mosley, 2005 p. 58.)

According to Orsody and László (2003), the employer brand can be compared to a product for which the company tries to find the best buyer (in this case the ideal employee). This idea also illustrates the changes in employee behaviour and attitudes and the impact of labour shortages on labour market trends and processes. The concept of personnel marketing has evolved from a market-oriented conception (Bálint, 2014). In definition of Uglyai, personnel marketing is "a combination of measures that encourage employees of a company to stay with the company and to perform at a high level through motivation, and also encourages external applicants from clearly defined target groups to seek jobs offered by the company and gives them a preference over competing companies" (Uglyai, 2005, p. 27) The definition succinctly summarises the main benefits and objectives of employer brand building. Beamery (2017) in his definition, in addition to what has already been mentioned, draws attention to the importance of differentiation. According to this formulation, employer branding is an endless process whereby a company successfully differentiates itself from its competitors and then, by successfully promoting its defined identity, is able to attract and engage potential employees (Beamery, 2017).

2.2 Specific characteristics of family businesses

The economic importance of family businesses is demonstrated by the fact that family businesses account for around 70-90% of global GDP; in most countries, more than half of the workforce is employed by family businesses. In Europe, the share of family businesses is around 70-80%, but their role in North America is even more important, with a share of between 80-90% (Vágány - Fenyvesi - Kárpátiné, 2016).

Defining the exact number and economic importance of family businesses is problematic because there is no single agreed definition (Vágány - Fenyvesi - Kárpátiné, 2016) Kása, Radácsi and Csákné in their 2019 study draw a wide range of definitions, of which Laczkó's definition perhaps best captures the unique functioning of family businesses. (Kása - Radácsi - Csákné, 2019) In Laczkó's (1997) formulation, "Family businesses are run from the family's savings, using the working experience and expertise of family members, with the decisive contribution of family members in the day-to-day work. Strategic decisions are taken by the family. As the decision affects the fate of generations, their vision is generally positive and more optimistic, and their plans cover a longer period than those of non-family businesses." (Laczkó, 1997, p.9.) This definition shows that these businesses often operate on family resources, and therefore their budgets are obviously tight. The definition also highlights the dominant role of family members. In their 2016 study, Vágány, Fenyvesi and Kárpátiné summarise the advantages of running a family business, the most important of which are relevant for this research:

- flexibility;
- adaptability to changes in market conditions;
- openness to new solutions and innovation;
- planning for the long term;
- meeting local needs and playing an important role in local trade (Vágány - Fenyvesi - Kárpátiné, 2016).

2.3 Possible means of influencing the employer brand

The perception of the employer brand can be influenced by the company, but no organisation can completely determine it. A company's employer brand is primarily determined by what its existing and prospective employees think of it. (Dajnoki - Héder-Rima, 2020) It is therefore worthwhile to assess the perception of the brand before influencing it. (Mosley, 2014) The four basic elements for intervention, depending on the results of the survey, proposed by the authors Dajnoki - Héder are:

- Developing a career page that communicates in detail why it is worthwhile to work for the company.

- By improving the application experience and shortening the process, the drop-out rate among potential applicants can be significantly reduced.

- A presence on social media and continuous communication can raise awareness among prospective employees.

- By sharing positive opinions of the company's employees, they can attract new applicants and potential candidates (Dajnoki - Héder-Rima, 2020)

2.4 Introducing of the business

The company analysed in this study is located in Győr. The main activity of the company is photocopying and other paperwork. The business was founded in 2004 by a young couple.

The main motivation of the founders was to leave the status of employees. One of the founders used to edit a column in the daily newspaper Kisalföld, and his partner worked for a company servicing photocopiers. Both felt that they were more creative than to be satisfied with their positions in companies and the remuneration they received. Both of them were close to the printing industry and had gained a lot of expertise in this field during their years of employment.

Győr experienced rapid development in the early 2000s. The Széchenyi István University of Győr was expanding, and as a result, more and more students were studying in the city. This trend continues to this day. At the time of its foundation, it was not so common for people to have all the tools in their homes to produce and print the documents they needed for their studies or work. In any case, university studies have a high overhead cost, so most university students did not have a printer in their rented accommodation. Smart devices didn't make their lives any easier. Notes could not simply be photographed with their phones and stored in their memories, but had to be either written by hand or photocopied from borrowed notes. The founders recognised and took advantage of the rapid development of the university and the increase in the number of students when they started their business. The needs of the students in Győr were well assessed by the founders, and a company was created to provide a service that was in short supply in the area at the time.

As the business has evolved, it has added many new services. In addition to printing and photocopying, the first business was diploma binding. Meanwhile, the town continued to grow and the university expanded with a large technical wing. More and more construction and industrial expansion started, and design copying and folding quickly became part of the business. The range of potential customers was widened, as from then on they were able to serve not only students but also construction companies.

3 Methods

The primary research method was an in-depth interview and a questionnaire survey.

In the depth interview was conducted with the owners of the business. The aim was to explore the philosophy and communication of the business, the elements of the employer brand communicated to employees and potential employees.

The interview was processed through content analysis, and the information obtained was then organised using McKinsey's 7S model tool. The 7S model, based on the responses, was used to identify the main negative trends experienced by employers.

A questionnaire survey was conducted among employees to assess their current perception of the employer brand. Employees were asked to rate their workplace on a scale of one to ten (1= least agree; 10= strongly agree) according to the questions provided.

The Barrow and Mosley wheel dimension measures individual employees' perceptions of 12 essential elements of their employer brand.

Respondents were asked to rate each of the 12 elements on a scale of one to five, with 5 being the most positive and 1 being the most negative. The items are then arranged in a radius shape, with the scores assigned to the radii. The points of the given values are connected to draw an area inside the circle. A larger area indicates higher employee satisfaction (Kajos - Bálint, 2014). Employee satisfaction and loyalty were measured by calculating the Net Promoter Score (NPS). The method, developed by Fred Reichheld, consists of asking respondents to answer a question on a scale of one to ten about how much they would recommend the company to their friends. Based on the answers given, three groups can be distinguished: supporters (score 9 to 10); indifferent (score 7 to 8) and detractors (score 0 to 6) (Chovan, 2017)

The results were also used to plot the wheel dimension diagrams of each employee. The diagrams can be used to identify the putative causes of employee dissatisfaction.

4 Results

Employee satisfaction results are preceded by a description of the external and internal environment of the company. The results are summarised on the basis of an interview with the founders of the company.

4.1 The external and internal environment of the business

The external macro-environment of the company was analysed using the STEEP analysis, the micro-environment using Porter's five forces model and the internal environment using McKinsey's 7S model. In this paper, only the SWOT analysis summarising the results of all three analyses is presented (Figure 1).

Strenghts: - family atmosphere - wide range of products - competitive prices - proximity to the university - punctuality, reliability	**Weaknesses**: low capacity - high turnover of staff - procurement difficulties - long-term return on investment - lack of a corporate governance system
Opportunities: - EU tenders offer the opportunity to upgrade their machinery at a more favourable price - the proximity of the university and the exemption from income tax for under-25s make it possible to employ students on favourable terms	**Threats**: - Competitors entering the market - digitalisation - rising prices due to inflation and strong bargaining power of suppliers - environmental trends - labour market trends

Figure 1
SWOT analysis of the enterprise
Source: Based on primary research own editing

4.2 Results of employee satisfaction survey

Results of employee satisfaction survey

To measure employee satisfaction, a full questionnaire survey was conducted among the company's employees. A total of 6 subordinates employed by the company were interviewed. In order to evaluate the overall picture and to formulate recommendations, a chart was prepared from the average of the responses using Barrow and Mosley's wheel dimension.

Using the average chart (Figure 2), it can be concluded that employees are mainly dissatisfied with the internal communication of the company. In addition, the area of the reward system and the quality of the working environment were identified as critical areas for improvement.

Figure 2
Employee satisfaction (average of responses)
Source: Based on primary research own editing

Performance management and opportunities for development scored medium, so improving these factors could also increase overall satisfaction levels.

The calculation of the NPS (real customer support system) indicator could also be a suitable tool to measure employee loyalty and satisfaction. The overall NPS indicator of the company is illustrated in the Figure 3.

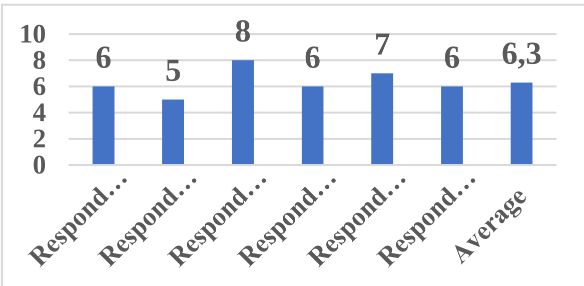

Figure 3
Employee satisfaction (average of responses)
Source: Based on primary research own editing

The NPS indicator has taken a value of 6.3, which shows that the majority of reviewers are in the company. Two employees belong to the indifferent category, while unfortunately none belong to the satisfied group. However, it is reassuring that no employee is extremely dissatisfied.

The questionnaire survey also showed that the owners perceived the benefits of working for them well. Flexible working hours, a family-friendly attitude and employee benefits were highlighted by employees as positive aspects of working for the company.

5 Discussion

The results of the research show that employees of the company currently have a critical attitude towards their employer. The main causes of employee dissatisfaction are the quality of communication within the company, the inadequacy of the reward system and the inadequacy of the working environment. These are the first areas where owners are advised to take corrective action. Various ad hoc services are available to improve internal communication (e.g. involvement of a communication specialist in processes, participation in team-building training), which can help to remedy the problems. Monitoring of competitors and market research are recommended to improve the reward system. If the same or slightly higher rewards than competitors are available in the company, overall satisfaction may increase. Improving the working environment is perhaps the easiest and quickest measure to implement. It is important for owners to find out about the needs of their employees before doing so, and then to adapt the business premises accordingly. By improving these three factors, satisfaction in other areas is likely to reduce turnover and increase employee referrals.

Conclusions

The research examined the impact of the labour market situation on the competitiveness of an expanding family business. After a brief overview of the concept of employer brand and the tools to influence it, the current situation of the employer brand of the enterprise was examined. An in-depth interview with the owners was used to analyse the 7 S model of the enterprise and to identify the main negative trends experienced by employers. A questionnaire survey of employees the NPS indicator of the company was calculated and the Barrow-Mosley wheel diagram was drawn based on the wheel dimension diagrams of each employee. The diagram was used to identify the likely causes of employee dissatisfaction and to suggest ways to improve them. The survey of employees in this research can be used as a starting point and as a model for measuring the success of improvement measures.

Acknowledgement

We would like to thank the owners of the company for allowing us to carry out and publish the research, as well as thank the employees of the company for their cooperation and for their honest, constructive attitude. We hope that the research provides ideas for businesses in a similar situation. Also, we hope that the study will draw the attention of SMEs that may find themselves in a similar situation in the next period..

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Social Media Marketing: How do Pet Influencers on Social Media Affect Consumers' Purchase Intention?

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Abstract: Given the popularity of non-human social media influencers, this study aims to analyze specifically pet influencers. Previous studies have analyzed how social media influencers affect consumers' purchase behavior. However, when it comes to the pet influencer domain, there is still a lack of relevant research as more and more pet influencers are also starting to promote their online presence through social media platforms. Using a quantitative analysis of pet influencers' attributes and consumers' perceived characterizations, this study focuses on how pet influencers affect consumers' purchase intention, taking into account pet influencers' special attribute of anthropomorphism. By exploring factors affecting consumers' purchase intention, this study helps social media pet influencers to find effective advertising appeals to promote products. The data of this study were collected through a questionnaire with a sample size of 250 social media users following pet influencers in China. The collected data were analyzed through Hayes Process Macro SPSS. This study finds that attitude homophily, social attractiveness, and use of anthropomorphism indirectly affect consumers' purchase intention by influencing consumers' trustworthiness, perceived expertise, and parasocial relationship with pet influencers.

Keywords: Social media influencer marketing; Pet influencers; Anthropomorphism; Adopted theory of persuasion; Purchase intention

1 Introduction

1.1 Background of the study

Social media platforms are gaining increasing popularity in recent years. Over 3.6 billion people are using social media across the world in 2021, which increases by 26% compared to 2017 (Wei et al., 2021). Under the trend of user-generated media, where the users can post self-created content and gain followers to become the leading creators, the concept of social media influencers is gradually formed

(Masuda et al., 2022). To be more specific, influencers act as advertisers, brand promoters online, and friends building parasocial relationships with followers and increasing the possibility of purchasing (Castillo & Fernández, 2019). Working with social media influencers is becoming more common among brands that are taking advantage of this new opportunity to connect with their target audiences (Masuda et al., 2022).

Among millions of influencers on social media, one of the popular and emerging trends is the pet influencers. According to Jacobson et al. (2022), influencers are defined as individuals who have attracted a large number of followers. In this paper, the pet influencers are defined as individuals whose social media accounts focus on pet content and have received a large following. There is a specialized classification for pets on *Bilibili*, which is one of the most popular video-sharing websites in China (Chen, 2021). The most popular pet account gains millions of followers, which draws the marketers' and brands' attention because influence brings engagement (Myers et al., 2022). There are several reasons behind the popularity of pet influencers. The distinct difference between pet influencers and some other types of social media influencers is that pet influencers' followers first intention is to entertain themselves by the content on social media (Myers et al., 2022). Also, followers are likely to follow the pet influencers out of their spontaneous needs to interact with the pets. Therefore, the followers are more likely to engage in the advertisement content for the reason that it correlates with their interests. Additionally, according to Lloyd and Woodwise (2013), animals are employed in advertisements to help people feel included in or be able to relate to the message being conveyed. Pet influencers are gaining increasingly more opportunities on social media for commercial value.

The promoted products of pet influencers are not limited to pet care products only. On *Bilibili*, a pet influencer with 1.6 million followers posted several native advertising videos. The promoted products vary from skin care products to vacuum cleaners. The most famous one winning 12.81 million times of views is a story about a pet cat helping a mouse to prepare for its wedding ceremony. It turns out to be a sponsored native advertising video for a soft drink brand at the end of the video. According to Myers et al. (2022), the famous Grumpy Cat earned net worth of $100 million. Little pets have huge potential on social media nowadays.

Anthropomorphism is a common method used by pet influencers in animal advertising videos. For example, the famous pet influencer on *Bilibili* mentioned above has a video in which the cat decides to lose weight to get a girlfriend. The promoted product in this video is a soft drink that claims its attribute health. Anthropomorphism is defined as the tendency for people to attribute human features, senses, ideas, and intentions to nonhuman beings, such as animals (Apaolaza et al., 2022). According to Jacobson et al. (2022), advertisements using animals as allegories are characterized by animals anthropomorphized to imitate human behaviors. This method is proved by Lerner and Kalof (1999) to be the least controversial and almost the most efficacious way to get animals involved in ads to promote.

1.2 Purpose of the Study

The purpose of the study is to discuss how pet influencers on social media affect consumers' purchase intentions. As increasingly more pet influencer accounts become popular on social media, the deeper reasons behind the phenomenon affecting consumers' purchase intention are worthy of exploration.

In the social media influencer marketing domain, no previous study has specifically discussed about how pet influencers affect consumers' purchase intention. The study developed by Masuada et al. (2022) discusses how influencer attributes affect the consumers' purchase intention in social media influencer marketing. The study does not subdivide the specific types of influencers. However, when it comes to specifically pet influencers, different attributes can be taken into account to make it more accurate to analyze non-human influencers. Anthropomorphism, which is a significant feature of pet influencers, is a method that had been proved a long time ago to successfully make consumers respond positively (Jacobson et al., 2022). This study aims to take anthropomorphism into consideration in the influencers' attributes to test its effects on purchase intention.

1.3 Research Objectives

By combining the model of the adopted theory of persuasion and the theory of anthropomorphism, how effective the attributes of pet influencers contributing to consumers' purchasing intention is will be explored and discussed.

Based on the pet influencers' attributes influencing consumers' perception, possible effective advertising appeals for pet influencers to attract consumers will be explored and discussed.

1.4 Significance of the Study

Pet influencers' gaining popularity on social media has become an important phenomenon especially after the pandemic situation. Exploring why and how this phenomenon happens helps to find out consumers' common psychological reasons or common clues hiding behind them. The practice of involving animals in advertisements to promote is common. According to research about the Swedish dairy business on social media (Linn'e, 2016), the depiction of cows in advertisements improved consumer sense of the dairy industry as being compassionate and moral. Animals or pets can effectively improve the audience's perception of the brand or product. The development of social media provides a business model different from celebrity endorsement in that social media influencers build community with their followers and convert the followers to potential customers for the brands (Jacobson et al., 2022). The popularity of pet influencers provides a new way of promotion by affecting the consumers' perceived characterization of the influencers (Masuda et al., 2022). For example, according to Jacobson et al. (2022), pet influencers show the usage of products in their daily routine, which becomes persuasive to the followers when there is a parasocial relationship between them. The parasocial relationship is the followers' perceived characterization of the influencers, which can influence the consumers' purchase intention towards a brand or a product. In order to find the inner relationship of such a phenomenon, this thesis develops an insight of how the pet influencers' attributes affect their perceived characterizations of the influencers, thus influencing the purchase intention.

1.5 Theoretical Framework

1.5.1 Adopted Theory of Persuasion (Masuda et al., 2022)

Adopted theory of persuasion is adopted from one branch of the persuasion theory which used the elaboration likelihood model (ELM). This model defines two avenues of persuasion: the more elaborative central and the less elaborative periphery. In the peripheral route, a person evaluates the communication source's attractiveness without careful deliberation. It is designed to facilitate heuristic persuasion, in which individuals' ideas or convictions are influenced by interpretations of the authenticity of information sources. The theory of persuasion is applied to social media influencers by considering influencers' characterizations, which is directly related to the credibility, as influencing factors of behavioral intentions. The theory further considers that influencers' personal attributes decide followers' characterizations of them. 3 characterizations are defined as followers' perceived characterizations for influencers: trustworthiness, perceived expertise, and PSRs. Influencers can be distinguished by three qualities that have been found to be particularly significant: attitude homophily, physical attractiveness, and social attractiveness (Masuda et al., 2022).

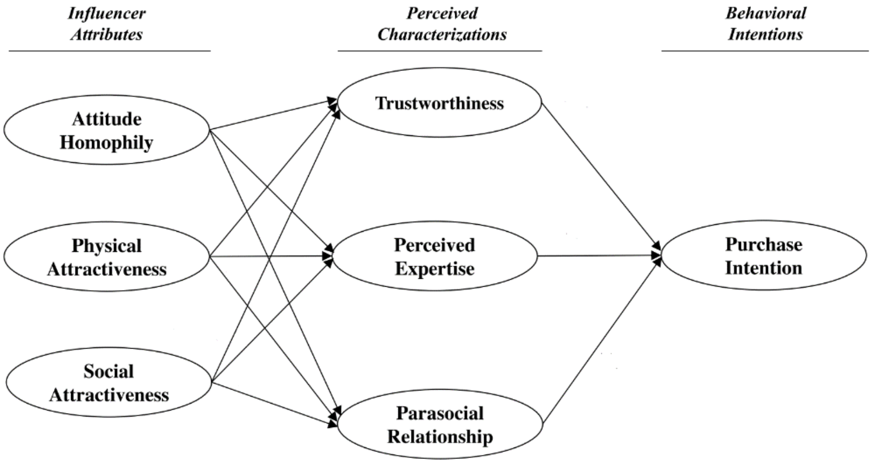


Figure 1: Theoretical Framework - Adopted theory of persuasion

1.5.2 Theory of Anthropomorphism (Wan & Chen, 2021)

The theory of anthropomorphism developed by Wan and Chen (2021) discusses how anthropomorphism satisfies people's needs in three domains: comfort and pleasantness, self-identity, and self-efficacy. When people's needs for these 3 aspects are satisfied by anthropomorphism, the object attachment will be strengthened because the satisfaction stimulates people's positive feelings and evaluations of the objects. While people's needs for these 3 aspects are threatened by anthropomorphism, it decreases people's degree of object attachment by arising people's negative feelings about the objects.

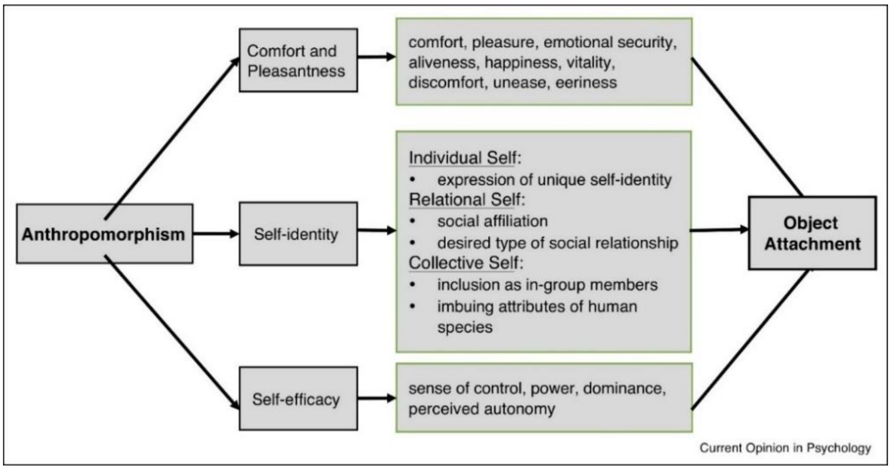


Figure 2: Theoretical Framework – Theory of Anthropomorphism

1.6 Conceptual Framework

Based on the literature review and combined with the 2 theoretical models, the conceptual model is presented in Figure 3. The physical attractiveness of influencers is replaced by use of anthropomorphism. In the study conveyed by Masuda et al. (2022), physical attractiveness focuses on the appearance of a human. When it comes to pets, their physical attractiveness tends to be evaluated as cute in general. The difference in physical attractiveness between different pets is not that significant.

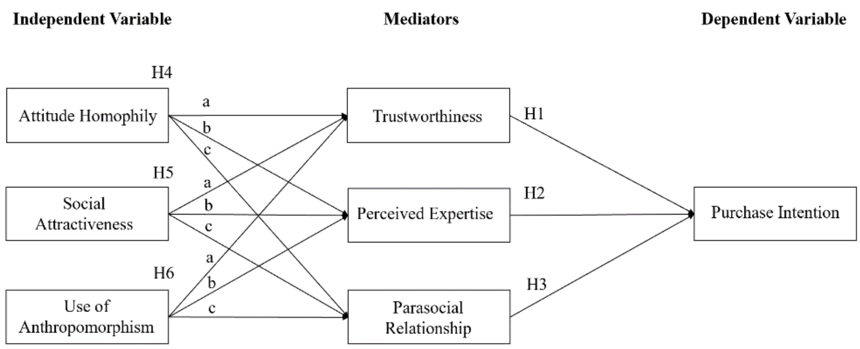


Figure 3: Conceptual Framework

1.7 Hypothesis Development

H1: Trustworthiness positively influences purchase intention.

H2: Perceived expertise positively influences purchase intention.

H3: Parasocial relationship positively influences purchase intention.

H4a: Attitude Homophily positively influences trustworthiness.

H4b: Attitude Homophily positively influences perceived expertise.

H4c: Attitude Homophily positively influences parasocial relationship.

H5a: Social attractiveness positively influences trustworthiness.

H5b: Social attractiveness positively influences perceived expertise.

H5c: Social attractiveness positively influences parasocial relationship.

H6a: Use of anthropomorphism positively influences trustworthiness.

H6b: Use of anthropomorphism positively influences perceived expertise.

H6c: Use of anthropomorphism positively influences parasocial relationship.

2 Literature Review

2.1 Pet Influencers on Social Media Platforms

With the increasing diversity of advertisements and the development of social media, the popular ways of product promotion vary from traditional advertisements with celebrity endorsement to social media influencers' advice and recommendation. According to Jacobson et al. (2022), social media influencers are defined as people who have accumulated a bunch of followers on social media platforms. Social media influencers work to develop a sense of community with their audience, which includes potential clients for brand partners, and a sense of trust is built through authenticity. Social media influencer marketing has similarities with celebrity endorsements in traditional mass media, but the interaction between social media influencers and their followers focuses more on content (Lou and Kim, 2019). The practice of micro-celebrity has been used by social media influencers as a self-presentation strategy to post their updated status. The strategy is also used by many social media users to build friendly relationships with their followers, who are addressed as fans in this strategy, rather than just serving the ego for themselves (Ngai, 2022).

Among all kinds of social media influencers, pet influencers have the highest engagement rate according to market research. Animals participate in social media by the means of widely-spread pet memes to famous pet influencers (Baklanov, 2021). According to a survey carried out by the world's largest petcare company, 65% of pet owners showed a frequency of 2 times a week to post pet-related content on social media platforms, and 17% of pet owners had registered a separate social media account focusing on their pet (Mars Petcare US, 2016). During the COVID-19 period, people have less human contact, resulting in the phenomenon of a higher degree of dependence on both pets and social media platforms. The phenomenon of keeping pets and posting them to social media platforms becomes more common for pet owners, which contributes to the booming of social media pet influencers (Ngai, 2022).

2.2 Theoretical Framework and Hypothesis Development

2.2.1 The Adopted Theory of Persuasion Framework

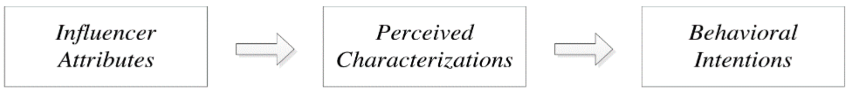


Figure 4: The adopted theory of persuasion

The adopted framework was proposed by Masuda et al. (2022), which is adjusted from the theory of persuasion for social media influencer research. The Persuasion

Knowledge Model proposed by Friestad and Wright (1994) is one of the important theoretical bases in this field. It analyzed how consumers understand persuasive behavior through identification and assessment as well as how they deal with it. Consumers' attitude towards dealing with persuasive behavior was usually considered to be defensive. However, a study of persuasive advertising claimed that persuasive behavior may also bring entertainment and knowledge about products to consumers (Verlegh et al., 2015).

Various models are used in the persuasion theory. The ELM model is also one of the most influential models in persuasion theories, which divided the routes of persuasion into central and peripheral to analyze the changes in attitudes. The strength, durability, and resistance of the consumers' strength may differ as the route varies. The ELM model integrated the four classical sources, which include source, message, recipient, and context, to evaluate their effects on the persuasion process based on different routes (Shrum, 2012). The persuasion knowledge model focuses on the persuasion process in the marketplace, which evaluates the consumers' acquisition of the intention and strategies used in marketing communication. In other words, the degree of persuasion knowledge acquisition affects the consumer's awareness of the methods, timing, and purposes of the marketers, resulting in skeptical and critical thoughts or evaluations in marketing messages (Myers, 2022). The source effect model is used to evaluate the persuasion contexts in a study of influencer marketing. The model illustrates that the effectiveness and degree of receiving in the communication process are influenced by the features of the communication source. The factors influencing the source effect include source credibility, attractiveness, similarity, source visibility and identity, etc. (Farivar, 2021).

2.2.2 Perceived Characterizations

2.2.2.1 Trustworthiness

According to Van der Waldt et al. (2009), trustworthiness refers to the honesty, integrity, and believability the endorser possesses. The degree of loyalty and trust between customers and influencers has a significant role in the long-term success of the connection between the two parties, as well as in the sales of the products and endorsed brands. (AlFarraj et al., 2021). Trustworthiness is included in the contrast of source credibility, which means communicators' positive features that affect the receiver's perception when accepting the message (Pornpitakpan, 2004).

In the research of celebrity endorsers, Pornpitakpan (2004) aimed to verify the study of the credibility dimension conducted by Ohanian in America (1991), which proved expertise to be the only factor affecting the purchase intention significantly. High attractiveness and low trustworthiness were seen as common characteristics of celebrities by the audience, so the 2 factors were easy to be ignored. However, research focusing on Asian groups showed that trustworthiness led to better outcomes in regard of purchase intention. Given the fact that Singaporeans are collectivists, which is different from the individualism in America, they need to ensure a sense of interpersonal trustworthiness in the connectedness in celebrity endorsement (Singelis, 1994; Pornpitakpan, 2004). To examine the results with cross-cultural generalizability, Pornpitakpan used the questionnaire development method in Singapore and successfully supported the hypothesis that trustworthiness affects purchase intention positively for Singaporeans.

Because of the sense of insecurity and uncertainty caused by the inability to interact face-to-face on the internet, trust is considered a crucial stimulator in purchase behavior over the internet (Dutta & Bhat, 2016). In the research of social media influencer marketing, the trustworthiness of influencers was proved to have both indirect and direct positive affect on consumers' purchase intention, using a sample size of 76 valid respondents and the data analysis method of SmartPLS 3 (Saima & Khan, 2020).

As a result, the following hypothesis is proposed:

H1: Trustworthiness positively influences purchase intention.

2.2.2.2 Perceived Expertise

The weight of source expertise in persuasion was predicted to be affected by three dimensions of culture, including power distance, uncertainty avoidance, and individualism-collectivism (Pornpitakpan & Francis, 2000). The source credibility model counts both source trustworthiness and source expertise as crucial dimensions in illustrating the influence of endorsements on consumer behavior (Hovland & Weiss, 1951). In the source credibility model (Hovland & Weiss, 1951), the definition of source expertise is the degree to which a communicator can be seen as a source of a valid and credible assertion. A study involving expert influencers in electronic product promotion shows that expert influencers increase consumers' purchase intention by exhibiting a positive effect on brand attitude using the questionnaire with a sample size of 421 responses (Trivedi & Sama, 2020).

A study of expertise in the social media influencer domain defines expertise as the degree of followers' perception of experience, knowledge, qualification, and reliability for influencers (Ki et al., 2020). The level of knowledge and experience will be taken into consideration when the consumers decide whether to buy the products endorsed by social media influencers or not (Weismueller et al., 2020). According to a study focusing on pet influencers on social media, when consumers are seeking knowledge of pet caretaking or pet-related purchases from the pet influencer for their expertise, the pet influencers are demonstrating their opinion leadership among their followers (Hänninen, 2021).

Hence, the following hypothesis is proposed:

H2: Perceived expertise positively influences purchase intention.

2.2.2.3 Parasocial Relationship

Compared to traditional celebrity endorsement, social media influencer marketing increases the followers' degree of engagement slightly (Arora et al., 2019). The way of communication that celebrity endorsement delivers information to the audience is one-way, which means the audience has no access to respond to the celebrity (Yuan & Lou, 2020). However, the followers can build a parasocial relationship with the social media influencers through the way of making comments or liking the content posted by the influencers on social media platforms, which can be seen as limited two-way communication (Masuda et al., 2022).

According to two different research, purchase intention is positively affected by parasocial relationships (Hwang & Zhang, 2018; Chung & Cho, 2014; Colliander & Dahlén, 2011). The previous study about television hosts shows that consumers' exposure is greatly influenced by the parasocial relationship between television viewers and the hosts on the shopping program, thus encouraging the viewers' intention to purchase the products promoted (Kim & Kim, 2015). Research on vloggers shows that consumers' desire for luxury brands was triggered by the comparison of luxury possessions to what the vloggers own. Consumers' perception of the brand can be positively influenced by parasocial interaction between consumers and vloggers, thus increasing the purchase intention (Lee & Watkins, 2016).

Thus, the following hypothesis is proposed:

H3: Parasocial relationship positively influences purchase intention.

2.2.3 Influencer Attributes

2.2.3.1 Attitude Homophily

According to the source attractiveness model, the communication source that makes consumers feel attracted includes three aspects: likability, similarity, and familiarity (McGuire, 1985; Frank & Mitsumoto, 2021). In the field of social media influencer marketing, homophily is adopted as one of the dimensions of source attractiveness. If a listener deduces that an influencer's attitudes are similar to their own, they will be more likely to agree with the influencer's opinions (Kim & Kim, 2021). Trust can be built between the followers and influencers by the source attractiveness, which comes from the perceived similar background and consistent arguments created by the perceived homophily (Frank & Mitsumoto, 2021).

Another study about the perceived credibility in eWOM proves that members' homophily significantly and positively affects the source trustworthiness by analyzing the data of the questionnaire with a sample size of 402 valid respondents from a fashion website's members. Trustworthiness in this study is measured by the credibility of the information source delivered to the members of the fashion website (Chih et al., 2020). When information senders and recipients are homophilic in their online communication experience, the credibility of the information source is higher. (Brown et al., 2007). The study conveyed by Sokolova and Kefi (2020) also proves the result that attitude homophily is positively related to the credibility of influencers, which is defined as the degree of trustworthiness and reliability in this study. Finding similar values in another individual is explained as the process of internalization (Djafarova & Rushworth, 2017).

Thus, the following hypothesis is proposed:

H4a: Attitude Homophily positively influences trustworthiness.

A study examining the effect of homophily on video bloggers in the beauty product industry shows that perceived expertise can be influenced by 4 dimensions of homophily, including attitude homophily (Ladhari et al., 2020). Compared to other information sources, people in support groups that use computers for mediation can do better in conveying empathy and providing emotional support because of a higher degree of homophily (Wright & Bell, 2003). Wang et al. (2008) conducted a study of online health information as the internet develops and provides more access to health information both through online websites and discussion rooms. Expertise and trustworthiness were considered as two primary dimensions of credibility in this research. The experiment detected that homophily had positive effects on the persuasion of online users in regard to online health information based on perceived credibility. The higher degree of homophily of the online health information stimulus can increase the possibility of users' accepting the advice.

Accordingly, the following hypothesis is proposed:

H4b: Attitude Homophily positively influences perceived expertise.

A study focusing on Instagram and YouTube bloggers' promotion defined attitude homophily as the extent to which people were willing to bond with other people that are similar to them. Attitude homophily is considered the factor explaining the relationship built based on influence or interpersonal communications (Sokolova & Kefi, 2020). One research found that attitude homophily acted as the bridge to fill the gap between the endorsers' characteristics and the consumer-celebrity parasocial relationships. The perceived attractiveness and expertise of celebrities were considered separately as the antecedent factor of perceived attitude homophily and respect for the celebrity using the structural equation model. In this way, the parasocial relationship was built between the celebrity and the consumer to create a positive brand attitude (Zhang et al., 2021). Furthermore, a study conducted by Turner (1993) showed that homophily is a critical factor influencing the strength of parasocial relationships, especially in the aspects of attitude, appearance, and background homophily.

Thus, the following hypothesis is proposed:

H4c: Attitude Homophily positively influences the parasocial relationship.

2.2.3.2 Social Attractiveness

Social attractiveness is measured by the degree of followers' willingness to build an emotional link with the influencers beyond simply giving thumbs-up on the social media platform (Masuda et al., 2022). A study about anthropomorphic interfaces in the computer domain defines social attractiveness for anthropomorphic interfaces as the combination of likable, sociable, friendly, and personal. Social attractiveness can increase users' trustworthiness in computers, which is suggested by the promotion of the users' social responses to anthropomorphic interfaces (Lee, 2010). In a study examining the perceived trustworthiness in Facebook profiles, social attractiveness was counted in the assessment process of the profile owners' trustworthiness (Toma, 2014). Social attractiveness, which was included in positive social judgments, was found to have a curvilinear relationship with the number of friends. Sociometric popular individuals, which is measured by the number of friends, tend to be more trustworthy. As social attractiveness goes up to a point, the number of friends increases while it decreases after social attractiveness exceeds the turning point (Tong et al., 2008).

As a result, the following hypothesis is proposed:

H5a: Social attractiveness positively influences trustworthiness.

Social attractiveness was examined to positively relate to sociometric popularity, which is measured by the number of friends (Tong et al., 2008; Jin & Phua, 2014). The credibility of celebrities with a larger number of followers is generally considered to be higher (Jin & Phua, 2014). As mentioned before, both trustworthiness and expertise are counted as critical dimensions of the source credibility (Hovland & Weiss, 1951).

Thus, the following hypothesis is proposed:

H5b: Social attractiveness positively influences perceived expertise.

In Yuan and Lou's study (2020), trustworthiness, expertise, similarity, and attractiveness were considered as four determinants of source credibility that are positively related to the parasocial relationship. Attractiveness in this study includes both the physical and social attractiveness of a media persona. In a study of the parasocial relationship in Harry Potter in different cultures, attractiveness was divided into physical attractiveness, social attractiveness, and task attractiveness, which separately indicated the characters' physical appearance, personality and agreeableness, and competence and success. Compared to physical attractiveness, social attractiveness was considered to be a more significant predictor influencing parasocial relationships (McCroskey & McCain, 1974; Rubin & McHugh, 1987; Schmid & Klimmt, 2011).

Accordingly, the following hypothesis is proposed:

H5c: Social attractiveness positively influences the parasocial relationship.

2.2.3.3 Use of Anthropomorphism

The use of animal spokes characters in advertising is increasing (Phillips et al., 2019). Spokes-characters are defined as imaginary or virtual characters to endorse the products. Studies have found that anthropomorphism in brands could contribute to the cognitive process of consumers' internalization of the brand by considering the brand as entities with their thoughts, reasons, and feelings (Tuškej & Podnar, 2018). The research found that anthropomorphized objects could also induce similar cognitive processes even when people know the anthropomorphized didn't have humanlike features (Chartrand, 2008; Epley et al., 2007). People's way of understanding the world tends to be related to their own experiences. Because of this mechanism, interactions and interests with the spokes characters or any brands associated with the spokes-characters can be aroused in the promotion process (Delbaere et al., 2011). Many companies use anthropomorphized animals as spokes characters, in which the audience can see their personalities (Sheehan, 2020). Relevance between anthropomorphized spokes character and the products will affect consumers' perceptions of spokescharacter trust positively (Garretson & Niedrich, 2004). Relevance means the extent to which the spokes character is deemed appropriate for the product associated with the promotion (Sheehan, 2020). Employing an anthropomorphized spokes character is to use a symbolic object to promote the products with conveying a brand's personality (Callcott & Phillips, 1996). Strong brand personalities of a product contribute to consumers' unique and harmonious links with the brand. It further creates strong emotional bonds between the brand and consumers, which increases consumers' loyalty and trust in the brand ultimately (Kyung & Sung, 2010).

Using anthropomorphized spokes characters to project positive emotions, which include feelings of trust and loyalty, is a common practice in the marketplace (Khogeer, 2013). According to research on anthropomorphized messengers, people who have lower interpersonal trust, which means the tendency to believe in other people's words and commitments or rely on someone else (Rotter, 1967), are more likely to trust in and be persuaded by anthropomorphized messengers because they think humans are lacking in good intention and unreliable (Touré-Tillery & McGill, 2015). People involved in object anthropomorphism can feel the emotional response of a sense of comfort and pleasure (Wan & Chen, 2021), which positively affects consumers' trustworthiness in the background of electronic commerce (Belanger et al., 2002).

To conclude, the following hypothesis is proposed:

H6a: Use of anthropomorphism positively influences trustworthiness.

Currently, the literature on the relationship between anthropomorphism and perceived expertise mostly focuses on the anthropomorphism of artificial intelligence or brands. A study of the anthropomorphism of computers found that a doctor-like virtual character can trigger the users' expertise heuristic by affecting how people evaluate the credibility of health-related information (Kim & Sundar, 2012). Another study of automated vehicle technology applies anthropomorphized systems with a “personality” to make it more expert-like to make users feel more trustworthy. Both anthropomorphism and expertise are counted in the factors affecting trust (Ekman et al., 2017). A study examining how anthropomorphism affected consumer-brand identification indicated that anthropomorphism could strengthen consumers’ tendency to collaborate with the brand, creating closer and more private connections with the brands. Thus, consumer-brand identification would be positively influenced (Tuškej & Podnar, 2018), which is determined by corporate ability and corporate social responsibility. Corporate ability association was defined as the degree of expertise to deliver services or produce goods and other dimensions that summarized the company’s attributes. The perceived expertise of employees and manufacturing were included in the dimensions to evaluate a company’s corporate ability (Fatma et al., 2016).

Thus, the following hypothesis is proposed:

H6b: Use of anthropomorphism positively influences perceived expertise.

One determining factor of anthropomorphism is sociality (Epley et al., 2007), which suggests that the object people attach anthropomorphism to can work as a substitute for a relation target in human society. Anthropomorphizing abstract objects helps to strengthen the connection with other people, enriching people’s rational selves (Wan & Chen, 2021). The memory of a relationship with one specific person can be triggered by anthropomorphism. The degree of this kind of perception depends on how strong the tendency of anthropomorphism is (Kwok et al., 2018). On the other hand, anthropomorphized objects stand for a good image in people's desired relationships (Wan & Chen, 2021).

The phenomenon that consumers form a pseudo-social relationship with influencers on social media is similar to the process media personalities expose repeatedly to the audience, making the audience develop a feeling of intimacy (Masuada et al, 2022). In the theory of parasocial relationship, a parasocial relationship is defined as a relationship in which the audience develops an illusion of intimacy and considers it to be an interpersonal relationship with the performer in real life (Dibble et al., 2016). The parasocial relationship is characterized by similar features in relationships formed in direct social interactions from time to time. Television has extended the parasocial relationship to leaders of the world of affairs, virtual figures, film stars, and even anthropomorphized characters who are promoted into celebrities or influencers (Horton & Richard, 1956).

No literature that directly illustrates how anthropomorphism influences the parasocial relationship. However, anthropomorphism satisfies people’s needs for a desired social relationship with others by evoking people’s perceptions of relationships with others and providing long-term commitments and a sense of belongingness (Wan & Chen, 2021; Chen et al., 2017). Parasocial relationship, which is described as “intimacy at a distance” in Horton and Richard’s research (1956), is one of the social relationships people can develop with others. From this perspective, anthropomorphism can positively influence parasocial relationships, which is included in social relationships with other people.

As a result, the following hypothesis is proposed:

H6c: Use of anthropomorphism positively influences the parasocial relationship.

3 Research Method

3.1 Data Collection and Sample Characteristics

An online questionnaire survey was conveyed in this research to explore pet influencers' effects on consumers' purchase intention in social media marketing. The majority of the participants are social media users aged from 25 to 38 years old in China. The sample involved 251 participants in this study, in which around 80% of the participants reflected relatively high degree of concern in pet influencers. 75.30% of the participants reflected to buy products because of the influencers' recommendation once a week or month and more. 35.06% of the participants viewing pet influencers' content on social media more than three times every day. 42.23% of the participants reported to view the content one to five times a week. Most of the respondents' disposable income were included in the range between 3,001 RMB to 7,500 RMB.

Table 1. Demographics of respondents

Demographics	Frequency %
Gender	
Male	55.78
Female	44.22
Age	
17 or under	6.37
18-24	19.12
25-31	34.66
32-38	26.29
39-45	9.96
46-52	2.79
53 and above	0.80

Degree of concern in pet influencers	
Very concerned	36.65
Somewhat concerned	44.22
Seldom concerned	19.12
Frequency of buying products because of recommendation from influencers on social media platforms	
Usually (Once a week and more)	33.07
Sometimes (Once a month and more)	42.23
Seldom (Once a year and more)	18.33
Never	6.37
Frequency of viewing content (including videos, posts with pictures or texts) from pet influencers on social media	
Over 3 times every day	35.06
1-5 times every week	42.23
1-5 times every month	18.33
1-5 times every year	4.38
Disposable income every month	
< 1,500 RMB	7.17
1,500 – 3,000 RMB	2.79
3,001 – 4,500 RMB	23.51
4,501 – 6,000 RMB	33.86
6,001 – 7,500 RMB	24.30
> 7,500 RMB	8.37

3.2 Measures and Reliability Tests

The measurement of this study came from the prior studies. The constructs included attitude homophily (AH), social attractiveness (SA), use of anthropomorphism (UA), trustworthiness (TW), perceived expertise (PE), parasocial relationship (PR), and purchase intention (PI). The questionnaire of the variables social attractiveness and parasocial relationship were adopted from Masuada et al. (2022). The questionnaire of the variables attitude homophily and purchase intention were adopted from Masuada et al. (2022) and Bu et al. (2022). The questionnaire of the variable use of anthropomorphism was adopted from Harrison and Hall (2010) and Manfredo et al. (2020). The questionnaire of the variable trustworthiness was adopted from Lou and Kim (2019). The questionnaire of the variable perceived expertise was adopted from Lou and Kim (2019) and Müller et al. (2018). A seven-point Likert scale was used in the questionnaire to measure all the variables, spanning from 1 (Strongly disagree) to 7 (Strongly agree).

Under the circumstances of rather restrictive hypothesis, Cronbach’s alpha is considered to be an accurate measurement (Eisinga et al., 2013). The cutoff value for Cronbach’s alpha is often required to be values of 0.7 or 0.75, which is used to measure the reliability of the test (Christmann & Van Aelst, 2006). According to table 2, Cronbach’s alpha value of variables in this study all meet the requirement of 0.7 or 0.75, which proves the reliability of the variables.

Table 2. Cronbach’s Alpha (α) of Each Variable

Variables	No. of Items	α
Attitude Homophily (AH)	5	0.849
Social Attractiveness (SA)	5	0.897
Use of Anthropomorphism (UA)	5	0.887
Trustworthiness (TW)	5	0.880
Perceived Expertise (PE)	5	0.861
Parasocial Relationship (PR)	8	0.863
Purchase Intention (PI)	5	0.847

3.3 Correlation Test

In this study, Pearson correlation is used for jointly normally distributed data, which are scaled to the range from -1 to +1. The value of zero in correlation suggests that no linear association exists between the two variables. As the absolute value of correlation gets close to 1, the relationship between the two variables becomes stronger (Schober et al., 2018).

Correlation coefficient values in this study range from 0.205 to 0.491. According to Schober et al. (2018), the coefficient values between 0.10 and 0.39 are interpretated as weak correlation. The values between 0.40 and 0.69 are interpretated as moderate correlation. Table 3 shows that the variables in this study are proved to have weak or moderate correlation.

Table 3. Correlation analysis between the variables

Variable	AH	SA	UA	TW	PE	PR	PI
AH	1						
SA	0.478**	1					
UA	0.491**	0.354**	1				
TW	0.387**	0.205*	0.260**	1			
PE	0.403**	0.263**	0.308**	0.273**	1		
PR	0.463**	0.379**	0.274**	0.271**	0.324**	1	
PI	0.424**	0.361**	0.259**	0.259**	0.244**	0.274**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4 Results

4.1 Evaluation of Measurement Results

Linear regression in IBM SPSS Statistics 26 was used to test the hypothesis in this study. Hayes Process Macro was used to test the mediation effect. Mediation analysis is based on linear regression, which is applied to help a researcher to test hypotheses about or better understand how an effect of *X* on *Y* operates. *X* and *Y* are casual events that are chained together by the mediator, and mediator variable *M* is casually located between *X* and *Y*. The whole process is that *X* affects *M*, and *M* in turn affect *Y* (Hayes & Rockwood, 2017). In this study, model 4, which matched with the structure of the conceptual framework, was used to do the mediation analysis.

The conceptual framework of this study considers attitude homophily (AM), social attractiveness (SA), and use of anthropomorphism (UA) to be the independent variables that affect the dependent variable purchase intention (PI) through the mediation variables, including trustworthiness (TW), perceived expertise (PE), and parasocial relationship (PR).

4.2 Hypothesis Analysis

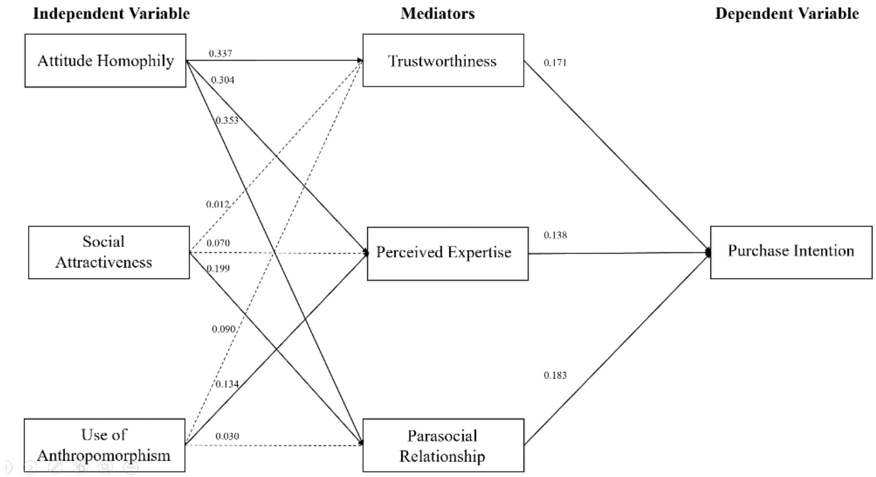
Table 4 presents the results of the hypothesis analysis for this study using the linear regression method. From the analysis, results can be concluded that the pet influencers' attributes can positively affect consumers' purchase intention in general through affecting the perceived characterizations of pet influencers. H1 is accepted since β = 0.171, p =0.007< 0.01, which supports that trustworthiness positively affects purchase intention. In H2, β = 0.138, $p=0.032$ < 0.05, thus H2 is supported, which proves perceived expertise to positively affect purchase intention. For H3, since β = 0.183, p = 0.005 < 0.01, H3 is supported, resulting in the conclusion that parasocial relationship positively affect purchase intention. Attitude Homophily (β = 0.337, $p=0.000$ < 0.01) positively affects trustworthiness, thus accepting H4a. Moreover, attitude homophily (β = 0.304, p = 0.000 < 0.01) is proved to positively affect perceived expertise, so accepting H4b. H4c is also accepted since β = 0.353, p = 0.000 < 0.01, thus attitude homophily positively affects parasocial relationship. Social attractiveness (β = 0.012, p = 0.861 > 0.05) was found fail to have positive effects on trustworthiness, thus rejecting H5a. Social attractiveness (β = 0.070, p = 0.290 > 0.05) is found fail to have positive effects on perceived expertise as well, thus rejecting H5b. Social attractiveness (β = 0.199, p = 0.002 < 0.01) was indicated to positively affect parasocial relationship, hence accepting H5c. H6a is rejected since β = 0.090, p = 0.184 > 0.05, which indicates that use of anthropomorphism fail to positively affect trustworthiness. However, use of anthropomorphism (β = 0.134, p = 0.046 < 0.05) is proved to positively affect perceived expertise, thus accepting H6b. H6c is rejected because use of anthropomorphism (β = 0.030, p = 0.639 > 0.05) fails to positively affect parasocial relationship.

Table 4. Hypothesis Analysis

Hypotheses	Path	Coefficient	*t* value	*p*-value
H1	TW→PI	.171	2.715	.007**
H2	PE→PI	.138	2.855	.032*
H3	PR→PI	.183	3.312	.005**
H4a	AH→TW	.337	4.664	.000**
H4b	AH→PE	.304	4.266	.000**
H4c	AH→PR	.353	5.170	.000**
H5a	SA→TW	.012	.176	.861
H5b	SA→PE	.070	1.061	.290
H5c	SA→PR	.199	3.131	.002**
H6a	UA→TW	.090	1.331	.184
H6b	UA→PE	.134	2.004	.046*
H6c	UA→PR	.030	.469	.639

**. p-value is significant at the 0.01 level (2-tailed).

*. p-value is significant at the 0.05 level (2-tailed).



**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Non-significant routes are illustrated in dotted lines above.

Figure 5: Hypothesized model with results

Table 5 and 6 show the results of the mediation analysis of TW, PE, and PR, which are the mediation variables operate between independent variables and the dependent variable. Hayes Process Macro was used to calculate the total and indirect effects in the model. The indirect effects for SA and UA via the mediators TW, PE, PR are significant since p < 0.01 and Boot LLCI >0, demonstrating that TW, PE, PR play a mediation role between SA, UA and PI. Since Boot LLCI < 0 for AH, TW, PE, PR fail to show significance when playing a mediation role between AH and PI. The statistics are the same for the same independent variable in the total effect of the mediation analysis. Specially, when the correlation with the dependent variables is zero-order, the total effect may be the same (Alwin, 1977).

Table 5. Mediation analysis – Total Effect

Path	Effect	Coefficient	SE	t value	p-value	LLCI	ULCI
AH -> TW -> PI	Total	.4377	.0593	7.3800	.0000**	.3209	.5545
AH -> PE -> PI	Total	.4377	.0593	7.3800	.0000**	.3209	.5545
AH -> PR -> PI	Total	.4377	.0593	7.3800	.0000**	.3209	.5545
SA -> TW -> PI	Total	.2712	.0444	6.1033	.0000**	.1837	.3587
SA -> PE -> PI	Total	.2712	.0444	6.1033	.0000**	.1837	.3587
SA -> PR -> PI	Total	.2712	.0444	6.1033	.0000**	.1837	.3587
UA -> TW -> PI	Total	.2509	.0592	4.2356	.0000**	.1343	.3676
UA -> PE -> PI	Total	.2509	.0592	4.2356	.0000**	.1343	.3676
UA -> PR -> PI	Total	.2509	.0592	4.2356	.0000**	.1343	.3676

Table 6. Mediation analysis – Indirect Effect

Path	Effect	Coefficient	Boot SE	Boot LLCI	Boot ULCL
AH -> TW -> PI	Indirect	.0444	.0299	-.0099	.1082
AH -> PE -> PI	Indirect	.0366	.0312	-.0245	.0990
AH -> PR -> PI	Indirect	.0474	.0380	-.0248	.1255
SA -> TW -> PI	Indirect	.0297	.0153	.0049	.0647
SA -> PE -> PI	Indirect	.0317	.0167	.0048	.0698
SA -> PR -> PI	Indirect	.0457	.0237	.0036	.0959
UA -> TW -> PI	Indirect	.0516	.0233	.0123	.1022
UA -> PE -> PI	Indirect	.0542	.0259	.0095	.1117
UA -> PR -> PI	Indirect	.0583	.0273	.0138	.1198

Table 7. Summary of Hypothesis

Hypothesis	Results
H1: Trustworthiness positively influences purchase intention.	Supported
H2: Perceived expertise positively influences purchase intention.	Supported
H3: Parasocial relationship positively influences purchase intention.	Supported
H4a: Attitude Homophily positively influences trustworthiness.	Supported
H4b: Attitude Homophily positively influences perceived expertise.	Supported
H4c: Attitude Homophily positively influences parasocial relationship.	Supported
H5a: Social attractiveness positively influences trustworthiness.	Rejected
H5b: Social attractiveness positively influences perceived expertise.	Rejected
H5c: Social attractiveness positively influences parasocial relationship.	Supported
H6a: Use of anthropomorphism positively influences trustworthiness.	Rejected
H6b: Use of anthropomorphism positively influences perceived expertise.	Supported
H6c: Use of anthropomorphism positively influences parasocial relationship.	Rejected

Conclusions

The results of this study show that eight hypotheses out of twelve are supported in this study. This paper reveals that three determinants of the source credibility, including trustworthiness and perceived expertise and parasocial relationship (Yuan & Lou, 2020), are important characterizations of social media pet influencers to positively affect consumers' purchase intention. Three pet influencer attributes, including attitude homophily, social attractiveness, use of anthropomorphism, are proved to positively affect the pet influencer characterizations. The results are different from the previous research by Masuada et al. (2022) in regard to attitude homophily and social attractiveness, which means the audience on social media may consider different attributes that are important for the pet influencers. Social attractiveness is considered not to positively relate to trustworthiness and perceived expertise for pet influencers while the previous study supports the two hypotheses. Attitude homophily shows the positive effects on all three characterizations in this study while the previous study fails to show its significance on trustworthiness and perceived expertise. The results indicate that pet influencers are more likely to create good images among the followers by focusing on building attitude homophily with the followers compared to strengthening their social attractiveness.

Compared to the previous study, this study proves the significant effect of anthropomorphism on perceived expertise, which in turn increases consumers' purchase intention. Perceived expertise is a factor behind celebrity influencers' high pay, which also help other kinds of influencers to create a celebrity status. When the promoted products fit within the influencers' area of expertise, the influencers' credibility in that area can bring greater influence on consumers (Campbell & Farrell, 2020). Pet influencers can seek the chance to transform to experts in the areas that they are good at by using the method of anthropomorphism to increase their informational influence.

Implications

This paper makes a theoretical contribution to research on social media influencer marketing. Previously, there was no study using the persuasion model to analyze specifically the pet influencers. This study enriches the knowledge of a specific segmentation in various kinds of influencers on social media. On one hand, Respondents' data in this study helps to understand customer attitudes towards pet influencers, indicating possible promotion methods specifically for pet influencers. On the other hand, the conceptual model combined the theory of persuasion and theory of anthropomorphism to provide a new perspective for consumer behavior prediction in the pet influencer domain. More comprehensive attributes and characterizations for pet influencers can be added to the marketing approach to improve consumers' purchase intention.

This study provides possible effective advertising appeals involving animals or pets, which are not limited in pet products. The examples used in this study focus on pet influencers promoting human products, creating more possibilities for the animal endorsers or animal spokes characters. Pet influencer marketing is a potential sales or marketing approach, bringing profit to the companies and creating the chance of improving brand images. In a study of brand image, Animals are used in the promotion campaigns to take advantage of secondary features brought by people's perceptions of animals to distinguish the products or brands when they are almost identical in the market (Hussey & Duncombe, 1999). This study also provides the insight of how anthropomorphized animals or pets are used as the spokes character to influence consumers' perceptions of the brands. Moreover, the method of anthropomorphism can be applied not only on the spokes characters, but also on other marketing elements to show the brand personality vividly. Brand anthropomorphism is defined as the method to view the properties of brand products as if they were actual humans. Anthropomorphizing tendency has been encouraged in the market to strengthen the brand personality, which helps to increase the consumers' brand loyalty (Guido & Peluso, 2015).

Acknowledgement

Limitations with this study can provide the inspirations for furthermore in-depth research. This study only discussed the influence of purchase intention that the influencer attributes and perceived characterizations brought on pet influencers. However, broader sights can be extended to explore the influence on other aspects in social media influence marketing. For example, the effectiveness and efficiency of information delivery is also an interesting topic to study. Social media influencers, who have the power to influence their followers, also take the important role in spreading meaningful ideas or socially beneficial values to help the society or individuals develop better.

Additionally, influencer attributes and characterizations that can more effectively influence the consumers' purchase intention or other aspects in social media marketing can be explored considering the hypotheses rejected and the insignificant mediators in this study. Other models in the persuasion theory, including the persuasion knowledge model and the source effect model, etc., can be applied in the study of pet influencers to explore more factors effectively persuade the consumers to purchase the promoted brands or products.

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The Impact of Social Media Influencers on Choosing Fast-Moving Consumer Goods Among Generation Z in China.

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Abstract: Social media influencers have become indispensable in today's business. They have an influence on social media platforms and exert persuasive power over their followers. As Generation Z gradually represents a larger proportion of social media users who heavily rely on the digital world and have ever-increasing purchasing power, the business owner put more emphasis on this target group than ever. Especially in the fast-moving consumer goods (FMCG) sector, products or brands need to gain a position in the minds of consumers as soon as possible owing to intenser competition. Business owners turn to social media influencers as the best product endorsers. Therefore, constructing a conceptual framework by integrating Source Credibility Model(SCM) and Celebrity Influence Model(CIM), this study examines the impact of social media influencers on choosing fast-moving consumer goods among Generation Z in China. Study findings indicate that purchase intention is influenced by para-social relationships with social media influences and followers' identification. They are also influenced by the characteristics of social media influencers. The results of this study are expected to extend the knowledge about social media influencers. In addition, it also helps online retailers to improve their social media marketing.

Keywords: Social media influencer; Fast-Moving Consumer Goods (FMCG); Generation Z; Source Credibility Model (SCM); Celebrity Influence Model (CIM)

1 Introduction

1.1 Background of the Study

China has the world's most prominent social media market (Thomala, 2022a). The active social media users increased by 52.5 million from 2020 to 2021, reaching 983.3 million people in 2021 (Thomala, 2022b). In 2021, approximately 73% of the Chinese population used the Internet (Wahab et al., 2022). Internet users mainly use microblogging (Weibo) and other mainstream social media platforms, such as Douyin (Chinese version of TikTok), Red, and Zhihu (Thomala, 2022a).

As the Chinese social media ecosystem becomes robust, more and more brands prefer to promote products and build awareness through social media, which brings a more profound impact on consumer behaviors and perceptions (Wahab et al., 2022). Chinese social media have extended their functions to e-commerce, combining social with shopping. Specifically, users are free to post pictures or videos about their purchase experience, personal suggestions, and usage feedback. Part of them is viewed as key opinion leaders on social media platforms because of their trustworthy and valuable content. Since the emergence of social media influencers, businesses' communication and interaction with customers and potential customers have essentially altered (Koay et al., 2021). For example, potential customers are led to click the links directly or turn to other e-commerce apps to learn and purchase related products while browsing influencers' recommendations. Therefore, customers' purchase intentions directly connect with social media influencers. According to Nielsen China, social recommendations lead to 80% of impulse purchases, such as online content and word-of-mouth (Degennaro, 2021). Firms increasingly cooperate with digital influencers to advertise their products (Jiménez-Castillo & Sánchez-Fernández, 2019). Fast-moving consumer goods sector is a typical example.

Items in this category are consumed daily, so FMCG goods account for a substantial part of a family's monthly budget (Sridevi, 2014). Great demand results in an enormous number of items circulated in the market. Besides, the online channel has become a preferred alternative for Chinese customers to purchase FMCG goods, especially after COVID-19 (Yu, 2020). The Chinese government took initiatives of housing and neighborhood lockdowns to prevent, deter, and detect the spread of the pandemic so that customers are forced to stay at home (Mariia & Viktoriia, 2022). Many families rely on e-commerce platforms to choose products, particularly FMCG goods. In 2021, the proportion of the sales of FMCG goods through the Internet accounted for 27% in China; the sales of FMCG goods in supermarkets are only second to that (Ma, 2022). Therefore, the intense competition in the FMCG sector and a shift in purchase behaviors lead FMCG businesses to cooperate with online celebrities to endorse products on social media platforms (Sridevi, 2014). Generation Z is a vital group significantly impacted by social media influencers in China.

The members of Generation Z were born and developed in the digital era. They are highly dependent on social media, a crucial channel for obtaining information (Nurhandayani et al., 2019). Global consultancy Accenture anticipated that global social commerce would boost from $492 billion to $1.2 trillion over a span of 4 years (2021-2025), three times faster than traditional e-commerce (Kelly, 2022). Generation Z is believed to be the main driving power behind the growth (Fan, 2022). Sun et al. (2021) reported that 70% of Generation Z prefer to purchase from social media platforms. While many studies have addressed the functions of social media influencers (Jiménez-Castillo & Sánchez-Fernández, 2019), the impact of social media influencers on the purchase of fast-moving consumer goods by Generation Z in China remains understudied. This study attempts to solve this problem by combining Source Credibility Model (SCM) with Celebrity Influence Model (CIM) models.

1.2 Purpose of the Study

The study aims to investigate the impact of social media influencers on choosing fast-moving consumer goods among Generation Z in China by combining SCM and CIM. The following research goals must be facilitated in order for the study to achieve its goal:

1. By combining SCM and CIM, explore how the social media influencers' characteristics (perceived attractiveness, perceived expertise, and perceived trustworthiness) affect para-social relationship, identification, and purchase intention.
2. To explore whether the relationship between social media influencers' characteristics and followers' purchase intentions is mediated by para-social relationship and identification.

SCM and CIM are the two most common models used to assess endorsement effectiveness (Rungruangjit, 2022). However, in previous studies, only a few have combined the two. In addition, although many studies have analyzed the impact of social media influencers on followers' purchase intentions, including luxury fashion, cosmetic products, and automobiles (Chekima et al., 2020; Kshetri & Jha, 2016; Sun et al., 2021), rare studies specifically explore the impact of social media influencers on Chinese Generation Z's purchase intention, particularly for FMCG products.

This study explains how social media influencers' characteristics (attractiveness, expertise, and trustworthiness) influence the Chinese Generation Z's purchasing decisions on FMCG products. This provides excellent value for FMCG businesses to select proper social media influencers and thus attract more Generation Z who possess the great potential of purchasing power in China and increase their purchase intentions.

1.3 Theoretical and Conceptual Framework

1.3.1 Source Credibility Model (SCM) (Ohanian, 1990)

"Source credibility" is widely used to examine the receivers' acceptance of information affected by the message disseminator's positive traits. The SCM was derived from a turning point research by Hovland and his associates (Ohanian, 1990). The perceived credibility of the message disseminator is influenced by two factors, expertise and trustworthiness. Ohanian (1990) defines expertise as authoritativeness, competence, expertness, and qualification. Trustworthiness is defined as the degree of confidence and the level of acceptance receivers have in communication (Ohanian, 1990). So far, many studies use SCM as a theoretical framework to analyze how social media influencers' credibility affects advertising effectiveness, for example, whether it is appropriate to invite social media influencers to endorse cosmetic products in Malaysia rather than traditional celebrities (Chekima et al., 2020).

1.4 Theoretical Framework-Source Credibility

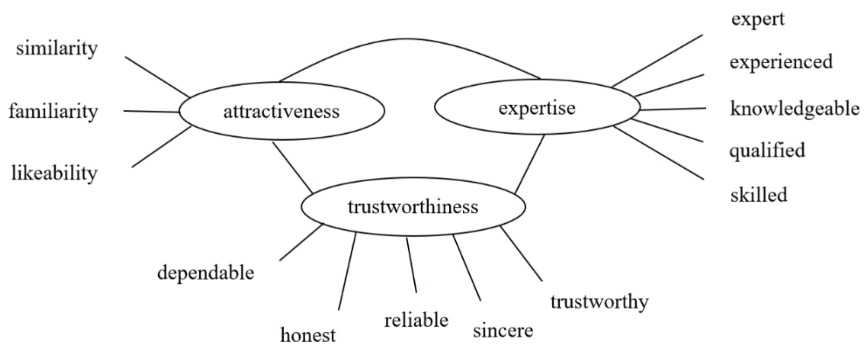


Figure 1: Theoretical Framework-Source Credibility

1.4.1 Celebrity Influence Model (CIM) (Fraser & Brown, 2002)

CIM is a model widely used to explain the ways that individuals are affected by media exposure (Wahab et al., 2022). The CIM model is built on para-social relationships and identification (Aşman Alikiliç & Özer, 2021). Identification is defined as the reconstruction of individual attitudes, values, or behaviors towards the real or imagined images of admired people via personal and mediated relationships (Fraser & Brown, 2002). A para-social relationship created by the mass media builds a virtual face-to-face relationship between celebrities and audiences (Aşman Alikiliç & Özer, 2021). More and more studies based on CIM have shown that this theory is not only appropriate to find out the effect of traditional celebrities on audiences but also the effect of social media influencers on followers (Wahab et al., 2022).

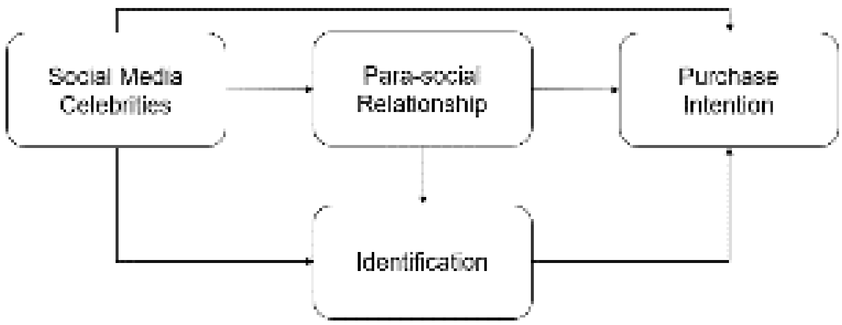


Figure 2: Theoretical Model

Based on the review of literature, the conceptual model is presented in Figure 3.

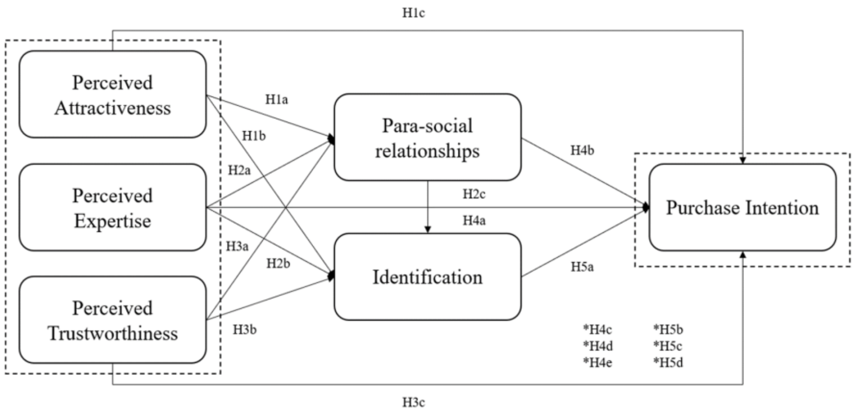


Figure 3: Conceptual Framework

2 Hypothesis Development

H1a: Social media influencers’ perceived attractiveness is positively associated with para-social relationships with social media influencers.

H1b: Social media influencers’ perceived attractiveness is positively associated with followers’ identification.

H1c: Social media influencers’ perceived attractiveness is positively associated with purchase intentions.

H2a: Social media influencers’ perceived expertise is positively associated with para-social relationships with social media influencers.

H2b: Social media influencers’ perceived expertise is positively associated with followers’ identification.

H2c: Social media influencers’ perceived expertise is positively associated with purchase intentions.

H3a: Social media influencers’ perceived trustworthiness is positively associated with para-social relationships with social media influencers.

H3b: Social media influencers’ perceived trustworthiness is positively associated with followers’ identification.

H3c: Social media influencers' perceived trustworthiness is positively associated with purchase intentions.

H4a: Para-social relationships with social media influencers are positively associated with followers' identification.

H4b: Para-social relationships with social media influencers are positively associated with followers' purchase intentions.

H4c: Para-social relationships with social media influencers mediate the relationship between social media influencers' perceived attractiveness and purchase intentions.

H4d: Para-social relationships with social media influencers mediate the relationship between social media influencers' perceived expertise and purchase intentions.

H4e: Para-social relationships with social media influencers mediate the relationship between social media influencers' perceived trustworthiness and purchase intentions.

H4e: Para-social relationships with social media influencers mediate the relationship between social media influencers' perceived trustworthiness and purchase intentions.

H5a: Followers' identification is positively associated with followers' purchase intentions.

H5b: Followers' identification mediates the relationship between social media influencers' perceived attractiveness and purchase intentions.

H5c: Followers' identification mediates the relationship between social media influencers' perceived expertise and purchase intentions.

H5d: Followers' identification mediates the relationship between social media influencers' perceived trustworthiness and purchase intentions.

3 Literature Review

3.1 Generation Z and Consumption of Fast-Moving Consumer Goods

Those born between the middle of the 1990s and the beginning of the 2010s are known as Generation Z (Hua et al., 2022). They are regarded as "digital natives" who grow up surrounded by the Internet and digital technologies (Wang et al., 2022). Exposure to technology at an early age shapes their different ways of interacting with the world (Munsch, 2021). For example, they are accustomed to dealing with repetitive tasks with the hand of technology (Munsch, 2021). Generation Z is also known as the “Second Generation of Only Child” (Alessia, 2019). As the only child in the family, their parents are inclined to provide adequate financial support, which allows them to enjoy their life without financial pressure (Alessia, 2019). Therefore, their purchasing power outstrips their income level (Hua et al., 2022).

In the past, fast-moving consumer goods (FMCG) businesses believed that consumers would be pleased if they were provided with several choices (Thangavel et al., 2019). According to Iyengar and Lepper’s academic research, however, excessive options will cause a ‘mind freeze’ when consumers make purchasing decisions (Thangavel et al., 2019). For Generation Z, they seek immediate and instant action (Hua et al., 2022). Therefore, they are more likely to get confused about countless choices and get into the dilemma that other choices would be better compared with the choice they have already made (Thangavel et al., 2019). Therefore, businesses need to stand out among competitors and win the customers’ minds as soon as possible.

3.2 Social Media Influencers and Fast-Moving Consumer Goods

On social media platforms, anyone who can exert influence is often called as “blogger,” “vlogger,” “YouTuber” or “KOL (key opinion leader)”; more generally, they are also regarded as “social media influencer” (Nurhandayani et al., 2019). Social media influencers receive much attention and popularity via posting self-generated content on various topics, such as beauty, travel, and food (Chekima et al., 2020). Studies indicate that people prefer to listen more carefully to suggestions from others than to advertisements in media, which is also the basis of influencer marketing: followers trust social media influencers more than commercials (Panyi et al., 2017). Influencer marking is perceived as native advertising, integrating advertising messages with non-advertising content (Balaban & Mustățea, 2019). This pattern effectively presents products and weakens consumers’ resistance (Balaban & Mustățea, 2019).

In the FMCG sector, trust dominates customers' purchasing decisions (Chandpuri & Ahuja, 2020). One of the characteristics of FMCG products is relatively high frequency (Cha & Park, 2019). Therefore, it is essential to build trust in the minds of consumers to keep them as regular customers (Chandpuri & Ahuja, 2020). For businesses, social media influencers, as the ones who possess persuasive power over their followers or fans, are viewed suitable to propagate products and provoke the interests of potential customers, especially among “digital savvy” (Nurhandayani et al., 2019).

3.3 Theoretical Framework and Hypothesis Development

3.3.1 Source Credibility Model (SCM)

Source credibility refers to the receiver's perception of the attributes of the sender (Zhang, 2018). It is often used in Marketing and Communication research literature (Ayeh, 2015). In Marketing studies, SCM is applied to study the effectiveness of celebrity recommendation advertising and celebrity endorsement, while in Communication studies, this model is used to examine different media platforms in terms of their credibility (Ayeh, 2015; Seiler & Kucza, 2017). Previous discoveries studied the effects of source credibility on purchase intention, information adoption, information validity, and information trustworthiness (Ismagilova et al., 2020). Current researchers demonstrate that source expertise, source trustworthiness, and para-social relationships between media users and media influencers affect the source of information people to perceive (Ismagilova et al., 2020).

The model points out that source attributes have an impact on the value of a message (Chekima et al., 2020). Source attributes also influence the persuasiveness of a message (Corina, 2006). Source credibility can be demonstrated in various aspects (Zhang, 2018). For example, Hovland, Janis, and Kelley's research indicate that source expertise and source trustworthiness are two key dimensions; McCroskey's research introduces two other dimensions: authoritativeness and character; Wynn's research examines expertness, dynamism, believability, and sociability (Zhang, 2018). Ohanian (1990) creates a source-credibility scale to examine three dimensions: attractiveness, trustworthiness, and expertise through exploratory factor analysis and confirmatory analysis.

3.3.2 Celebrity Influence Model (CIM)

Celebrity Influence Model is first presented by Fraser and Brown (Aşman Alikiliç & Özer, 2021). This model finds that mediated personalities have the potential power to forecast various outcomes in terms of attitude, emotion, cognition, and behavior (Wen, 2017). It highlights the ways that people are affected by media exposure (Wahab et al., 2022). For existing research, this model is used to identify the effect of traditional celebrities on their followers (Wahab et al., 2022). Few studies apply CIM to study online celebrities (Wahab et al., 2022). For instance, Wahab and Tao (2019) find that Internet celebrities have an impact on purchase decisions.

Para-social relationships and identification are two basic psychological concepts of this model (Wen, 2017). Followers build a liking for celebrities through a para-social relationship, which is a one-sided and virtual face-to-face relationship between audiences and celebrities. (Wahab et al., 2022; Aşman Alikiliç & Özer, 2021). Media exposure is necessary for para-social relationships because people have few opportunities to meet celebrities in person and thus follow celebrities through the media (Wen, 2017). This relationship causes individuals to develop an identification with celebrities (Aşman Alikiliç & Özer, 2021). Followers tend to adopt and imitate the behaviors of celebrities due to identification (Aşman Alikiliç & Özer, 2021).

3.3.3 Perceived Attractiveness

Previous studies regarded endorser attractiveness as a critical attribute of promotion (Taillon, 2020). Attractiveness impacts an individual's popularity degree, persuasive power, and others' attitudes (Taillon, 2020). If endorsers possess attractive appearances or characters, audiences are more likely to purchase the products advertised or used by the endorsers, expecting to have the resembled characteristics (Zhang, 2018). An attractive information sender is more likely to influence audiences' attitudes and beliefs (Zhang, 2018). Physical appearance is crucial and seldom overlooked (Seiler & Kucza, 2017). Social media influencers' physical appeal can strengthen the endorsement's effectiveness (Chekima et al., 2020).

Zhang's (2018) study shows that influencers' social attractiveness is positively associated with para-social relationships between audiences and influencers (Zhang, 2018). Hoffner and Buchanan's (2005) study indicates that physical appearance is associated with wishful identification. Previous empirical findings present that source attractiveness positively impacts persuasion (Pornpitakpan, 2004). Based on previous research, this study gives rise to the following hypothesis:

H1a: Social media influencers' perceived attractiveness is positively associated with para-social relationships with social media influencers.

H1b: Social media influencers' perceived attractiveness is positively associated with followers' identification.

H1c: Social media influencers' perceived attractiveness is positively associated with purchase intentions.

3.3.4 Perceived Expertise

The definition of expertise is "the extent to which the source is perceived as being capable of providing correct information" (Ismagilova et al., 2020). People who get training and experience in a specific field are perceived as one who has the expertise (Racherla & Friske, 2012). Expertise has a persuasive function in that receivers have little incentive to retrieve their ideas to determine the authenticity of information (Racherla & Friske, 2012). Source expertise impacts attitudes and source credibility positively (Seiler & Kucza, 2017). According to Ohanian's research, source expertise plays a positive role in attitude change in terms of endorser marketing (Ayeh, 2015). Other researchers also find that source expertise positively affects information usefulness (Ayeh, 2015). It is more legitimate to utilize a qualified and professional person as an endorser than utilize usual information and advertorials (Chekima et al., 2020).

Although the effect of perceived expertise on para-social relationships has been little studied in the previous literature, some studies have examined the effect of specialized skills and knowledge on para-social relationships that media users perceive with media figures (Zhang et al., 2021). Ismagilova et al. (2020) found that source expertise has a positive effect on consumers' purchase intentions. Based on previous research, this study puts forward the following hypothesis:

H2a: Social media influencers' perceived expertise is positively associated with para-social relationships with social media influencers.

H2b: Social media influencers' perceived expertise is positively associated with followers' identification.

H2c: Social media influencers' perceived expertise is positively associated with purchase intentions.

3.3.5 Perceived Trustworthiness

Janssen et al. (2022) point out that influencer trustworthiness refers to the degree to which consumers perceive influencers as reliable specialists on a product or service. Existing studies underscore that source trustworthiness influences a variety of consumer outcomes (Ayeh, 2015). For example, a trustworthy source can change opinions (Seiler & Kucza, 2017). If trust is missing, different attributes owned by endorser will not be noticeable in changing customers' opinions (Chekima et al., 2020). Trustworthiness allows audiences to acquire truthful and reliable product information (Chekima et al., 2020). When the source is trustworthy, receivers have less doubt about the information's credibility (Ismagilova et al., 2020).

Previous studies emphasized the effect of perceived attractiveness and similarity, but there is still a research space for the association between perceived trustworthiness and para-social relationships (Yuan & Lou, 2020). Therefore, we expect that influencers' perceived trustworthiness will affect para-social relationships. There are two significant processes by which brand endorsement influences advertising effectiveness: one is identification, and the other is perceived trustworthiness (Schouten, 2020). Chekima et al. (2020) indicate that source trustworthiness is associated with customers' purchase intentions. Based on this evidence, we hypothesize as follows:

H3a: Social media influencers' perceived trustworthiness is positively associated with para-social relationships with social media influencers.

H3b: Social media influencers' perceived trustworthiness is positively associated with followers' identification.

H3c: Social media influencers' perceived trustworthiness is positively associated with purchase intentions.

3.3.6 Para-social relationship

Recent research on para-social relationships has enhanced people's understanding of marketing, especially in influencer marketing (Bu & Thaichon, 2022). Para-social relationships are defined as the imagined and single-sided relationship between media followers and media celebrities (Shang & Luo, 2021). The perceived social relationships between celebrities and followers are similar to interpersonal ones; however, they are built not through direct social interaction but through vicarious interaction (Wen, 2017). Media figures dominate this relationship by creating an image to affect the perceptions of media users on them (Zhang, 2018). Audiences' internal need is satisfied psychologically and emotionally because celebrities can bring them a sense of closeness and companionship (Zhang et al., 2021). This perceived intimate relationship is initiated and kept only by followers without the awareness of celebrities (Wen, 2017).

The celebrity influence model indicates that para-social relationships between media figures and media users facilitate the media users' identification (Wahab et al., 2022). According to Bu & Thaichon (2022), para-social relationships influence followers perceived similarity with celebrities; besides, higher similarity individuals believe in having with celebrities leads to a greater possibility people have a strong sense of identification with celebrities. Para-social relationships between followers and social media influencers lead to favorable customer experiences, which influence the purchase intentions of followers by providing practical values (Kim et al., 2015). Few existing studies focus on how para-social relationships affect the association between endorsers' characteristics and audiences' purchase intentions. Thus, we propose the following hypothesis:

H4a: Para-social relationships with social media influencers are positively associated with followers' identification.

H4b: Para-social relationships with social media influencers are positively associated with followers' purchase intentions.

H4c: Para-social relationships with social media influencers mediate the relationship between social media influencers' perceived attractiveness and purchase intentions.

H4d: Para-social relationships with social media influencers mediate the relationship between social media influencers' perceived expertise and purchase intentions.

H4e: Para-social relationships with social media influencers mediate the relationship between social media influencers' perceived trustworthiness and purchase intentions.

3.3.7 Identification and purchase intention

Identification is a psychological process that a person desires and expects to become a character he or she identifies with (Hoffner & Buchanan, 2005). Followers' identification plays a vital role in the effect of information they receive from celebrities because followers will imitate celebrities' values, beliefs, and behaviors (Wahab et al., 2022; Aşman Alikiliç & Özer, 2021). For instance, college students perceive cosmetic surgery positively after being affected by celebrities (Wen, 2017). Some individuals have identification with celebrities personally (Aşman Alikiliç & Özer, 2021). Elvis Presley's followers regard Elvis as a husband, friend, and father (Aşman Alikiliç & Özer, 2021).

Nurhandayani et al. (2019) indicate that someone's buying interest is influenced by (1) others' attitudes. Whether positive or negative, others' attitudes towards a product or service will limit a person's purchase choices. (2) unknown factors. These will influence a customer's position when making a purchase decision. Wahab et al.'s (2022) research show that followers' identification positively influences their purchase intentions. Therefore, the following hypothesis is presented:

H5a: Followers' identification is positively associated with followers' purchase intentions.

H5b: Followers' identification mediates the relationship between social media influencers' perceived attractiveness and purchase intentions.

H5c: Followers' identification mediates the relationship between social media influencers' perceived expertise and purchase intentions.

H5d: Followers' identification mediates the relationship between social media influencers' perceived trustworthiness and purchase intentions.

4 Research Method

4.1 Data Collection and Sample Characteristics

In this study, an online questionnaire was created to investigate the impact of social media influencers on choosing fast-moving consumer goods among Generation Z in China. The questionnaire was first created in English before being translated into

Chinese. Chinese Generation Z participants range in age from 12 to 27 and have a variety of vocations and monthly salaries. In Table 1, the participant demographics are displayed as percentages. Among the 355 participants, 148 were males and 207 were females. Their ages are concentrated between 21 and 23. 85.63% of them are students, and 68.17% of them have less than 1,500 RMB monthly income.

Table 1. Demographics of respondents

Demographics	Frequency%
Gender	
Male	41.69
Female	58.31
Age	
12-14	15.21
15-17	14.93
18-20	21.69
21-23	25.92
24-27	22.25
Occupation	
Students	85.63
Unemployed	3.38
Part-time	4.79
Full-time	6.2
Monthly Income	
<1,500 RMB	68.17
1,500-3,000RMB	13.8
3,001-4,500 RMB	5.63
4,501-6,000 RMB	3.1
6,001-7,500 RMB	3.66
>7,500 RMB	5.63
Frequency of social media usage	
Never	0.85
Sometimes	28.17
Usually	32.96
Always	38.03
Social media platforms used to follow celebrities	
Douyin	55.49
Xiaohongshu	56.9
Weibo	40.28
Bilibili	40.28
QQ	35.77
WeChat	38.59
Zhihu	31.27
Douban	29.58
Kuaishou	0.56
How many social media influencers you follow?	
Below 50	20.56

50~100	20.28
101~150	17.18
151~200	18.03
Above 200	23.94
Do you buy products because a social media influencer promoted them?	
Always	16.62
Often	18.59
Sometimes	25.92
Rarely	21.41
Never	17.46

4.2 Measures and Reliability Tests

We modified the items for the questionnaire from existing research to fit the setting of this study in order to guarantee the constructs' validity and reliability. The variables used in this study came from prior studies. The constructs including attractiveness, expertise, trustworthiness, para-social relationships, identification, and purchase intention were adopted from Ohanian (1990) and Wahab et al. (2022). A seven-point Likert scale, with a scale of 1 (strongly disagree) to 7 (strongly agree), was used to evaluate the questionnaire's 31 items.

In order to quantify the internal consistency of a test or scale, Lee Cronbach created the alpha statistic in 1951; it is represented as a number between 0 and 1 (Tavakol & Dennick, 2011). The correlations between items are determined by the statistic employed in a Cronbach's alpha (Connelly, 2011). The number of items in a test determines the alpha score; for instance, if the number of items increases from 4 to 10, the test's reliability will increase from 0.80 to 0.86 (Vaske et al., 2017). Taber's research (2018) demonstrates that alpha values of 0.7 or above are perceived as acceptable reliability for a test. Besides, excellent alpha values present a span between 0.93 and 0.94, and strong alpha values range between 0.91 and 0.93. In this study, Cronbach's alpha was used to assess the consistency of the variables. All of the valid survey responses required for this investigation were acquired in three weeks. The Cronbach's alpha value for each variable is shown in Table 2. Four of the six alpha values are above 0.93, and the remaining two are between 0.91 and 0.93, which offers excellent and good reliability of all variables.

Table 2. Cronbach's Alpha (α) of Each Variable

Variables	No. of Items	α
Perceived Attractiveness (PS)	5	0.922
Perceived Expertise (PE)	5	0.929
Perceived Trustworthiness (PS)	5	0.936
Para-social Relationship (PSR)	6	0.939
Identification (IN)	5	0.936
Purchase Intention (PI)	5	0.937

4.3 Correlation Test

The correlation coefficient, sometimes referred to as the r coefficient, is a statistic that measures how strongly or to what extent two variables are related (Taylor, 1990). Theoretically, the correlation coefficient can take any value from -1 to +1 (Ratner, 2009). 0 indicates no linear relationship between the variables (Taylor, 1990). The strength of the correlation between the measured variables increases as the r gets near ±1 (Taylor, 1990). If variable A increases, variable B will also increase, according to a positive correlation coefficient. An inverse relationship is shown by a negative r coefficient (Taylor, 1990).

Table 3. Correlation analysis between the variables

Variable	PA	PE	PT	PSR	IN	PI
PA	1					
PE	0.895**	1				
PT	0.859**	0.896**	1			
PSR	0.875**	0.857**	0.859**	1		
IN	0.864**	0.847**	0.860**	0.929**	1	
PI	0.894**	0.878**	0.885**	0.913**	0.908**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3 displays the findings of an investigation of correlations between various variables. According to the research of Ratner (2009), a weak positive (negative) relationship between two variables is indicated by correlation coefficient values within 0~0.3 (-0.3~0). The |r| value ranges between 0.3 and 0.7, showing a moderate correlation. If the value ranges from 0.7 to 1 or from -0.7 to -1, it indicates a strong positive or negative relationship between the variables. All the data gathered above exhibit a strong positive correlation between any two variables.

5 Results

5.1 Evaluation of Measurement Results

Regression analysis is used to examine the relationship between variables for statistical purposes (Sykes, 1993). Regression analysis is based on the fundamental tenet that all variables are statistically independent of one another, or at the very least uncorrelated (Liang & Zeger, 1993). The causal effect of one variable on the other and the "statistical significance" of anticipated correlations can be measured and assessed (Sykes, 1993). According to MacKinnon et al. (2007), mediation is the insertion of a third variable to the relationship between X and Y: X influences M (mediating variable) and M affects Y. In the single-mediator model, a denotes the relationship between X and M, b denotes the relationship between M and Y after X adjustment, c' denotes the relationship between X and Y after M adjustment, and residuals in the M and Y are denoted by the symbols e2 and e3.

Regarding the research's hypotheses model, PA, PE, and PT are the independent variables that will impact PSR, IN, and PI. PSR and IN are mediating variables that mediate the relationships between PA and PI, between PE and PI, and between PT and PI and that impact PI.

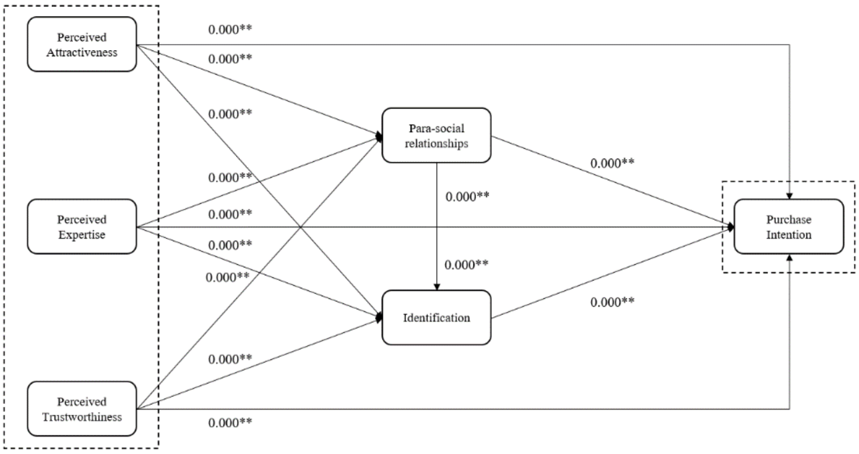
5.2 Hypothesis Analysis

The results of the structural model study are shown in Table 4. We can infer from the analysis that social media influencers' perceived attractiveness will greatly affect para-social relationships between audiences and social media influencers. H1a is accepted since $\beta = 0.881$, $p < 0.01$. In H1b, $\beta = 0.886$, $p < 0.01$; thus, H1b is supported, and social media influencers' perceived attractiveness will greatly affect followers' identification. For H1c, since $\beta = 0.918$, $p < 0.01$, H1c is supported, leading to the conclusion that social media influencers' perceived attractiveness will greatly affect purchase intention. Social media influencers' perceived expertise ($\beta = 0.882$, $p < 0.01$) had a great effect on para-social relationships; thus, accepting H2a. Moreover, perceived expertise ($\beta = 0.882$, $p < 0.01$) will greatly influence followers' identification, so accepting H2b. H2c is accepted since $\beta = 0.920$, $p < 0.01$; thus, perceived expertise will greatly affect followers' purchase intention. Social media influencers' perceived trustworthiness ($\beta = 0.885$, $p < 0.01$) was found to significantly affect para-social relationships between followers and social media influencers; thus, supporting H3a. Perceived trustworthiness ($\beta = 0.903$, $p < 0.01$) was found to significantly impact followers' identification; thus, supporting H3b. H3c is supported since $\beta = 0.931$, $p < 0.01$, with the conclusion that perceived trustworthiness will greatly affect purchase intention. Para-social relationship ($\beta = 0.947$, $p < 0.01$) was indicated to greatly affect followers' identification; thus, accepting H4a. For H4b, since $\beta = 0.931$, $p < 0.01$, H4b is supported, resulting in the conclusion that para-social relationships will significantly influence purchase intention. H4c is accepted since $\beta = 0.918$, $p < 0.01$; therefore, para-social relationship has a mediating effect on the relationship between perceived attractiveness and purchase intention. In H4d, $\beta = 0.920$, $p < 0.01$; thus, H4d is supported, resulting in the conclusion that para-social relationship mediates the correlation between perceived expertise and purchase intention. Para-social relationship ($\beta = 0.931$, $p < 0.01$) mediates the relationship between perceived trustworthiness and followers' purchase intentions. Identification ($\beta = 0.909$, $p < 0.01$) was accepted to greatly impact purchase intention; therefore, H5a was supported. H5b is accepted since $\beta = 0.918$, $p < 0.01$, with the result that followers' identification mediates the relationship between perceived attractiveness and purchase intention. For H5c, since $\beta = 0.920$, $p < 0.01$, H5c is supported, resulting in the conclusion that identification has a mediating impact on the relationship between perceived expertise and purchase intention. H5d is accepted since $\beta = 0.931$, $p < 0.01$; thus, identification mediates the relationship between perceived trustworthiness and purchase intention. The conceptual framework is shown in Figure 2. The findings of the hypothesis testing are shown in Table 5.

Table 4. Hypothesis Analysis

Hypotheses	Path	Coefficient	t value	p-value
H1a	PA→PSR	0.881	33.906	0.000**
H1b	PA→IN	0.886	32.229	0.000**
H1c	PA→PI	0.918	37.520	0.000**
H2a	PE→PSR	0.882	31.302	0.000**
H2b	PE→IN	0.888	29.951	0.000**
H2c	PE→PI	0.920	34.421	0.000**
H3a	PT→PSR	0.885	31.509	0.000**
H3b	PT→IN	0.903	31.626	0.000**
H3c	PT→PI	0.931	35.797	0.000**
H4a	PSR→IN	0.947	47.256	0.000**
H4b	PSR→PI	0.931	42.174	0.000**
H4c	PA→PSR→PI	0.918	37.520	0.000**
H4d	PE→PSR→PI	0.920	34.421	0.000**
H4e	PT→PSR→PI	0.931	35.797	0.000**
H5a	IN→PI	0.909	40.784	0.000**
H5b	PA→IN→PI	0.918	37.520	0.000**
H5c	PE→IN→PI	0.920	34.421	0.000**
H5d	PT→IN→PI	0.931	35.797	0.000**

**. Correlation is significant at the 0.01 level (2-tailed).



**. Correlation is significant at the 0.01 level (2-tailed).

Figure 2. Hypothesized model with results

The outcome of the mediation analysis of PSR and IN, using them as the mediation items within PA, PE, PT, and PI, is shown in Table 5. The total and indirect effects are computed using SPSS 26 and Hayes Process Macro. The indirect effect via PSR was significant since $p < 0.01$, indicating that PSR played a mediation role within PA, PE, and PT, and PI. Also, the indirect effect via IN was significant because $p < 0.01$, presenting that identification took a mediation part between PA and PI, between PE and PI, and between PT and PI. Table 6 presents the outcomes of the hypothesis testing based on the findings.

Table 5. Mediation analysis

Path	Effect	Coefficient	SE	t value	p-value	LLCI	ULCI
PA→PSR→PI	Total	0.9181	0.0245	37.5197	0.0000**	0.8700	0.9662
PA→IN→PI	Total	0.9181	0.0245	37.5197	0.0000**	0.8700	0.9662
PA→PSR→IN →PI	Total	0.9181	0.0245	37.5197	0.0000**	0.8700	0.9662
PE→PSR→PI	Total	0.9203	0.0267	34.4209	0.0000**	0.8677	0.9728
PE→IN→PI	Total	0.9203	0.0267	34.4209	0.0000**	0.8677	0.9728
PE→PSR→IN →PI	Total	0.9203	0.0267	34.4209	0.0000**	0.8677	0.9728
PT→PSR→PI	Total	0.9306	0.0260	35.7973	0.0000**	0.8794	0.9817
PT→IN→PI	Total	0.9306	0.0260	35.7973	0.0000**	0.8794	0.9817
PT→PSR→IN →PI	Total	0.9306	0.0260	35.7973	0.0000**	0.8794	0.9817
Indirect effect	Effect	Coefficient	Boot SE	Boot LLCI		Boot ULCL	
PA→PSR→PI	Indirect 1	0.5021	0.0635	0.3786		0.6277	
PA→IN→PI	Indirect 2	0.4748	0.0502	0.3784		0.5767	
PA→PSR→IN →PI	Indirect 3	0.2049	0.0425	0.1214		0.2857	
PE→PSR→PI	Indirect 1	0.5460	0.0739	0.3875		0.6774	
PE→IN→PI	Indirect 2	0.5180	0.0647	0.3884		0.6425	
PE→PSR→IN →PI	Indirect 3	0.2249	0.0427	0.1385		0.3056	
PT→PSR→PI	Indirect 1	0.5263	0.0719	0.3874		0.6700	
PT→IN→PI	Indirect 2	0.5092	0.0623	0.3866		0.6321	
PT→PSR→IN →PI	Indirect 3	0.1923	0.0420	0.1102		0.2741	

Table 6. Summary of Hypothesis

Hypothesis	Results
H1a: Social media influencers' perceived attractiveness is positively associated with para-social relationships with social media influencers.	Supported
H1b: Social media influencers' perceived attractiveness is positively associated with followers' identification.	Supported
H1c: Social media influencers' perceived attractiveness is positively associated with purchase intentions.	Supported

H2a: Social media influencers’ perceived expertise is positively associated with para-social relationships with social media influencers.	Supported
H2b: Social media influencers’ perceived expertise is positively associated with followers’ identification.	Supported
H2c: Social media influencers’ perceived expertise is positively associated with purchase intentions.	Supported
H3a: Social media influencers’ perceived trustworthiness is positively associated with para-social relationships with social media influencers.	Supported
H3b: Social media influencers’ perceived trustworthiness is positively associated with followers’ identification.	Supported
H3c: Social media influencers’ perceived trustworthiness is positively associated with purchase intentions.	Supported
H4a: Para-social relationships with social media influencers are positively associated with followers’ identification.	Supported
H4b: Para-social relationships with social media influencers are positively associated with followers’ purchase intentions.	Supported
H4c: Para-social relationships with social media influencers mediate the relationship between social media influencers’ perceived attractiveness and purchase intentions.	Supported
H4d: Para-social relationships with social media influencers mediate the relationship between social media influencers’ perceived expertise and purchase intentions.	Supported
H4e: Para-social relationships with social media influencers mediate the relationship between social media influencers’ perceived trustworthiness and purchase intentions.	Supported
H5a: Followers’ identification is positively associated with followers’ purchase intentions.	Supported
H5b: Followers’ identification mediates the relationship between social media influencers’ perceived attractiveness and purchase intentions.	Supported

H5c: Followers' identification mediates the relationship between social media influencers' perceived expertise and purchase intentions.	Supported
H5d: Followers' identification mediates the relationship between social media influencers' perceived trustworthiness and purchase intentions.	Supported

6 Conclusion & Implications

6.1 Conclusion and Discussion

This paper demonstrated that perceived attractiveness (PA), perceived expertise (PE), and perceived trustworthiness (PT) positively influence para-social relationship (PSR) (Zhang, 2018; Zhang et al., 2021; Yuan & Lou, 2020), identification (IN) (Le & Hancer, 2021), and purchase intention (PI) (Pornpitalpan, 2004; Ismagilova, 2020; Chekima et al., 2020). Moreover, para-social relationships are factors explaining identification and purchase intention. This discovery confirms the findings of Wahab et al. (2022) that para-social relationships between followers and social media influencers have an important influence on followers' decision-making process. Also, this research found a positive impact of followers' identification on their purchase intentions, which coincides with previous findings (Wahab et al., 2022).

We explored the mediation of the para-social relationship in the relationship between social media influencers' perceived attractiveness and purchase intentions, demonstrating that followers develop perceived intimate relationships with social media influencers who are attractive and classy, which consequently brings followers pleasant customer experiences and triggers their purchase intentions. Additionally, we investigated that PSR moderates the relationship between PE, PT, and PI. Similar results are validated by Masuda et al. (2022), that para-social interaction was a conduct that occurred in conjunction with para-social relationships and that social media fashion bloggers' credibility is linked to purchase intention. This finding also agrees with the study of Kim et al. (2015), who reported that customers desire to wear the same fashion ornaments as celebrities. Our study also explored that followers' identification moderates the relationships between social media influencers' characteristics and purchase intentions. Customers who find an influencer's image appealing may want to emulate the influencer and improve their ideal self-image by utilizing and buying the product the influencer has recommended (Shan et al., 2020).

6.2 Implications

6.2.1 Theoretical Implications

This paper makes a number of theoretical contributions. First, prior scholars primarily focused on celebrity endorsement (Ahmed et al., 2015; Bergkvist & Zhou, 2016; Escalas & Bettman, 2009). We apply CIM to the influencer endorsement context by exposing the impact of social media influencers' characteristics on para-social relationships, identification, and followers' purchase intentions in the Chinese setting. Increased incomes in China are developing a wealthy middle class with educated and affluent customers; therefore, the price is no longer the only factor influencing purchases (Nanevi et al., 2022). Chinese customers are more willing to purchase if a product is talked about favorably on social media platforms.

Second, participants' data help to understand Chinese Generation Z's preferences on social media influencers' characteristics. Scholars can choose the appropriate variables to use when analyzing the effects of various source credibility factors on customers' purchasing behavior. Third, the conceptual model combined with SCM and CIM provides a new perspective for social media influencer marketing in the FMCG sector. This combination provides a better understanding of the relationship between social media influencers' characteristics and purchase intention.

6.2.2 Managerial Implications

This study also provides some managerial implications. First, the research results will remind marketers that they should take into account the different characteristics of social media influencers when creating their product promotion strategy in terms of perceived attractiveness, perceived expertise, and perceived trustworthiness. Then, companies, especially in the FMCG sector, are adequate to promote their products through social media influencers' endorsement in the Chinese market.

Third, it is vital for marketers to think about developing a relationship with brand-loyal customers. The para-social relationship is helpful in enhancing marketing effectiveness. The research results will help marketers to exploit the impact of para-social relationships on purchase intention. Social media influencers should be considered by managers not only as a potent source of brand profitability but also as a way to establish and preserve a dependable bond with consumers (Leite & Baptista, 2022).

6.3 Limitations and Future Research

Future studies should address the limitations of our investigation. Our results are only valid in the Chinese context, and future researchers could broaden the use of our concept to the western context. Due to the significant variations between the consumer cultures and target audiences in the U.S. and China, these two countries use highly distinct marketing strategies. For example, U.S. marketers place more emphasis on a product's usability, while Chinese marketers place more emphasis on a brand name (Nanevi et al., 2022). Second, future scholars can Further subdivide the characteristics of social media influencers used in this study. Qualification, sociability, competence, dynamism, and other celebrity-related attributes can all be used to judge a source's credibility (Zhang, 2018). Third, future studies can conduct comparative research across different product categories within the FMCG sector.

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The Impact of Using Social Media Marketing on Consumer-Brand Engagement Among Generation Z in China — An Empirical Study on Tiktok

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Abstract: This paper examines the impact of the five dimensions of social media marketing (SMM) activities on consumer brand engagement (CBE), and thus expands to the impact on brand awareness and brand image, as well as the mediating role of CBE in SMM on brand equity among the generation Z in China. This study used a quantitative research approach, using sampling among TikTok users (N=264) and analyzed with Hayes Process Macro in SPSS. The results of the study point out that among the five dimensions of SMM, only entertainment and customization have positive significant correlations on CBE. The relationship between consumer brand engagement on brand loyalty and brand image is significant. Under the influence of consumer brand engagement, generation Z shows increased brand awareness of brands promoted by social media marketing campaigns on social media with high entertainment, customization, and trendiness. Therefore, marketers focusing on the younger generation in China can use this article as valuable insights for their social media campaigns.

Keywords: Social Media Marketing (SMM); Consumer-brand Engagement (CBE); Gen Z; China; Brand Awareness; Brand Image; TikTok

1 Introduction

1.1 Background of the Study

Social media has played an essential role in the communication between consumers and communities and has become a part of consumers' lives (Miller et al., 2009; Kim & Ko, 2010). Ebrahim (2019) indicated that social media has reached 2.77 billion internet users worldwide and has become a very promising market channel, thus profoundly changing the practices of marketers. Additionally, the social media advertising budget has increased by 92.3% year-over-year spike, which aims at strengthening the bonds between brands and customers, as well as growing online sales volume, enabling the practice of more cost-effective marketing activities with less effort (Kapoor, 2022; Kim & Ko, 2010).

Based on the broad expansion of social media networks, marketers have begun to utilize social media marketing (SMM) to provide consumers with trendy content in an accessible, engaging, customized way to attract them to participate in the value-creating procedures of the brand (Cheung et al., 2021; Cheung et al., 2020b; Frasquet-Deltoro et al., 2019). Additionally, social media facilitates the development of the online brand community, by providing marketers a channel to hold SMM, allowing customers to share content, building social networks, etc., which is supported by online applications, and web tools as well as other technological infrastructures (Habibi et al., 2014; Kaplan & Haenlein, 2010; Laroche et al., 2012). Up to now, although SMM is assumed as a more promising marketing practice to build brands and interact with customers than traditional advertising (Weinberg & Pehlivan, 2011; Abzari et al., 2014), there are relatively few studies regarding how SMM activities affect customers' brand knowledge and related value (Seo & Park, 2018).

According to research literature, social media-related marketing communication naturally influences customers' attitudes and engagements toward brand-related promotion activities (Cheung et al., 2020a). Consumer-brand engagement (CBE) usually be defined as: “consumers’ specific level of cognitive, emotional and behavioral activity in brand interactions (Hollebeek, 2011, pp.7)”. According to Gómez et al. (2019), a powerful strategy for brand promotion on social media is to increase brand engagement, which can assist businesses in creating a competitive advantage. Schulz and Peltier (2013) argued that when marketers strengthen the interactions with consumers via social media platforms to promote their brands, it will effectively create a positive effect on CBE. When marketers pay attention to the content they created and try to encourage consumers to involve in this communication process with the brand in the online brand community, the CBE will be strengthened and customers' feeling of community and brand affinity will be developed and improved (Barger et al., 2016; Simon & Tossan, 2018). In summary, social media platforms and SMM activities are crucial for fostering consumer-brand interactions and improving CBE (Schulz & Peltier, 2013; Simon & Tossan, 2018; Barger et al., 2016).

For young consumers, brand equity, especially brand awareness and brand image, will significantly impact their consumption intention (Sasmita & Mohd Suki, 2015). Therefore, it is very essential to take young consumers as the target group of brand promotion activities. Schroth (2019) assumed that the Generation Z (Gen Z) are the people who are born after 1997 and before 2013 (pp.1)”. They are creative and young, living in the digital generation, and actively communicating with their favorite brands through online channels and participating in related activities (Bernstein, 2015). As consumers, they will focus more on innovation, they will present new challenges for market practitioners in the future (Priporas et al., 2017). As the main users of social media, Gen Z is heavily influenced by social media marketing such as social media celebrity marketing (Lin et al., 2019). Therefore, Gen Z can be a high potential group of consumers to explore the future direction and impact of SMM activities.

As a social media platform with a lot of integrated user-generated content, TikTok (or Douyin, for its Chinese version) attracts the attention of a large number of young people with its interesting content and has a huge impact on their lifestyles (Lin et al., 2019). TikTok is a popular short video-sharing application on mobile devices. TikTok provides users with the tools to create short videos for users to create videos as well as offers real-time hotspots and discussion boards for users to develop their social networks and express their opinions on this social media platform. In 2019, there are around 442.6 million users of TikTok in China (Thomala, 2020). Therefore, TikTok can be considered a typical social media platform to study the views of generation Z on SMM activities and the potential impact.

1.2 Purpose of the Study

To date, there are a significant amount of research on the area of SMM activities on consumer attitudes and reactions in the luxury, airline, and tourism industries (Kim & Ko, 2010, 2012; Seo & Park, 2018; Sano, 2014), while findings related to the direct impact of SMM activities on consumers remain limited (Ebrahim, 2019). Further, several research looked into how SMM activity affected customers' perceptions of brand value, brand awareness, as well as other relevant brand-related knowledge in Malaysia, Turkey, Hong Kong, and India (Koay et al., 2020; Bilgin, 2018; Cheung et al., 2020; Chahal & Rani, 2017), but studies about mainland China are still few. Therefore, the objective of this study is to ascertain to what extent the five SMM aspects have an influence on the brand development mechanism in the modern Chinese market. explore different features of the CBE process in this area, as well as the key impact factor to construct a holistic framework of consumer perceptions of brand value, brand perceptions, brand loyalty, and brand-related knowledge through one of the most well-liked online social networking applications: TikTok among Gen Z in China.

1.3 Research Objectives

This paper attempts to investigate the effects of SMM activities on Gen Zs' consumer behavior, brand-related knowledge-building systems through the social media platform TikTok. The next two research topics are noteworthy in order to fulfill this goal of the study:

1. How each of the five dimensions of SMM influences consumer behavior, and thus to what extent, affects CBE.
2. To explore the connection between CBE and consumers' related brand understanding such as brand equity.
3. To further analyze how these behaviors make an effect on Gen Zs' lifestyles.

1.4 Contributions of the study

This study will help marketers and researchers to improve their understanding of the generation Z consumer group in China, especially in the SMM space. Moreover, it will provide a theoretical basis and guidance for marketers to develop brand building and brand marketing campaigns to help them develop more effective and cost-effective marketing strategies. In terms of brand-related literature, this article will examine the applicability and validity of the findings in mainland China on the role of the five dimensions of SMM: entertainment, customization, trendiness, interaction, and EWOM, in the process of building consumer brand perceptions. Furthermore, this will contribute to future research to elaborate the framework of SMM characteristics and help draw more generalizable conclusions about the factors influencing consumers' brand understanding which can ultimately contribute to the establish of strong brand awareness and positive brand image, etc.

1.5 Theoretical Framework

1.5.1 Five SMM dimensions (Kim & Ko, 2010, 2012; Keller, 2010, 2016)

Kim and Ko (2010, 2012) proposed and examined the methodology of using five SMM dimensions to understand the impact of SMM activities on brand equity, especially for brand awareness and brand image. According to Kim & Ko (2010)**,** the five dimensions include entertainment, customization, trendiness, interaction, and e-word-of-mouth (EWOM), which will affect consumer-based brand equity, especially on brand awareness and brand image under the mediating effect of product involvement level. This result is consistent with Keller (2010;2016): brand awareness and brand image are usually used as standards when measuring customer brand knowledge and brand-related value.

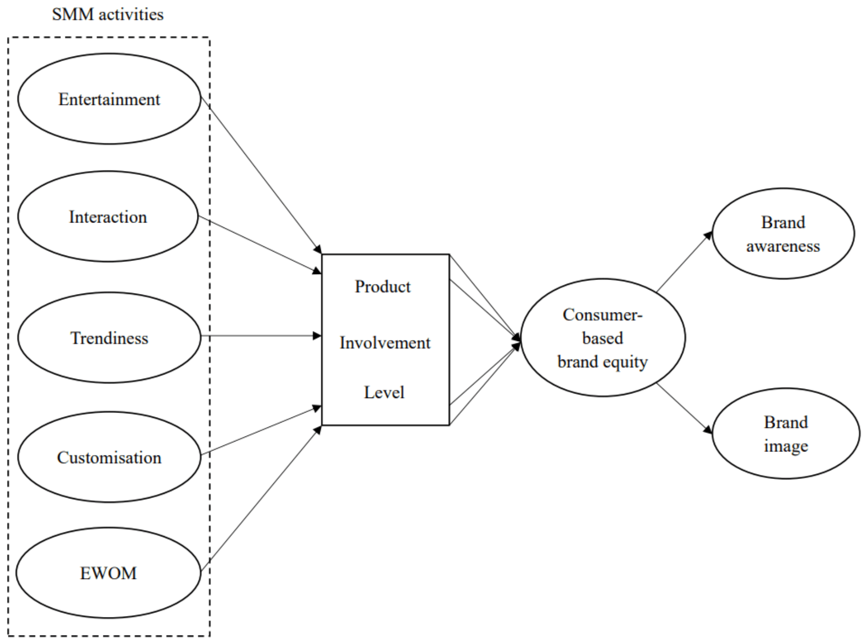


Figure 1 Five SMM Dimensions Model

1.5.2 CBE Framework (Hollebeek et al.,2014; Van Doorn et al., 2010; Islam et al., 2018; Jarvis et al., 2003; Schivinski and Dabrowski, 2016)

CBE is usually explained as consumers' unique cognitive level behaviors with emotions when they interact with marketing activities held by the brand (Hollebeek et al.,2014). It is believed to be a key factor in promoting brand equity, which refers to consumer behaviors that stem from motivational factors other than purchases (Van Doorn et al., 2010). Given its significance, CBE is operationally related to, affection, activation, and cognitive processing (Islam et al., 2018; Jarvis et al., 2003). Adapted from Schivinski and Dabrowski, brand attitudes are closely correlated with brand equity and purchasing intention (2016).

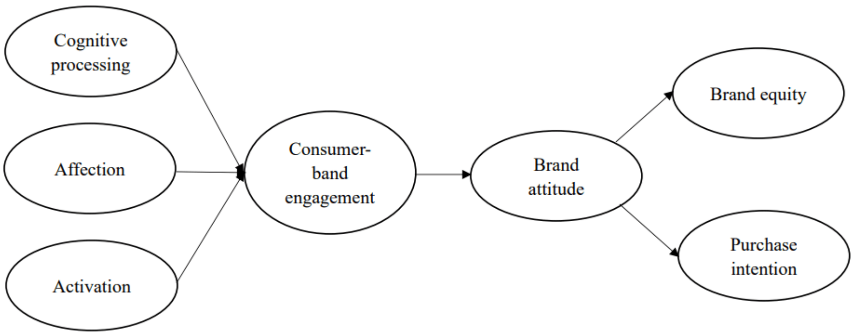


Figure 2 CBE Framework Model

1.6 Conceptual Framework

Thus, we combine the SMM dimensions mentioned in the previous section with the CBE framework to obtain our theoretical framework which show in figure.3 below:

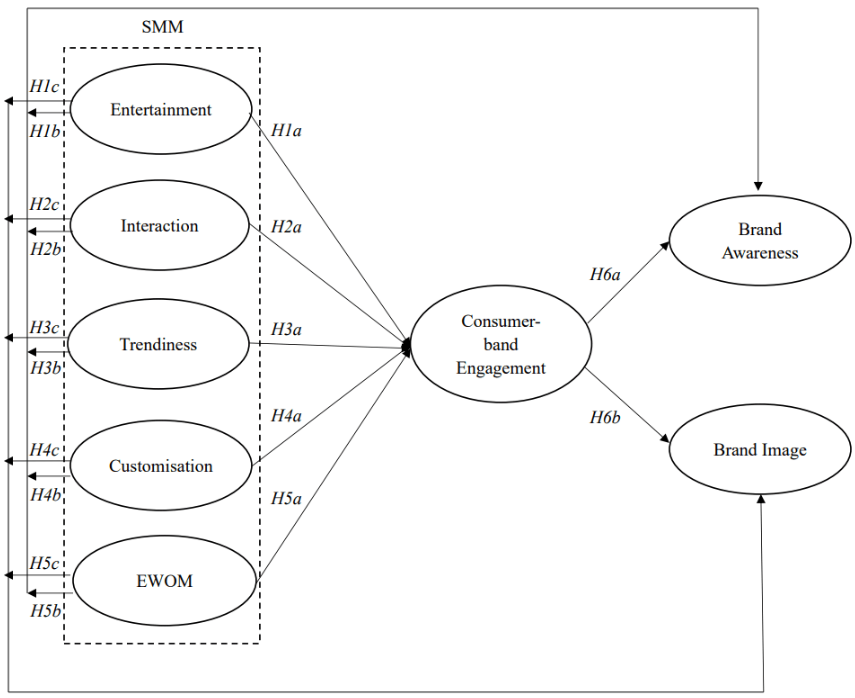


Figure 3 Conceptual Framework

H1a: Entertainment is positively associated with consumer-brand engagement (CBE).
H1b: Entertainment is positively associated with brand awareness (BA).
H1c: Entertainment is positively associated with brand image (BI).
H2a: Interaction is positively associated with consumer-brand engagement (CBE).
H2b: Interaction is positively associated with brand awareness (BA).
H2c: Interaction is positively associated with brand image (BI).
H3a: Trendiness is positively associated with consumer-brand engagement (CBE).
H3b: Trendiness is positively associated with brand awareness (BA).
H3c: Trendiness is positively associated with brand image (BI).
H4a: Customization is positively associated with consumer-brand engagement (CBE).
H4b: Customization is positively associated with brand awareness (BA).
H4c: Customization is positively associated with brand image (BI).
H5a: Electronic word-of-mouth (EWOM) is positively associated with consumer-brand engagement (CBE).
H5b: Electronic word-of-mouth (EWOM) is positively associated with brand awareness (BA).
H5c: Electronic word-of-mouth (EWOM) is positively associated with brand image (BI).
H6a: Consumer–brand engagement (CBE) is positively associated with brand awareness (BA).
H6b: Consumer–brand engagement (CBE) is positively associated with brand image (BI).

2 Literature Review

2.1 Social Media Marketing (SMM)

Kaplan and Haenlein (2010) defined social media as a set of applications developed on the Internet, which provides a strong technical basis to support the process of communication, and cooperation, as well as distributing user-generated content (UGC) among users (Berthon et al., 2012). Compared to traditional channels such as advertising on television, paper, etc., social media can be considered as a more interactive way and thus can build a strong social network, which can be used as a channel to have a larger community reach (Bowen, 2015; Ebrahim, 2019). Therefore, social media has the potential to provide good opportunities when business marketing campaigns want to establish connections with individual consumers (Kelly et al., 2010). The most common forms of social media are review sites including consumer experiences, Wikis, forums containing UCGs (Zeng & Gerritsen, 2014), as well as interpersonal networking sites, which can create private profiles such as Facebook, Twitter, and Blogger (Tess, 2013). These platforms enable companies to establish relevant brand awareness for users using social media marketing activities, such as uploading content, celebrity endorsement, and running brand communities, to reach the goal of establishing contact with consumers and other stakeholders (Phan et al., 2011; Keller, 2013; Yu & Yuan, 2019).

2.2 The Social Media Marketing on TikTok in China

According to Statista (2022), there are 302.25million social media users in China. As a market with a large number of social media users, much of the research on social media marketing (SMM) has been conducted in China. Shih et al. (2014) examined the SMM effect focusing on Xiaomi's marketing experience, pointing out that a fan-centric social media business model through multiple channels is an easier way for companies to gain a competitive advantage and increase profitability. High-frequency interactions with fans on social media to identify consumer needs, and solve consumer problems, can lead to more active consumer participation in creating marketing content, thus positively impacting brand loyalty and contributing to the co-creation process (Shih et al., 2014). There are also studies that point to social media as a new channel for establishing brand associations with customers (Gao & Feng, 2016). Different social media choices to deliver created content, and adopting different brand content strategies along with the different quality of brand-consumer communication will result in differences in Chinese users' gratification (Gao & Feng, 2016). The Chinese version of TikTok (Douyin) is number one of the top 10 most used social networks in China reaching 75% of the user share (Statista, 2022). Based on these previous studies of SMM, many unrevealed parts about the influences of content on social media need to be considered, and therefore relevant in-depth studies are needed. (Rowley & Keegan, 2019)

2.3 Theoretical Framework and Hypothesis Development

The following discussion revolves around the theoretical framework of SMM activities and links it with customer-brand Engagement (CBE) behavior. Furthermore, this paper will discuss the impact of SMM and CBE on consumer-perceived brand equity.

2.3.1 Customer-brand Engagement in Social Media Marketing

A previous study defined consumer brand engagement (CBE) as a psych-behavioral theory that links the relationships between customers and brands to the intensity of consumer engagement activities (Hollebeek, 2011, p. 790). In past definitions, consumer engagement was considered during the brand communication process, and this engagement was often examined by the specific states of three aspects: cognitive, affective, and behavioral (Hollebeek, 2011), but according to past research, it remains controversial whether this ultimately affects consumer behavior (Bowden, 2009). In the relevant literature, both the interactions between users on online social media platforms and brand knowledge, are usually linked to consumer brand engagement (Cheung, 2020). In previous studies, Schulz and Peltier (2015) suggest that social media is a good channel for consumers who are already engaged in brand interactions to increase the intensity of their communication with the brand. Based on the potential of social media, Barger et al. (2016) further suggested that scholars should focus more on the important role played by content on social media, which should focus on multi-sensory and have rich interactivity (De Vries et al.,2012). Barger et al. (2016) also affirmed that consumer distribution of posts across social-media-based brand communities can positively affect CBE, which was later improved by Simon & Tossan (2018), who emphasized more on emotional associations such as a sense of belonging, as well as intimacy of the brand-related community, can have a significant impact on CBE. In summary, the prevailing view on CBE is to encourage a variety of SMM activities to increase communication between users and brands (De Vries et al.,2012) and to promote brand-related experiences in consumers' perceptions (Barger et al. 2016).

2.3.2 The Effect of Social Media Activities on Brand Equity

According to the prior literature reviews, brand equity is the additional meaning attached to the name of brands or certain brand-related symbols, usually in the form of incremental value or additional loss, and is closely related to consumers' brand purchase preferences (Aaker, 1996). Keller (1993) explains that consumer-based brand equity is composed of brand awareness and consumer-perceived brand image, arguing that brand equity is a unique value based on consumer awareness that goes beyond the materiality of the product itself. In the process of exposure to a variety of marketing activities, consumers will depend on brand equity to differentiate the positioning of different products, thus creating a unique social phenomenon that gives symbolic meaning to different brands in the memory of consumers (Seo & Park, 2018; Keller, 1993; 2003). Furthermore, consumers show different tendencies to pay product premiums depending on brand equity, this finding links the company's economic benefits to establishing positive brand equity (Lassar et al., 1995). Extensive research has explored the relationship between SMM activities on social media and brand equity from the luxury industry, the airline industry, social media users, etc. (Kim & Ko, 2012; Seo & Park, 2018; Ebrahim, 2019). As a two-way communication platform, social media encompasses company- and user-created brand-related content and building consumer-based brand equity through SMM activities (Bruhn et al. 2012). Sasmita & Mohd Suki (2015) indicated that the young generation will change brand equity perceptions through exposure to SMM activities, particularly in terms of brand awareness. Also, previous scholar Godey et al. (2016) pointed out that SMM activities on social media would significantly affect brand awareness and image. Therefore, this paper will follow the previous study and explore whether SMM activities are still validated factors that will affect brand equity among the younger generation in China, which can enrich the findings in this area.

2.3.2.1 Brand Awareness

Brand awareness refers to consumers can recognize a specific brand among different brands and remember the brand name or its characteristics (Percy & Rossiter, 1992; Keller, 2009). Previous literature states that consumers are more likely to buy brands they recognize (BİLGİN, 2018). Therefore, the creation of brand awareness increases the likelihood that consumers will purchase the brand's products, reduces the perceived risk to consumers, and makes the product more likely to be selected among products of the same category for potential consumers to make a purchase (Keller, 1993; Verbeke et al., 2005; Aaker, 1996). Past research corroborates that social media marketing is an effective factor in the creation of brand awareness (BİLGİN, 2018; Rimadias et al., 2021; Ebrahim, 2019).

2.3.2.2 Brand Image

Brand image includes the sum of the consumer-perceived direct impression of their products and the related indirect associational connections (Keller, 1993). Consumers tend to use the brand image of the brands they use as a symbol of self-expression, which contains all the evaluations of this brand and associate them with celebrities (Lau and Phau, 2007; Iversen and Hem, 2008). Previous scholars have pointed out that a good brand image can help a company earn higher profits and gain an advantage over the competition by increasing its market share (Park et al, 1986). For young consumers today, brand image also positively impacts brand equity (Ebrahim, 2019).

2.3.3 Five Social Media Marketing Dimensions

Kim and Ko (2012) defined social media marketing (SMM) in terms of five attributes and explored the impact of each dimension on consumer equity and brand equity, as well as related derived consumer behavior. These five perspectives have been widely applied to social media marketing in various industries, and various conclusions have been drawn (eg. Godey et al., 2016; Rimadias et al., 2021; Seo & Park, 2018; Cheung et al., 2020). This paper will also use the five dimensions of SMM as a theoretical framework to explore the impact of each dimension on consumer brand engagement and brand equity.

2.3.3.1 Entertainment

The entertainment dimension mainly refers to the fact that the content posted on social media should be interesting and make the user feel pleasant emotionally during social media usage (Kang, 2005; Ebrahim, 2019). This entertainment sharing can encourage users to be continuously active on the brand as well as generate positive emotions and feelings in their minds (Manthiou et al., 2013). In order to retain users continuously, companies should encourage the creation of interesting content and turn this continuity into a competitive advantage, which has been proven to be powerful when holding SMM activities (Schivinski & Dabrowski, 2015; Shuang et al., 2021).

H1a: Entertainment is positively associated with consumer-brand engagement (CBE).

H1b: Entertainment is positively associated with brand awareness (BA).

H1c: Entertainment is positively associated with brand image (BI).

2.3.3.2 Interaction

Social media platforms with interactive properties need to create a two-way communication channel between consumers, which allows for the free exchange of ideas between consumers for the purpose of spreading marketing content (Kim and Ko, 2012, Muntinga et al., 2011) With social media as a more powerful communication method than traditional media, current SMM campaigns can be based on consumers' with social media, a more powerful communication method than traditional media, current SMM activities can push relevant marketing messages based on consumers' personal profiles and encourage discussions among users about them, which can help build connections between brands and consumers (Manthiou et al., 2013; Bowen, 2015).

H2a: Interaction is positively associated with consumer-brand engagement (CBE).

H2b: Interaction is positively associated with brand awareness (BA).

H2c: Interaction is positively associated with brand image (BI).

2.3.3.3 Trendiness

In previous literature, trendiness has been defined as the ability to be up-to-date with information, often containing the most recent descriptions of products and services (Bruno et al., 2016). Kim and Ko (2012) argue that the trendiness characteristic carried by social media can be beneficial in strengthening the connection with consumers. Additionally, Manthiou et al. (2016) argue that such SMM activities that can show the trend can build positive consumer perceptions of the brand. For example, in a brand's SMM activities, trendiness is usually associated with brand-related information updates, which are usually led or encouraged by marketing practitioners, to produce the latest reviews of products or services, and spread the latest ideas about the brand, ultimately helping to build brand image in the minds of consumers and establish brand trust (Godey et al., 2016). Therefore, this paper will continue to validate the impact of trendiness on brand perception as well as CBE, formally stating that:

H3a: Trendiness is positively associated with consumer-brand engagement (CBE).

H3b: Trendiness is positively associated with brand awareness (BA).

H3c: Trendiness is positively associated with brand image (BI).

2.3.3.4 Customization

Customization refers to a strategy that attempts to connect with individual users to meet their personal preference needs with individually optimized information, allowing individual users to receive customized services and personalized information, which helps to increase user satisfaction and generate positive perceptions, further building brand trust and increasing potential consumers' propensity to purchase (Ding and Keh, 2016; Godey et al. 2016; Martin and

Todorov, 2010). Past literature states that companies use social media customization to deliver brand messages and reflect brand uniqueness to consumers for the purpose of increasing brand perception and brand loyalty (Martin and Todorov, 2010). There is no consensus on the facilitating role of customization in consumer engagement behavior: some scholars argue that marketing strategies can facilitate consumer engagement, but the role of customization is not significant for CBE aspects (Bleier et al., 2017; Rimadias et al., 2021). This paper will dig more into the impact of customization and arrive at the following hypotheses:

H4a: Customization is positively associated with consumer-brand engagement (CBE).

H4b: Customization is positively associated with brand awareness (BA).

H4c: Customization is positively associated with brand image (BI).

2.3.3.5 Electronic word-of-mouth (EWOM)

Electronic Word-of-Mouth (EWOM) refers to content posted on social media platforms by potential, past, and current consumers about products and services, including the overall range of positive and negative statements, which can be viewed by other users (Hennig-Thurau et al., 2004). Compared to word-of-mouth, which contains relatively credible information, electronic word-of-mouth is considered to be a more efficient way to communicate because it reaches more consumers and is more accessible (Gruen et al., 2006; Chatterjee, 2001). Regarding the communication of brand-related information, negative comments can dilute brand equity and adversely affect the brand (Bambauer-Sachse & Mangold, 2011). Given the importance of EWOM, it also has a significant effect on CBE regardless of the category of product (Srivastava & Sivaramakrishnan, 2020). This paper will further examine the relationship between EWOM and brand equity which contains brand image and brand awareness as well as extend it to CBE behavior.

H5a: Electronic word-of-mouth (EWOM) is positively associated with consumer-brand engagement (CBE).

H5b: Electronic word-of-mouth (EWOM) is positively associated with brand awareness (BA).

H5c: Electronic word-of-mouth (EWOM) is positively associated with brand image (BI).

2.3.4 Effect of Consumer–brand engagement (CBE) with Brand Equity

Brand equity is often tied to a unique connection between the consumer and the branded product, which can generate different responses and increase consumers' purchase intention towards a branded product over an unbranded product (Keller, 1993; Aaker, 1996; Ailawadi et al., 2003; Yoo & Donthu, 2001). Consumers' involvement behaviors are interactions with branded products that can increase the bond with the brand and thus build a better connection with it (Dwivedi, 2015;

Keller, 1993; Aaker, 1996). At the same time, CBE can serve well as a predictor of high-level consumer involvement behaviors as well as self-expression, which is thought to increase perceived brand equity (Algharabat et al., 2020; Hepola et al., 2017). This paper will use brand awareness and brand image as the stand-in of brand equity (Keller, 1993).

H6a: Consumer–brand engagement (CBE) is positively associated with brand awareness (BA).

H6b: Consumer–brand engagement (CBE) is positively associated with brand image (BI).

3 Research Method

3.1 Summary Statistics

The questionnaire data collection was conducted online and the theme was to study consumer perceptions of the Jitterbug platform and the impact of the social media platform's SMM activities on consumer perceptions related to the brand. Over a two-month period, 321 questionnaires were collected, including 132 males and 189 females. More than half of the respondents use TikTok frequently (twice a week or more) and for more than an hour per day. Also, nearly 93.46% of respondents would pay attention to the brand of the product when purchasing, further pointing out the importance of studying brands related concepts for consumer behavior research. Table 1 below shows the basic characteristics of the online survey participants.

Table 1 Demographics Overview

Demographics	Frequency %
Gender	
Male	41.12
Female	58.88
Age	
≤17	1.87
18-27	60.43
28-37	14.33
38-42	4.98
≥43	18.38

Occupation	
Students	49.84
Unemployed	5.3
Part-time	7.48
Full-time	37.38
Monthly income	
Less than 1500 RMB	11.53
1500-3000 RMB	36.76
3001-4500 RMB	12.15
4501-6000 RMB	12.77
6001-7500 RMB	9.97
More than 7500	16.82
Frequency of using TikTok	
Never	14.02
Sometimes (Use once a week or less)	33.96
Usually (Use 2~3 times a week or more)	22.12
Always (Used almost every day)	29.91
Total time spent on TikTok per day	
Less than 1 hour	49.53
1-2 hours	30.84
2-3 hours	13.08
More than 3 hours	6.54
Whether pay attention to the brand when purchasing products	
Never	6.54
Sometimes	43.3
Usually	33.02
Always	17.13

3.2 Measures and Reliability Tests

This article will apply the widely used Cronbach's alpha as a measure of reliability for each variable analyzed in this study (Taber, 2017). Taber (2017) stated that Cronbach's alpha coefficient is a value ranging from 0 to 1 when reaching and larger than 0.7 means that the data is acceptable in terms of reliability. Table 2 below calculates the Cronbach's alpha values for each variable and all of them show a high level of confidence (>0.7).

Table 2 Reliability Test - Cronbach's Alpha (α)

Variables	No. of Items	α
Entertainment (ENT)	5	0.900
Customization (CUS)	5	0.924
Interaction (INT)	5	0.915
Electronic Word of Mouth (EWOM)	5	0.941
Trendiness (TRE)	5	0.938
Consumer-brand Engagement (CBE)	5	0.943
Brand Awareness (BA)	5	0.957
Brand Image (BI)	5	0.939

3.3 Correlation Test

This article uses Pearson correlation matrix to explore the correlation between independent variables and dependent variables. The correlation coefficient, r, fluctuates between -1 and 1, with values closer to 0 indicating an approximately low correlation between the two variables, and closer to -1 and 1 indicating a stronger correlation, representing negative and positive correlation, respectively (Benesty et al., 2009). The Pearson correlation coefficients of the variables in this study are shown in Table 3 below.

Table 3 Correlation analysis – Pearson Correlation

Variable	ENT	CUS	INT	EWOM	TRE	CBE	BA	BI
ENT	1							
CUS	.750**	1						
INT	.688**	.726**	1					
EWOM	.654**	.729**	.703**	1				
TRE	.602**	.688**	.656**	.674**	1			
CBE	.616**	.663**	.663**	.700**	.746**	1		
BA	.620**	.653**	.624**	.661**	.747**	.798**	1	
BI	.566**	.639**	.653**	.607**	.682**	.731**	.774**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Schober (2018) pointed out that if the r-value is above 0.7 and below 1, it represents a relatively strong correlation between the two examined variables. If the r-value is greater than 0.4 and less than 0.69, respectively, it represents a moderate correlation relationship. In conclusion, all the variables have at least a moderate correlation relationship (0.566), which shows significance at the 0.01 level.

4 Results

4.1 Evaluation of Measurement Results

This paper will use multiple linear regression analysis to conduct the result and test the interactions between the X and Y. It will also use the mediating effect regression analysis model proposed by Hayes (2013), which will include the effect of X on Y without the mediating variable and the effect of X on Y with the mediating factor, called direct effect and indirect effect, respectively.

In this paper, entertainment, customization, trendiness, interactions, and electronic word-of-mouth will be used as independent variables, brand awareness and brand image will be used as dependent variables, and consumer brand engagement will be introduced as a mediating variable to explore the ultimate impact of the five different dimensions of social media activity on brand equity and to discuss the extent to which consumers' brand engagement behaviors affect their connection.

4.2 Hypothesis Analysis

Table 4 shows the regression results for each pathway among each previous hypothesis, the third column shows the value of the regression coefficient (β), and the fifth column shows the *p*-value of each hypothesis, which represents their significance.

Most of our hypotheses can be supported. H3a shows a regression coefficient (β)=0.129 and *p*-value=0.020<0.05, so customization has a moderately significant positive effect on consumer engagement behavior. For H4a, since β=0.240 and p-value=0.001<0.01, we can conclude that electronic word-of-mouth has a highly significant influence relationship on consumer engagement behavior. Having H5a with β=0.420, p-value=0.001<0.01 allows us to conclude that a high score on the trendiness dimension will positively influence consumers to engage in brand engagement behavior. We can similarly conclude H1b, H4b, and H5b that the entertainment dimension, EWOM, and trendiness have a significant effect on brand awareness (β=0.147, p-value=0.009<0.01; β=0.169, p-value=0.003<0.01; β=0.470, p-value= 0.001<0.01). while for brand image, only Customization, Interaction, and Trendiness, can have moderate and highly significant influential effects respectively (β=0.144, *p*-value=0.045<0.05; β=0.256, *p*-value=0.001<0.01; β=0.345, *p*-value=0.001<0.01). Based on CBE's regression coefficient of two dimensions of brand equity: brand awareness and brand image β=0.820 0.689, and p-value=0.001; 0.001<0.01, we can draw a conclusion that the behavior of consumers participating in brand activities can significantly affect their brand awareness and brand image of the brand. The summary information about the assumptions will be listed in Table 6 below.

Table 4 Hypothesis Analysis

Hypotheses	Path	Coefficient	*t* value	*p*-value
H1a	ENT→CBE	0.088	1.639	0.102
H2a	CUS→CBE	0.038	0.623	0.533
H3a	INT→CBE	0.129	2.347	0.020*
H4a	EWOM→CBE	0.240	4.381	0.001**
H5a	TRE→CBE	0.420	8.324	0.001**
H1b	ENT→BA	0.147	2.641	0.009**
H2b	CUS→BA	0.056	0.880	0.380
H3b	INT→BA	0.056	0.984	0.326
H4b	EWOM→BA	0.169	2.977	0.003**
H5b	TRE→BA	0.470	9.031	0.001**
H1c	ENT→BI	0.031	0.492	0.623
H2c	CUS→BI	0.144	2.011	0.045*
H3c	INT→BI	0.256	3.971	0.001**
H4c	EWOM→BI	0.066	1.156	0.249
H5c	TRE→BI	0.345	6.310	0.001**
H6a	CBE→BA	0.820	23.622	0.001**
H6b	CBE→BI	0.689	19.115	0.001**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The Table 5 below shows the outcome of mediation analysis using Hayes regression process. For the total effect, it shows the impact of independent variables' impact on dependent variables ignoring the mediator. All pathways show that the *p*-value are less than 0.01, representing a significant effect of X on Y. For indirect effects, all LLCI > 0, we can conclude that there is a strong association from X to the mediating variable CBE and CBE to Y. Thus, we can conclude that CBE has a strong mediating effect between the independent and dependent variables.

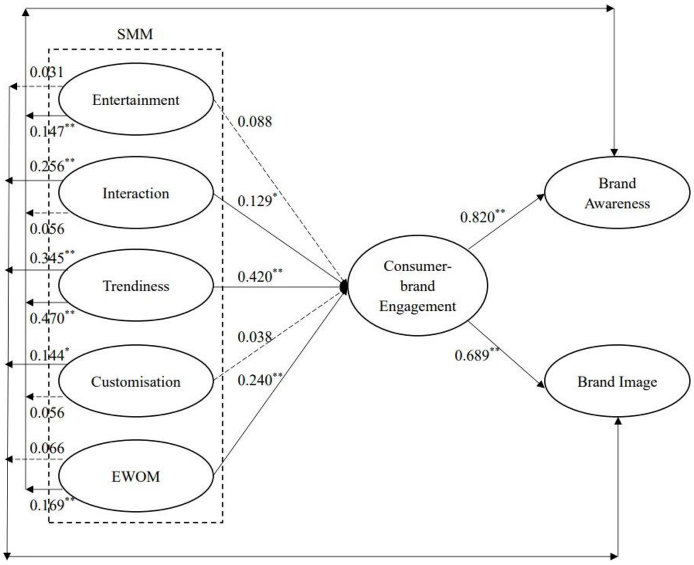
Table 5 Mediation analysis

Path	Effect	Coefficient	SE	*t* value	*p*-value	LLCI	ULCI
ENT→CBE→BA	Total	0.6923	0.0490	14.1239	0.0000**	0.5959	0.7888
ENT→CBE →BI	Total	0.5797	0.0473	12.2625	0.0000**	0.4867	0.6727
CUS→CBE→BA	Total	0.7364	0.0478	15.3953	0.0000**	0.6423	0.8305
CUS→CBE→BI	Total	0.6614	0.0446	14.8423	0.0000**	0.5738	0.7491
INT→CBE→BA	Total	0.7067	0.0495	14.2759	0.0000**	0.6093	0.8041
INT→CBE→BI	Total	0.6784	0.0440	15.4069	0.0000**	0.5918	0.7650
EWOM→CBE→BA	Total	0.6702	0.0426	15.7424	0.0000**	0.5865	0.7540
EWOM→CBE→BI	Total	0.5645	0.0414	13.6376	0.0000**	0.4830	0.6459
TRE→CBE→BA	Total	0.7860	0.0392	20.0650	0.0000**	0.7089	0.8630
TRE→CBE→BI	Total	0.6581	0.0396	16.6357	0.0000**	0.5803	0.7359

Indirect effect	Effect	Coefficient	Boot SE	Boot LLCI	Boot ULCL
ENT→CBE→BA	Indirect	0.4606	0.0554	0.3541	0.5708
ENT→CBE →BI	Indirect	0.3886	0.0471	0.2985	0.4844
CUS→CBE→BA	Indirect	0.4867	0.0585	0.3729	0.6026
CUS→CBE→BI	Indirect	0.3758	0.0494	0.2829	0.4775
INT→CBE→BA	Indirect	0.5134	0.0565	0.4048	0.6257
INT→CBE→BI	Indirect	0.3655	0.0475	0.2742	0.4598
EWOM→CBE→BA	Indirect	0.4659	0.0532	0.3610	0.5705
EWOM→CBE→BI	Indirect	0.3906	0.0484	0.2977	0.4879
TRE→CBE→BA	Indirect	0.4259	0.0676	0.2989	0.5641
TRE→CBE→BI	Indirect	0.3612	0.0494	0.2676	0.4616

Table 6 Summary of Hypothesis

Hypothesis	Results
H1a: Entertainment is positively associated with consumer-brand engagement.	Rejected
H1b: Entertainment is positively associated with brand awareness.	Supported
H1c: Entertainment is positively associated with brand image.	Rejected
H2a: Interaction is positively associated with consumer-brand engagement.	Rejected
H2b: Interaction is positively associated with brand awareness.	Rejected
H2c: Interaction is positively associated with brand image.	Supported
H3a: Trendiness is positively associated with consumer-brand engagement.	Supported
H3b: Trendiness is positively associated with brand awareness.	Supported
H3c: Trendiness is positively associated with brand image.	Rejected
H4a: Customization is positively associated with consumer-brand engagement.	Supported
H4b: Customization is positively associated with brand awareness.	Supported
H4c: Customization is positively associated with brand image.	Rejected
H5a: Electronic word-of-mouth is positively associated with consumer-brand engagement.	Supported
H5b: Electronic word-of-mouth is positively associated with brand awareness.	Supported
H5c: Electronic word-of-mouth is positively associated with brand image.	Supported
H6a: Consumer–brand engagement is positively associated with brand awareness.	Supported
H6b: Consumer–brand engagement is positively associated with brand image.	Supported



*Assumptions accepted are marked with solid line

**Rejected guesses are marked with dotted line

5 Conclusion

5.1 Main Conclusion

According to the regression result, most of our hypothesis are supported. SMM five dimensions such as entertainment, trendiness, customization, and EWOM can increase brand awareness, while interaction does not have a significant impact. Only interaction and EWOM are positively associated with brand image building, while entertainment, trendiness, and customization do not have a significant impact on brand image, which are in line with previous literature (Bruhn et al., 2012, Pham & Gammoh, 2016; Godey et al., 2016; Kim & Ko, 2012; Seo & Park, 2015). Consumer-brand engagement is positively associated with trendiness, customization, and EWOM, and is not significantly associated with entertainment and interaction (Kim & Ko, 2012; Seo & Park, 2015; Godey et al.; Cheung et al., 2020). Also, it is positively associated with brand awareness and brand image, which is in line with the previous study. Additionally, CBE has a strong mediating effect between five SMM dimensions and brand equity, which in general affects the overall association (Cheung et al., 2020).

From this we can conclude that when we aim at brand image building and raising brand awareness, EWOM are both important influencing factors. If we are to work on building brand equity, increasing the probability of brand engagement behavior among consumers will have a positive impact. Moreover, the five dimensions of social media activity can be linked to influencing brand equity by increasing the impact of consumer brand engagement behavior (Kim & Ko, 2012).

For these conclusions, the possible reasons are: young Chinese consumers pay more attention to brands when buying, but pay more attention to brand reputation on social media cautiously. Therefore, their brand engagement behavior which ultimately changed brand equity concept are also closely related to electronic word-of-mouth. At the same time, for brand awareness, the interest features and popularity of SMM activities, including personal preferences, will have a significant impact, while the interactive requirements for the activities are not required. At the same time, building a good brand image is more challenging on social media, because only interaction and word-of-mouth can have a positive impact on it. Word-of-mouth and comments are still the key to brand image.

5.2 Implications

5.2.1 Theoretical Implications

Combining data from respondents helps to understand the brand equity perceived by social media users in social media marketing activities, enriching the potential meaning of commercial applications of brand building. Scholars can further investigate the important influences on consumer brand perceptions to reveal more intrinsic connections. Moreover, this study fills the gaps in the SMM five-dimensional model and the CBE model applied in Chinese regional studies, and expands the sample types to which the model applies (Hollebeek, 2011; Keller, 1993, Cheung, 2020a; Cheung, 2020b). Meanwhile, the conceptual model in this article is a combination of the SMM five dimensions and an adapted CBE model, which provides a new perspective for predicting consumer brand-related knowledge of social media users. This combination allows scholars to better investigate the factors and channels that influence consumer brand perceptions, generating new insights on which to build further.

5.2.2 Managerial Implications

This research provides new insights for marketing practitioners in the brand sector, pointing to important factors in social media marketing campaigns that influence brand awareness and brand image. At the same time, the study points out the importance of guiding consumers to engage in brand engagement behaviors. Under the condition of brand engagement behavior, brand equity in consumer perceptions will be more susceptible to social media marketing behavior. This study provides insight into the social media habits and brand perception preferences of China's Generation Z, helping market practitioners and academics gain insight into the lifestyles and cognitive behaviors of this specific group. Finally, the study outputs some key findings such as the interactive nature of the campaign is not significantly effective in order to increase brand awareness. For brand image building, interaction and electronic word-of-mouth are important positive factors. Therefore, marketing campaigns can focus on different strategies for different purposes.

5.3 Limitations and Future Research

We will explore further to make our findings more reliable and create more value through deal with the following limitations: First, the sample collected in this study is not sufficient to cover most of China, and most of the sample is from Generation Z. Therefore, the findings may have some limitations, and we will try to find out more from the uninformed groups in the survey afterwards. We will then try to further verify the reliability and generalizability of the findings by surveying the inaccessible groups, and summarize the responses of different market segments to the exposure of brand-related knowledge in SMM activities. Second, we used TikTok as the main social media platform for our empirical study this time, and only investigated the impact of SMM activities on this platform, after which we can improve the generalizability of the current findings in terms of the impact of different types of social media platforms. Third, no specific examples are given for SMM activities in this study, thus there is no way to distinguish the different consumer responses to different product categories, after which we can delve into the social media marketing behaviors of specific categories to draw more specific and practical conclusions. Meanwhile, during the previous literature review, we found that other scholars have used Trust as a mediating variable to study the impact of the five SMM dimensions on brand-related attributes (Chahal & Rani, 2017; Delgado-Ballester & Luis Munuera-Alemán, 2005; Ebrahim, 2019). We will later also consider introducing additional mediating variables to improve our understanding of developing consumer relationships.

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The challenges of the sustainability of state pension systems

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Abstract: Nowadays, financial knowledge and financial literacy are a fundamental issue in everyday speech, as the crises and their consequences have highlighted the shortcomings of financial knowledge. When we talk about the causes of crises, we always mention the responsibility of households, companies and banks, in addition to the responsibility of governments. One of the main reasons for this may be a lack of financial knowledge and financial awareness. Many articles and studies deal with the importance of financial culture today. All of these studies point to the importance of financial literacy. Financial literacy can only be developed through education. The reform of the state pension system is a cardinal and noteworthy topic in all countries of the European Union and is often discussed at various scientific meetings. The presentation and related study describe the current pillars of the international and Hungarian pension system, and using demographic and statistical data, address the problems of the mandatory social security system in detail, such as the sustainability issues of the current system. The main goal of the research is to present the possible scenario of changes in pension benefits in Hungary. Using a variety of statistics and research based on a questionnaire of economic attitudes.

Keywords: financial crises, sustainability and modeling of state pension systems, pension savings, pension security, the role of financial culture in education

1 Introduction

According to the calculations of the United Nations (UN), the total world population exceeded the 8 billion milestone on November 15, 2022 (UN, 2021). More than half of the world's population (51.6 percent/4.11 billion people) lives in the seven most populous countries: China, India, the United States, Indonesia, Pakistan, Nigeria, and Brazil. It took more than 50,000 years for the world's population to reach 1 billion. Since 1960, we have added successive billions every decade or two. The world population was 3 billion in 1960; It reached 6 billion around 2000, and the UN predicts it will exceed 9 billion by 2037. However, the rate of population growth is currently slowing from an annual peak of more than 2 percent in the late 1960s to about 1 percent. to half of this by 2050. Population aging is the dominant demographic trend of the twenty-first century—increasing life expectancy, declining fertility, and the advancement of large cohorts into old age. Never before have such a large number of people reached the age of 65 (the traditional old-age threshold). According to our expectations, in the next three to four decades, one billion elderly people will be added to the more than 700 million elderly people living today. Among the older population, the over-85 group is growing particularly fast and is projected to exceed half a billion in the next 80 years. This trend is significant because the needs and capacities of those over 85 are generally significantly different from those between 65 and 84. The age structure of a population primarily reflects its fertility and mortality history. In high-mortality populations, improvements in survival occur disproportionately among children. This effectively creates a baby boom. Eventually, the boom ends when fertility declines due to perceptions of improved child survival, and fertility declines as desired with economic development. But as relatively large baby-boom cohorts move through adolescence and adulthood, the proportion of the population swells during peak working and saving years. The increase from 7 billion to 8 billion took only 12 years, raising long-standing fears about rapid population growth, including food shortages, rampant unemployment, population depletion, and uncontrolled degradation of natural resources and the environment. Earth's carrying capacity is about 5 billion people. So the Earth can provide an adequate amount of resources (e.g. soil, drinking water) for 3 billion fewer people than at present. Furthermore, for the previously mentioned reasons, it is questionable whether there will be an adequate pension level in aging societies.

2 Pension systems in OECD countries

The Organization for Economic Co-operation and Development (OECD) is an international economic organization based in Paris, of which Hungary has been a member since 1996. in the development and evaluation of social policy. According to the OECD, pension systems usually consist of "three pillars" (see Figure 1).

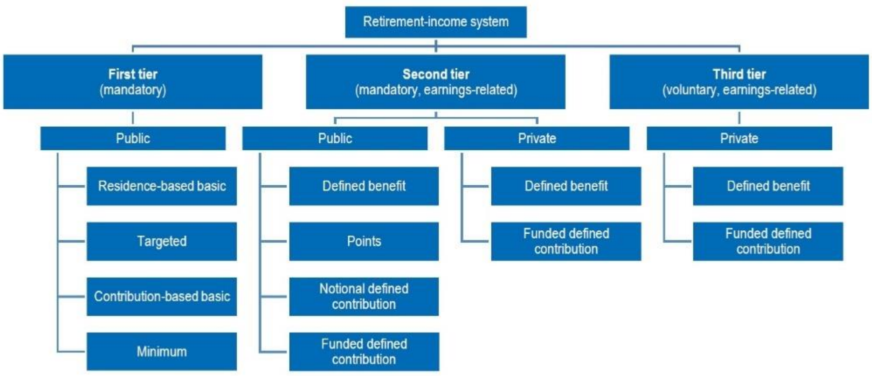

Figure 1 Summary framework of the various pension financing systems
(OECD, 2019, 2021, Novoszáth, 2014, own editing, 2022)

The "first pillar" (state) pensions are legal state pensions managed by the state, usually financed from social security contributions and/or general tax revenues on a pay-as-you-go (PAYG) basis. In some countries, individual plans financed by law have been introduced alongside the first pillar. "Second pillar" (employer) pensions are private supplementary programs related to the employment relationship. Finally, "third pillar" (personal) pensions are personal pensions, i.e. pre-financed private voluntary supplementary programs in which contributions are invested in an individual account managed by a pension fund or financial institution.

Pension systems can be grouped based on the principle of financing and the principle of operation. Regarding the financing of pension systems, there are three main types based on the principle of current financing and capital coverage: pay-as-you-go, capital coverage and expectation coverage systems. Based on the form of financing, there are also two types: the pay-as-you-go (PAYG), otherwise known as the financing system, and the funded system. In terms of the operating principle of the pension system, there are two types: the defined benefit (DB) and the defined contribution (DC) pension system.

	Pension System		*Private Pension Coverage*	
	Public	*Private*	*Mandatory*	*Voluntary*
	Type	*Type*	%	%
Australia		DC	85	18
Austria	DB			13.9
Belgium	DB			55.6
Canada	DB			39.4
Denmark	DB+DC	DC	>90	
Finland	DB			8.7
France	DB+points			15
Germany	Points			64
Hungary	DB	DC	74	31
Iceland		DB	>90	
Ireland	DB			42.9
Italy	NDC			10.6
Japan	DB			45
Mexico		DC	34.5	
Netherlands		DB	>90	
New Zealand				32.6
Norway	Points		>90	60
Poland	NDC	DC	71.7	1
Slovak Republic	Points		65.8	
Spain	DB			8.7
Sweden	NDC	DB+DC	>90	
Switzerland	DB	d.credit	>90	
United Kingdom	DB			47.1
United States	DB			46

Figure 2 Funding and operating principles of pension systems

(OECD, 2019, 2021, own editing, 2022)

In time, DB pension financing systems based on the principle of capital coverage were formed first, and the consequences and experiences of the Second World War led to the transition to DB systems based on the pay-as-you-go principle. Later, in parallel with the strengthening of the capital markets, DC systems based on the principle of capital coverage were formed and developed, and starting from the 1990s - in developed countries - the transformation of the systems into DC systems with current financing can be observed more and more. The pay-as-you-go pension system is based on the solidarity of the successive generations, while the essence of the capital protection system is self-care (Dezse, 2022).

During the 1950s, no distinction was made between defined benefit (DB) and defined contribution (DC) pension systems. Sometime later, when they recognized the difference between these two systems, they believed that annuity-based financing was synonymous with pay-as-you-go financing, and that contribution-based financing was equivalent to equity financing. However, in the mid-1990s, Sweden reconsidered the previously pay-as-you-go pension system, and as a result of the reform, a notional defined contribution (NDC) system was introduced, and this highlighted the need to treat the endowment system as synonymous with defined contribution - if not necessarily incorrect - but definitely an oversimplification (Dezse, 2022). The points system and the basic pension system (DB+Ponts) differ from the pure points system (Ponts) in that a part of the total pension, say half, goes equally to all old-age pensioners, and only the other half is distributed in proportion to the earned pension points (Simonovits , 2010, 2019).

The Figure 1 summarizes the financing and operating principles of pension systems in OECD countries. In Hungary, the state pension system is DB-based and accounts for 74% of the pension benefits, which means that there is a high dependence on the state pension system. Based on the OECD's recommendation, it would be important to put more emphasis on self-care, which could reduce the high dependence on the state pension system. Occupational pension schemes are not present in all OECD countries, and when they are, they may be voluntary or compulsory, while some countries have both. Along these lines, structural differences in pension systems and various reforms have led to different pension systems in individual countries. The vast majority of pension systems are public. At the same time, several countries have introduced occupational pension systems and/or private mandatory and voluntary systems (European Commission, 2021). In most countries, earnings-related old-age state pension systems are the main type of insurance, except for example Denmark, Greece, Ireland and the Netherlands (European Commission, 2021). The vast majority of European countries also provide a minimum guaranteed pension, which is usually means-tested, to ensure minimum adequacy for all pensioners. In contrast, in some other countries, such as Denmark, Ireland, the Netherlands and the United Kingdom, the minimum guaranteed pension is provided by a flat-rate pension that pays the same amount to all pensioners (European Commission. 2021). Most pension systems rely on a state (earnings-based) pension system. The basic indicator of the generosity of the pension system is the replacement rate, i.e. the percentage of employees' pre-retirement monthly income that they receive after monthly retirement. Recent evidence shows that the theoretical net substitution rate from mandatory schemes averages 59% and ranges from almost 30% in Lithuania and the UK to almost 90% in Austria, Italy and Portugal (OECD, 2019). Therefore, it becomes essential to examine whether enough information is provided to people to understand whether they are aware of how the pension system works in their own country.

3 Investigation of the sustainability of public pension systems

The sustainability and adequacy of social security systems primarily depends on how the level of employment and contributions deducted from the income of the employed, taxes and savings set aside for pension purposes develop and what influence they have on it (Augusztinovics, 2014). The sustainability and adequacy of social security systems primarily depends on how the level of employment and contributions deducted from the income of the employed, taxes and savings set aside for pension purposes develop and what influence they have on it (NYIKA, 2010, Mészáros, 2014, Banyár, 2016). The financing rules, eligibility conditions and labor market conditions must be adjusted in such a way that there is a balanced relationship between contributions and entitlements, the number of actively contributing employees and retired beneficiaries (Novoszáth, 2017).

Figure 1 summarizes the summary framework of the various pension financing systems based on the OECD. The Hungarian pension system currently consists of two pillars, the mandatory social security system ("giant") and the voluntary private pension system ("dwarf") (NYIKA, 2010, ONYF, 2015). Of the 30 OECD countries, only Hungary, New Zealand and Ireland do not have a mandatory second pillar, which includes community and private systems (Novoszáth, 2014). The previously mentioned demographic pressure can be modeled with economic-social impact assessments. In European countries, including in Hungary, the state pension system operates on a pay-as-you-go basis based on different financing principles and pre-calculations are made for the sustainability of the pension system. The essence of the pay-as-you-go principle is that it is tax-free: the pension contribution is paid out (imposed) on active employees, and it is distributive: the pension contributions collected from the employees are distributed among the current pensioners as a pension benefit. In pay-as-you-go systems, current pension expenses are covered from the contributions of economically active employees (Samuelson, 1958).

The European Union published its report on the change in the number of people living in the Union on its official website (Eurostat, 2015). The contents of the report are not very positive for Hungary. Considering the rate of population decline, the population of Hungary in 1995 was still 2.1% of the European Union, by 2015 only 1.9% of the population of the Union could call themselves Hungarian citizens. The basis of the sustainability of the pay-as-you-go pension system is that there are far more people of working age than people of retirement age, otherwise the balance of the system will be upset (Holtzer 2010). Based on his precalculations, the ratio of employed and retired people in OECD countries will change in an inappropriate direction, as the number of elderly people will increase and the number of people of working age will decrease, which are summarized in Figure 3.

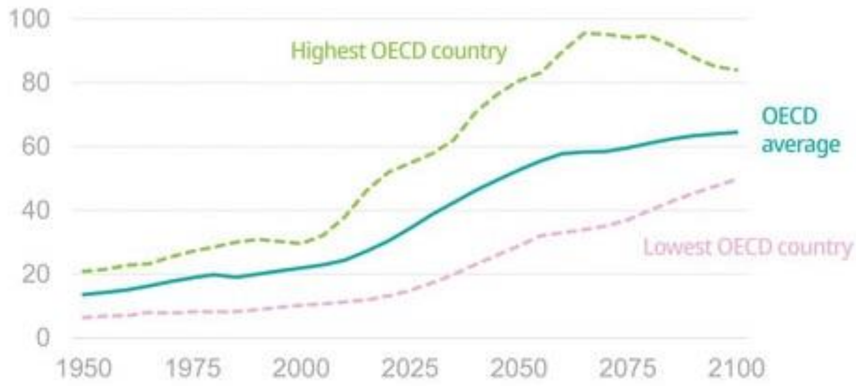

Figure 3 Old age ratio pensions
(OECD, 2019, 2021, own editing, 2022)

In Hungary KSH projections show that the proportion of pensioners and those of working age rose slightly from 22.4% in 1970 to 22.4% in 2000, but could rise to 47.7% by 2050. This means that in 1970 one pensioner was supported by five workers, while in 2050 one pensioner will be supported by the contributions of two workers (Simonovits, 2002). According to the medium-term macroeconomic forecast of the Ministry of Finance at the end of 2019, economic growth is expected to remain around 4 percent, and inflation will remain around the 3 percent target. In addition, until 2023, they forecast a confident reduction in the budget deficit, a decreasing state debt and limited budget room for maneuver. According to the PM, the labor market processes between 2019 and 2023 are likely to continue their favorable trend, as employment growth is associated with low unemployment. Average earnings may increase by 10.8% in 2019 and 9.3% in 2020. In addition, inflation may reach 3.4% in 2019, 2.8% in 2020, and 3% thereafter. The economic protection measures already in place and planned will probably contribute to protecting the achieved results and maintaining growth above the EU average (PM, 2019). According to forecasts, the state pension and the corresponding pension level will remain mostly unchanged in the short term, which still justifies the need to strengthen self-care in order to achieve an adequate pension in the long term.

4 Self-care as an option for pension security

The definition and importance of financial culture is one of the popular topics today. The financial crisis highlighted how much damage a lack of financial literacy can cause, and how much destruction events caused by irresponsible financial decisions can cause. Nevertheless, it should not have taken nearly ten years for the development of financial culture, but it should have started worldwide immediately after the crisis. The low level of knowledge was not an unknown fact in Europe and the United States of America either, as several articles and studies drew attention to this long before the crisis (Van Els et.al, 2007). The lack or insufficiency of financial literacy causes damage to the economy and leads to irresponsible decisions, which in many cases must be resolved by governments, just as in Hungary regarding the bailout of foreign currency loans.

Many researchers have already tried to formulate the definition of financial culture, but this study builds on the definition used by the Magyar Nemzeti Bank. In the strict sense of the word, financial literacy means financial reading and writing skills, which requires special professional knowledge. According to the generally accepted definition, "a level of financial knowledge and skills, with the help of which the individual is able to identify the basic financial information necessary for conscious and prudent decisions, to interpret it after obtaining it, and to make the actual decisions based on it, assessing their possible future financial and other consequences " (MNB – PSZÁF, 2008). Based on Atkinson and Messy's (2012) definition, financial literacy is a combination of knowledge, skills, abilities, attitudes and behavioral patterns that are essential for making appropriate financial decisions at both personal and societal levels. With financial culture, prosperity can be increased and improved, which can be felt not only at the micro level, but also at the macro level. Luxander et al. (2014) in their opinion, financial literacy is basically the ability to process financial information and make appropriate financial decisions.

The findings of Angus Deaton's Nobel Prize-winning British economist's research on consumption, well-being and poverty support that money does make you happy if you use it to move from poverty to subsistence and then to security. Above a certain level, however, more money no longer causes a significant improvement in the quality of life (Steptoe - Deaton - Stone, 2015). It should also be mentioned that he conducts research on the technique of surveying people living on less than one or two dollars a day and the reliability of the data, especially the household surveys conducted by the National Sample Survey (NSS) in India. His research also covers the relationships and national economic effects of social status, health, income and education. The Almost Ideal Demand System (AIDS), created by Angus Deaton, is the first globally applicable method for assessing poverty. The concept of the so-called Deaton paradox also comes from him, i.e. the fact that the level of consumption usually does not change even during rapid increases and decreases in income (Deaton, 2017). If we look at the levels of Maslow's hierarchy of needs, at the first two levels, income and money are necessary to be able to buy food, have a place to sleep and live, and we can achieve these almost exclusively with the contribution of money. Of course, these needs must also be satisfied in the long term, so it is clear that for the second level, money as a tool is the key to our long-term sustainability. As you move up the pyramid, you become more and more happy and satisfied with your own life. After this level, money as a value can do nothing more for our happiness, since love and acceptance cannot be bought by definition. The hierarchy envisioned by Maslow does not apply in all cases, as confirmed by numerous researches (Wahba - Bridwell, 1976).

Based on the forecasts, the number of pensioners will increase drastically, this cannot be changed in the short term. The Hungarian pension system currently relies on two pillars. Pillar I: the state pension system operates on a pay-as-you-go basis and Pillar II. pillar, which operates on the principle of capital coverage (Novoszáth, 2014). In the current pension system, choosing a voluntary pension fund can be an additional element of ensuring a living in old age. The voluntary pension fund can enable us to maintain the standard of living we were accustomed to during our active years upon retirement. These institutions supplement other retirement savings, such as pension insurance. In the general public perception, a pension is the pension that the elderly citizens of a country receive on a subjective basis, i.e. not on the basis of need. Its amount depends on the length of service, i.e. the number of years spent working (earning) and previous income (Matits, 2016). This definition reflects public opinion, according to which the concept of pension is exclusively related to social security benefits. However, any regular old-age income to which we are entitled during our active years can be considered a pension. Thus, our retirement income from some retirement savings can or could be a pension. It should be made aware that there is not and cannot be a form of state care that could promise an adequate pension for everyone, in all cases. In other words, if we really want to be safe in our old age, we must do a lot ourselves. In addition to raising taxes and contributions and pushing the retirement age further, there is also a more efficient and sustainable solution, which is called self-care. This means that people create for themselves the private pension fund that allows them to live a full life in old age. This also relieves the burden on the state, because, although with state aid, money is being set aside privately. They manage their own assets and do not pay more into the joint.

There are many different ways to save for retirement. Before choosing the right savings product, we must decide in advance to what extent the time period and liquidity will matter in the selection of the savings form. The state supports three types of pre-saving solutions for retirement purposes: the voluntary pension fund, the pension pre-savings account and pension insurances. For these, it is worth thinking in terms of at least 10-20 years. Accumulated private pension capital can be withdrawn upon reaching retirement age, with certain restrictions it can also be accessed earlier.

5 The role of self-care in our decisions

The primary research is also directed at the current and future state of direct persons. We are curious as to what guides the respondents to the self-care decision, what habits and processes influenced their decision, and more precisely what motivated them to choose the examined form of savings. With the help of the questionnaire research, we examined the respondents using the methodology of behavioral economic foundations and factor analysis to see what decision-making options are available to us in relation to the pension level expected in the future. The research examines the extent to which self-care as a supplemental pension pillar plays a role in the public consciousness and in our decisions today, as well as what possible pension system is considered desirable in the future, what the pension of the future generation will consist of, how many people will work and how in the future. The research starts from the basic assumption that people think about pensions with fear and uncertainty. Based on the previous chapters, it can be seen that the pay-as-you-go system is in crisis, so the pension system II. pillar, self-care is getting more and more attention these days.

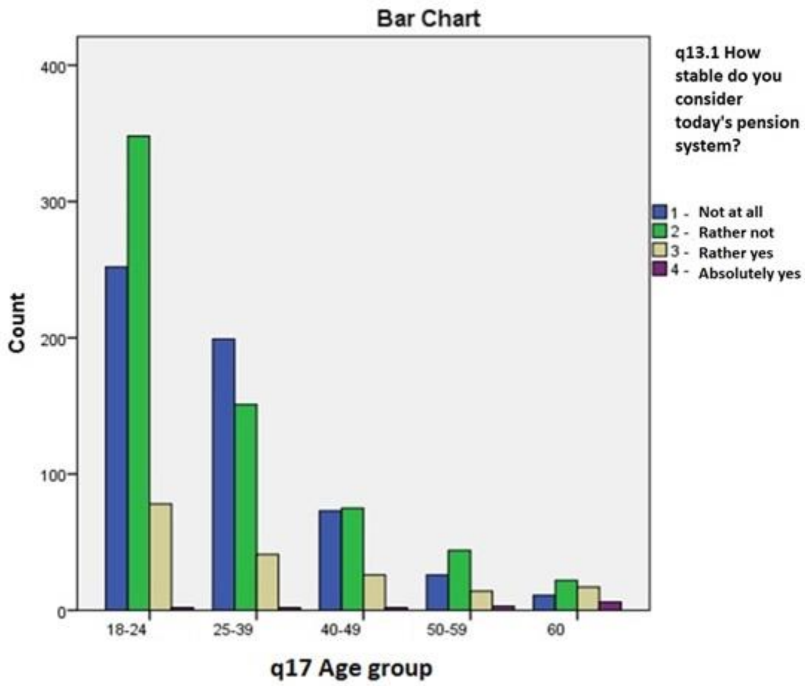

Figure 4 Pension system - Effects of demographic factors on financial awareness
(own editing, 2022)

The questionnaire data was processed using statistical methods. The online questionnaire research took place between April 26, 2020 and May 23, 2020. The total number of respondents was 1410 (n=1410). Anyone could fill out the questionnaire, but it was mainly addressed to colleges and universities where students and lecturers had economic and financial knowledge. Parallel to the research, an international research was also connected, where the online questionnaire was addressed to finance and economics students and lecturers from European and American universities. The total number of respondents was 127 (n=127). The international research is still being evaluated and published. Basic questions to which we sought answers were related to the planning of pension systems, forms of saving for retirement and self-care, pension security, as these are the elements that determine the financial background of our future existence, i.e. the extent of our self-care. The questions of the questionnaire survey were divided into the following groups:

• Financial and economic knowledge (e.g. economics or finance degree)

• Knowledge of pension systems (e.g. mandatory, voluntary)

• The role of self-care (e.g. savings)

• Financial planning (e.g. consulting)

• Cybersecurity issues (e.g. data protection, the role of information security in our lives)

• Mapping of personality traits (e.g. optimist, maximalist)

• What goals do we want to achieve (e.g. founding our own company, having children)

The groups were subjected to a number of statistical evaluations to examine demographic effects on the questions, such as means, frequencies, cross-tabulation. In this study, we only examine the role of the state pension and self-care, as well as the importance of data and information security in the case of online services. Based on the answers to the questions in the questionnaire and Figures 4 and 5, the respondents are basically informed about the issues related to pension systems, but the current state pension system is not considered stable by 40.2% of the respondents. On the other hand, they prefer pre-saving for retirement, based on the yes answer of 47.4% of the respondents. The results also show that financial savings are important to respondents. Based on the average age of those who completed the questionnaire (average age: 30.6 years), savings are important. Further analyzes show additional internal relationships, such as the role of optimism in retirement savings. Savings for retirement is more important for optimistic women, as yes answers are higher than for men with similar characteristics. Furthermore, in addition to the safety of savings, the respondents consider online services, data protection, and information security in relation to the pension system and self-care to be important.

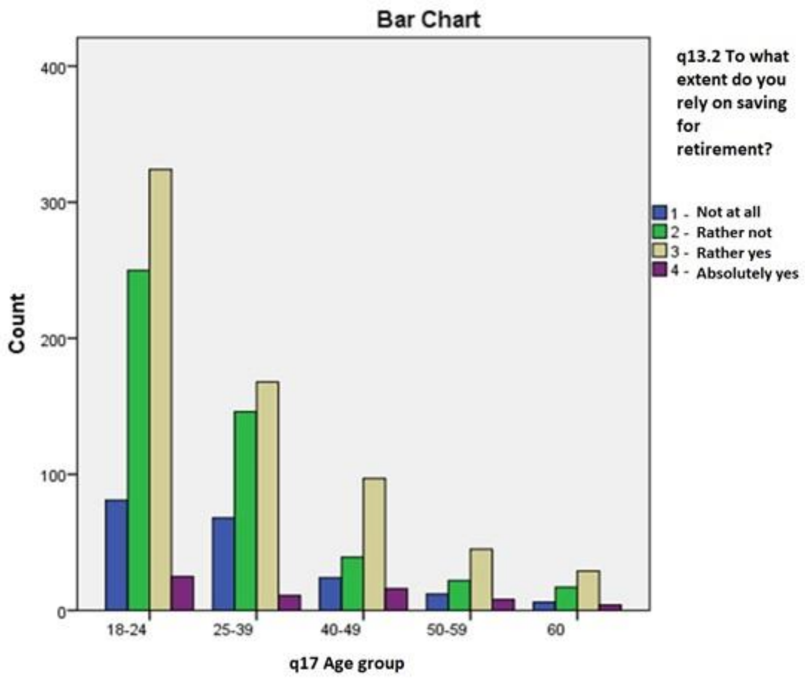

Figure 5 Pension savings - Effects of demographic factors on our financial decisions (own editing, 2022)

Conclusion

The current pension systems, due to the high degree of aging of societies, and based on the forecasts, the drastic change in the ratio of active earners and pensioners will most likely cause social, economic and other problems globally and in our country in the future. Living in old age and preserving the sense of security of the retired society is a priority social interest. In most European Union countries, public systems play a central role in enabling people to reasonably maintain their standard of living during their working years and beyond retirement. The challenge facing the pension policies of the member states is to create systems that are financially sustainable in the long term and fulfill the basic purpose of the pension systems, namely to enable an adequate income and standard of living for the elderly, as well as to ensure their economic independence. They should create an institutional system that is able to create sufficient coverage in the long term to create the security of the retired society.

Due to the high rate of aging of society, the current pension system and, based on forecasts, the drastic change in the ratio of active earners and pensioners will most likely cause social, economic and other problems in the future globally and in our country as well. Experts argue in favor of a mixed system, but there is no accepted concept that everyone would like. Due to the mandatory nature of the state pension, there is no choice.

Based on the literature review and research, we were not able to prove with certainty that a harmonious old age and pension security are possible even without material well-being, but we managed to clarify that in order to maintain our current standard of living in retirement, it is necessary to take care of ourselves in some financial form in the future. We already have three state-supported options for this, the choice is up to us as to which one or which ones we choose. When it comes to saving for retirement, the amount of our income and our emotional decisions determine which form or forms of savings we choose.

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Digitalization Effect on Enterprise Internationalization: Western Balkans perspective

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Abstract Bussiness all over the world try to gain knowledge in order to improve their net income through new products, new markets, and new distribution channels. Since the invention of the first computer progressive steps are made from businesses to adapt the opportunities raised from the usage of new technology solutions. This study consists on identifying the link and the extend to which digitalization helped businesses to expand their activity. Not only in their domestic market but further in the international market. Since the digitalization process keeps evolving it has been a great opportunity for business especially small and medium size enterprises. For this reason through this study we aim to identify the relationship between digitalization and SME internationalization, through literature review.The study is based on a bibliometric review of papers published from 2015 to 2020. In this way we are trying to understand through what the existing results comes from digitalization, internationalization and Small Mediu Enterprises. How does the digitalization process affects SME; what are the advantages and disadvantages that arise from adopting new technologies; how are the business modelsand value chain is affected.Also the literature on Digitalization, Internationalization, and SMEs is increasingly focusing on the impact of digital technologies' adoption in enterprises' strategies, focusing on business model innovation, global value chains, and performance. A future research will focus on the application of the findings in the Western Balkan countries context, using the database from Enterprise Survey from 2018-2020.

Keywords:SME; Digitalization ;Innovation ;Entrepreneurship
JEL Classification: L25, L26, J23, L21

1 Introduction

Digital transformation is a phenomenon dated since the invention of the first computers. These inventions fostered the need to adapt new perspectives and insights from both the society and business actors all over the world.

Some enterprises have joined rapidly the trend and adoption of new technologies in order to improve their strategic and operational goals and some others fail due to their old business models, traditional organizational behavior and lack of innovation attitude.

The impact of digitalization of services and internal management models will foster the development of businesses to a new phase. The impact will affect the supply chain in one hand and exploring new market possibilities on the other.

The new pandemic Covid19 proved to be the one from which society in general searched for new possibilities to exchange information, goods, services and so on. That leaded in emphasizing new perspectives, not just how to survive to the period but also how to integrate new insight to their sustainability business models.

Since the pandemic was an unpredictable situation the society was unprepared to face these new needs. The business faced its challenges since the adoption of new technologies was a rapid process, one day the employees were presented the new tools and the next they have to use it. So, in the situation stated there was a lot of pressure from all to all. That pressure was even before the pandemic but it took time to adopt and to be convinced about the opportunities that digitalization offers.

Many researchers, in their papers have stated and studied the effect that digitalization have on productivity and performance in micro and macro level.

Since yet not discovered in total dimensions, our study focuses on Western Balkans. Most of the companies are organized as SME in this region though having a significant impact on overall countries' GDP. The Western Balkans, comprise of six countries have their own piece of cake in this proccess. Although the number of enterprises is smaller than compared to other regions of Europe, still it is important to investigate the level of digitalization adoption and its effect, since some countries that lie in this area have made some progress toward EU member admission.

This paper tries to have a better understanding of how the digitalization process affected the internationalization of SME, through the investigation of recent literature on the matter.

2 Literature Review

2.1 Digitalization, Business Models and Value Chain

According to Brennen and Kreiss (2016) digitalization is referred to as the “adoption or increase in the use of digital or computer technology by an organization, industry, country”. According to Sebastian et al (2017), Vial 2019 digitalization refers to the process of organizational transformation through the adoption of digital technologies. This refers to digital platforms, digital infrastructure and internal management tools that support internal decision making and performance evaluation.

Digital technologies are a mix of computerized information and communication technologies (Sturgeon 2019) and can be classified into seven types: social, mobile, big data, cloud computing, Internet of Things (IoT), platform development, and AI-related technologies (Sebastian et al. 2017; Vial 2019).

So knowing that recently there is a rush in adopting new technologies and thus digital solutions, the following section debate consists on explaining how digitalization effects the business models, their digital strategy and global value chain.

Business models describe an architecture for how companies design and conduct activities in order to offer value to their customers, how they are compensated by them, as well as how they interact with their stakeholders (suppliers, partners, and customers) (Müller et al., 2018).

During tha last decade busines models have increasingly become a source of innovation and competitive advantage (Rachinger, Rauter, Müller, Vorraber, & Schirgi, 2019). In this way online sales, e-commerce represented a new window to the business, connecting directly the demand and offer, conecting customers and companies, connecting different stakeholders in a fraction of time. In this way enabling new communication channels that leaded in offering new products. The Industry 4.0, known as the fourth revolution, was a steping stone for companies to grow their added value to customers. Products and goods are added new services, known as servitization process, adding in this way more value to customer eye.

Though flexible or innovative business models, offering new insights of how the busines must be organized, what must improve day after day, need to be suppported by new technologies. Chesbrough (2010) argues that having an innovative and suitable business model is as essential as having new and innovative technologies for firms to be successful in the digital world.

We can find three ways of how digitalization effects the business models: first, digitization of the product or service, resulting on a cost optimization of the existing business model; second, digital processes and decision making, reconfiguring the existing business models with the support of Big Data or artificial intelligence; and third, development of a new business model, with the transformation of the value proposition and operating model (Berman, 2012; Matzler, Bailom, von den Eichen, & Anschober, 2016; Rachinger et al., 2019).According to Ritter and Pedersen (2020), enterprises improve first their actual business models, and lately change to more innovative ones.

On the other hand exists a new perspective how the firms organize for value creation and delivery, affecting all value chain activities, including the design of the product, production, logistics, marketing and sales, and the after-sales service (Karlsson & Rundcrantz, 2017; Porter, 2001).

The value chain envolves activities from research and development to customer services after sale, thus an enterprise can evaluate which activities of their value chain create value to customers, through management accounting tools. In this way determining their weak points or strengths in this context, they can gain competitve advantage above otheres in the same industry. All this process need to be converted in information which must be processed, and communicated. Thus information technologies (IT) play a vital role in the value chain (Porter, 2001).

Digital transformation goes further, enabling production within value chains to become more efficient, flexible, and consequently allowing enterprises to produce smaller batches to niche markets (Rüßmann et al., 2015; Strange & Zucchella, 2017).

2.2 Digitalization and Internationalization

Internationalization is used as a sinonim of the foreign expansion of firms' business activities (Ruzzier, Hisrich, & Antoncic, 2006). Exports and how to be internationally exposed has been one of the trend topics on research in the past few decades. Mainly the issue was related to SMEs, once they are facing international constraints similar to the ones faced by larger firms, due to today's international marketplace (Ruzzier et al., 2006).

According to Dethine at al (2020) Digitalization has been identified as an element that fosters the internationalization of SMEs.

Most of the research is oriented through the effect of digitalization on SMEs performance and growth, and few research is made upon the effect on the internationalization side of the SMEs.

According to the World Trade Organization (2016), once SMEs engage in internationalization and have already acquired experience and obtain a network of partners and customers, this experience becomes a capability, and a source of competitive advantage. But having new technologies it is not enough to enter in global markets.

According to Leonidou (2004), difficulties in engaging in a global market are related to enterprises' internal and external characteristics. Internal aspects refer to the resources, organization capabilities, and company's vision, notably lack of financial resources, skills or time, and knowledge about the foreign markets, and in the same time the vision of the owners.The external difficulties are related to the internal or external business environment, polical situation, the stability of the tax system and custom's law. In context of Western Balkan Countries, where the external factors play an important role, the strategy and business models of the enterprise are effected mainly due to unsecure political situation. .

2.3 SME in Western Balkans

SMEs play a major role in most economies, accounting for most businesses all over the world. In 2018, European SMEs accounted for 99.8% of all enterprises, generating, on average, 56.4% of the value-added and 66.6% of the employment (EC, 2019). As the context of this study is perform to investigate at a second future research in Western Balkans, lets have some figures and data to better understand at what extend SME are important for this region.

According to the annual Report (2022) from Western Balkans Enterprise Development and Innovation Facility (WB EDIF), small businesses form the backbone of the Western Balkan economies and are the stepping stone to their economic convergence and path towards the EU accession. Small and Medium-Sized Enterprises (SMEs) employ between 60% and 80% of the active population in the region, which is on average higher than in the EU.

SMEs in Albania in 2020 represented 99.8% of all enterprises and employed 81.9% of the working population. In 2020, Albania's 102 405 micro, small and medium-sized enterprises represented 99.8% of all enterprises in the economy. According to WB EDIF, SMEs enjoyed the highest share of exports in the region, accounting to 64% in 2020. Data for 2020 shows that the largest share of SMEs is in the trade sector (39%), followed by the newly introduced category of accommodation and restaurants (16.4%) and transport, information and communication (8%)(INSTAT).

In 2020, Bosnia and Herzegovina's 31 726 SMEs accounted for 99.46% of all enterprises in the economy. In 2020, SMEs represented 63.14% of employment in the business sector (Statistical offices of the FBiH and the Republica Serpska).The breakdown of enterprises by size in Kosovo was 91.9% microenterprises, 6.8% small, 0.15% medium and only 0.66% large enterprises in 2020. SMEs also increased employment,accounting for 75.5% of total employment in the economy. (Statistical Office of Kosovo). The breakdown of North Macedonian enterprises by size was 99.3% micro and small enterprises, 0.6% medium enterprises and only 0.1% large enterprises in 2020 (MAKStat, 2021). In 2020, 74% of North Macedonia's formal workforce was employed by micro, small and medium-sized enterprises (MSMEs) and created approximately 68% of the total value in the business sector (MAKStat, 2021).

Almost all the countries refer to the same way how they classify SME, conform EU standards with any exception due to accounting indicators like turnover and asset size.

3 Methodology

After reviewing the main topics that relates digitalization, SMEs and internationalization, we try to evaluate the depth of research in the field through a bibliometric analysis. First of all there were determined the key words; internationalization, digitalization, small and medium enterprises, and subkeywords that better represents the main words of the study. The subkeywords consists on the dimensions that specifically represent the keyword.

We searched only online for the papers from World Bank database papers, published in their website, for books, journals or conference papers published through GoogleScholar, IDEAS/REPEC, Web of Science and some free journals listed in Scopus. Also there are analysed different journal of European universities which have ISSN code. The databases selected represent a large coverage of published scientific and academic work. They go through paper review and offer the times the papers are cited by other authors and researchers. Web of science and Scopus represent the most valuable database since they have high citation index.

The search in the databases go through some set filters like the kind of journal or conference papers which was limited in Business, Management, Finance and Accounting areas of study.

Since manufacturing SMEs tend to expand their businesses internationally, firstly as direct or indirect exporters, the two entry modes with less risk involved, and secondly through FDI (EC, 2014). That's the reason why we choose to use subkeywords to conduct the search.

The search was initiated first on selecting the subkeywords set for the digitalization like website, Internet of things, Smart solutions, Industry 4.0, Smart manufacturing; Internationalization referred as exports, FDI (to catch any % of foreign ownership), outsourcing; and SME. The analysis followed any dublication published by different journals. The first result was about 250 papers that linked any of the subkeywords. After reviewing their abstracts, only 25 of them relates to our topic. So the second search was limited strictly on the link between the keywords alltogather.

4 Results and Discussion

The first search resulted in 250 papers published in journals and conference proceedings. Any of them were working papers from European Commision and World Bank. From them 65% resulted in studing the link between digitization or digitalization and SME, 25% studied internationalization and SME and only 10% have incommon the three main keywords.

These 25 papers that were the aim of our search are gone through full analysis in order to detect the following features:

1. The publication trend of the topic
2. The methodology used
3. The number of publications by geographical area
4. The main platform used for publish

We noticed that the publication of the related papers recently signed an increasing number. Perhaps that's the pandemic Covid19 that affeced mostly the international profile of SME, followed lately by the Russia-Ukraine War. Since Ukraine supplied with raw materials like grain mostly the biggest part of Europe, made a domino effect in the prices of goods. That's why SMEs were faced with a new kind of risk now. So if we compare 2015 to 2020, there is a geometric increase of publications related to the topic.

Relating to the methodology used, from the papers selected we detected three kinds of methodology: (1) theoritical, (2) emperical and (3) mixed methods. From the observation results that the percentage of theoretical and empirical studies is similar and a few studies use mix methodology. On the other hand the multivariate models follow the previous results. These papers were mostly based on regression analysis and factor analysis.

Meanwhile, descriptive and exploratory analysis were based on statistical methods, such as distribution, ANOVA, correlation tests, and cross-tabulation measures. There were no observed or detected surveys in these kind of papers. If we refer to the countries studied the trend consists on analysing one country. There are few studies that cover more than one country, meanwhile as per Europe the first paper was published in 2016 "Effects of the use of the Internet and ICTs on Export performances of the EU" developed by Akhvlediani and Katarzyna. After this publication, others have been developed also focusing on EU and European countries mainly from EU members.There is a vast research papers which studied the issue under non EU members, like Western Balkan countries. The papers most cited come from Scopus nad Web of Science with the high citation index, compared to others in the set.

5 Conclusions

The current paper represents a first attempt to address how digitalization affects SMEs' strategies. We argue that further research examining Digitalization, Internationalization, and SMEs may shed light on empirically understanding the adoption of digitalization by traditional SMEs and its impact on their internationalization strategies, namely enterprises' entry modesand business models. Clarifying the relationship between SMEs' digital maturity and their international strategies should also be addressed in further investigations, as well as the impact of digitalization on internationalization and, consequently, SMEs' performance. Much work remains to be done before a full understanding of the extent of the impact of Digitalization on SMEs' strategies, notably internationalization, is established.So this study must be followed by an emperical analysis on the context of Western Balkan Countries to understand at what extent the SME, which are at another dimension compared to European Union SMEs, were able to match digital advantages to international opportunities. The study must be conducted mainly pre and post Covid to catch any changes due to health crises and perhaps compare ta war Crises. As for the limitations of the present study, we must emphesize that the literature on the relationship between Digitalization and SMEs' internationalization is still in its early stage and due to financial constraints not all the papers that come from the search were possible to be analysed other than the abstract.

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Macroprudential Policies and their impact on Banking Crisis Management in Balkan Region

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This article aims to study the role of macroprudential affairs in the framework of financial stability. In a narrow perspective this study will deepen in estimating whether macroprudential policies can prevent a possible banking crisis. Many studies have examined the effects of macroprudential policy on credit growth, but few empirical studies have analyzed its effect on the probability of a banking crisis. This paper empirically investigates the effect of macroprudential policy on the probability of a banking crisis. Specifically, using data for 11 Balkan countries from 2006 to 2020, through a probit and logit model it is analyzed the effect of changes in macroprudential policy and a set of other variables on the probability of crisis occurrence. The results highlight the importance of policy coordination between different government bodies to design an appropriate macroprudential policy. The findings of this study state that monetary regulations, such as interest rate and inflation are the main factors that drive the probability of a banking crisis occurrence.

Keywords: macroprudential policies; banking crisis; financial stability; Balkan Region

1 Introduction

In the current global turmoil of the economic crisis caused by the coronavirus, macroprudential policy may be one of the most important macroeconomic policy tools to avoid an economic crisis turning into a financial crisis. During times of crisis, there is a common concern that there may be large capital outflows from emerging markets and developing economies, which may lead to liquidity pressures in local or foreign currencies in financial sector. This can create adverse reactions especially when exchange rate depreciations are large and currency mismatches are common. If the crises lasts longer, the real estate sectors are also likely to be strongly affected, which in turn could lead to reinforcement from falling asset prices. In this circumstance, the establishment of macroprudential policy or capital flow measures is mostly considered among policy makers.

In terms of financial regulation and supervision, the global financial crisis has highlighted the need to go beyond a simple micro-based approach. There is a growing consensus among policymakers that a macroprudential approach should be adopted. Policymakers are currently working on implementing macroprudential policy tools and frameworks, whose efforts involve coordination between central banks, governments, and regulatory authorities.

1.1 Research focus and Objectives

This article aims to address the question of whether macroprudential policy affects the probability of preventing a banking crisis. Hence, the purpose of this paper is to analyze macroprudential policies, their role in the economy and in preventing possible financial crises. Based on the review of the existing literature and the framework of current policy concerns, this paper identifies several key research questions, which would be particularly useful to address and implement macroprudential policy instruments.

The main objectives of this paper are: (i) to analyse macroprudential policies; (ii) to analyze the role of macroprudential policies in preventing the banking crisis; (iii) to analyse the role of these policies in supporting the financial stability of the system.

2 Literature Review

The recent financial crisis has highlighted the lack of analytical frameworks to help predict and effectively deal with sudden increases in financial imbalances. There has been a failure to assess how aggressive risk-taking is by different types of financial institutions against the macroeconomic backdrop. Overconfidence in the self-regulatory ability of the financial system led to an underestimation of the consequences, rising debt and leverage.

During the crisis period, an insufficient recognition of the role of financial innovation in mitigating financial imbalances and their consequences in the real economy was found. Consequently, the number of research papers and conferences discussing a macro perspective on financial regulation has increased significantly. There is a growing consensus among policymakers that a macroprudential approach should be adopted.

One of the most popular measures is related to the regulatory framework, namely the adoption of the third Basel Accord, which is considered the main response to the shortcomings caused by the financial crisis, in two additional security systems: countercyclical mitigation and capital conservation mitigation, activated in case of excessive lending and protects banks from deterioration of the loan portfolio when the trend of the economic cycle changes. The Basel III agreement is a controversial topic which in the existing literature has two sides; economists like Ayadi R, Arbak E, DeGroen W. (2012) who support the main benefits of its implementation and specialists like BIS (2011) and Ojo (2010) who worry about the higher costs of implementing the new rules with effects on lending and economic growth.

Basel III emerged after two sets of regulations (Basel I and Basel II) which were oriented towards microprudential risks, ignoring the importance of a fragile banking system. The effects of the current regulation issued by the Basel Committee have been studied in relation to their implications on banking welfare, where it will significantly increase the quality of banks' capital and the required level of their capital.

Since the global financial crisis in 2008, macroprudential policy has attracted considerable attention from policymakers as one of the main macroeconomic policy tools for sustainable economic development. In the current context of a widespread Covid-19 crisis across countries, macroprudential policy is once again attracting more attention globally.

2.1 Objectives of Macroprudential Policy

The main objectives of macroprudential policy are: (i) strengthening the financial system's resistance to shocks and economic imbalances and (ii) limiting the spread of the international financial crisis (Forbes, 2021). In addition to these objectives, the actions to minimize the costs caused by financial instability, to reduce the disparity between the settlement date of assets and liabilities, credit incentives for applicants to use it effectively, etc. were also pointed out.

In general, macroprudential policy is seen as aiming at financial stability, but there is no common definition of financial stability. The different views can be broadly divided into two groups. The first, referred to Padoa Schioppa (2003) Allen and Wood (2006) defines financial stability in terms of the stability of the financial system against external shocks. The second, according to Schinasi (2004) emphasizes the endogenous nature of financial distress and describes financial stability in terms of resilience to shocks coming from within the financial system while Borio and Drehman (2009) describe it as vulnerability to financial distress in response to shocks of normal size and not large strokes

2.2 Related Theory

Macroprudential regulations include a diverse set of tools focused on the stability of the entire financial system. They focus on the growth of systemic risk over time, as well as how weaknesses in individual institutions can spread or interact with other policies to affect the entire system and the overall economy. In certain situations, there is little difference between macroprudential regulation and other types of tools - such as microprudential regulation and capital controls. More specifically, microprudential regulation, which focuses on the stability of individual financial institutions, may be similar to macroprudential regulation in countries where the financial system is dominated by a small number of financial institutions.

Capital controls, which are taxes or regulations based on an investor's residency, can be similar to macroprudential regulations that focus on the investment currency. After the global financial crisis, international institutions, central banks, and other policy forums launched major initiatives on how to mitigate macro-financial weaknesses. From those discussions, it emerged that three related objectives for macroprudential policy should be prioritized: (i) addressing excessive credit expansion and strengthening stability in the overall financial system; (ii) reduction of key mechanisms of systemic risk amplification; (iii) mitigation of structural weaknesses related to the role of important institutions in the main markets.

Macroprudential policy and Banking Crisis

Banking crises have been one of the main causes of economic disruption and instability. Babecky et al. (2014) found that compared to other types of financial crises, banking crises are the costliest in terms of overall output loss. This approach is line with the study of Shehu (2016), and Shehu and Musta (2017), who state that the instability of the country comes mainly from the financial and banking system. Considering Albania, where more than 90% of the financial system is dominated by the banking system, having a solid and profitable banking industry, will of course contribute in a stable economic system in overall.

To avoid disruptive banking crises, macroprudential policies have been implemented in many countries. The empirical literature has studied the effectiveness of macroprudential policy in financial markets. Cihak, Demirguc-Kunt, Martinez Peria and Mohseni-Cheraghlou (2013) documented that, countries facing a crisis condition, exhibited lower current capital ratios, were less stringent in their regulatory treatment of bad loans, were less able to require banks to regulate their own capital, provisions or compensation schemes and had weaker incentives for private agents to monitor banks.

Related areas of research have examined the intersections of macroprudential policy and other types of policy such as monetary policy and capital controls. For example, Korinek and Sandri (2016) found that both capital controls and macroprudential policy lead to financial stability by reducing net capital inflows as well as the amount and riskiness of financial liabilities. Bruno, Shim and Shin (2017) found that macroprudential policy is more effective if it is complemented by monetary policy. Kim and Mehrotra (2018) found similar effects of monetary and macroprudential policies on credit growth, implying a complementary use of the two policies in normal times as well as a challenge for policymakers during periods when strong credit growth coincides with low inflation.

Recently, a growing body of literature on macroprudential policy is developing theoretical models to study how macroprudential regulations can reduce the probability of a financial crisis. Flemming, L'Huillier and Piguillem (2019) found that when the cumulative amount of borrowing is high enough, it is optimal to use tax debt to make agents internalize the systematic externality of their decisions.

Theoretical models to study the relationship between macroprudential policy and other macroeconomic policies, are also becoming more numerous. Ghilardi and Peiris (2016) used a DSGE model and found that macroprudential policy can usefully complement monetary policy. Alpanda, Cateau and Meh (2019) found that LTV regulations are the most effective and least expensive policy tool to deal with home loan imbalances, followed by bank capital regulations and monetary policy, respectively.

Mendoza and Rojas (2019) showed that the optimal policy is to tax domestic credit or capital inflows, and therefore capital controls as a separate instrument are not justified. In contrast, Schmitt-Grohé and Uribe (2017) found that the optimal macroprudential capital control policy should be tightened when the debt-to-sales ratio becomes high after the interest rate decline, i.e. an accommodative monetary policy.

3 Data Design and Methodology

In this paper, the effects of macroprudential policy on the probability of a banking crisis were analysed using an annual data set consisting of 11 Balkan countries within a 15 year timespan, from 2006 to 2021. The data is generated for Albania, Bosnia-Hercegovina, Bulgaria, Croatia, Slovenia, Kosovo, Serbia, Greece, Montenegro, Northen Macedonia, and Rumania. The initial observations were 240 and after trimming the data from " outliers" and missing data, the total observations went to 213 and the data were checked for heteroskedasticity. The analysis is based on a probit and logit regression, due to the binary type of the variable.

The table below summarises the variables used in this article. The first column depicts the variable name, the second column indicated the proxy used as an indicator for this variable, the third column stated the expected relationship of the independent variables with the explained variable, banking crisis. This relationship is generated as an expected relationship, based on the insights that previous studies and literature provides. The last column states the abbreviation used for this variable.

Table 1: Variable Description

Variable Name	Proxy	Expected relation.	Abbrev.
Banking Crisis	Indicator to measure financial stability of the banking system. This variable is generated as a dichotomic variable, taking binary values, 0 for stable banking situation and 1 for not stable (banking crisis).		B_Crisis
Currency	The exchange rate (ER) represents the number of units of one currency that is exchanged for one unit of another currency. It is calculated as an annual average based on monthly averages (local currency units relative to the US dollar). This Indicator is used to measure the currency power in forex market	-	Forex
Economic Growth	I Gross Domestic Product (GDP) is the standard measure of value added created by the production of goods and services in a country over a given period. This indicator is used to measure economic power and stability of a country	-	GDP
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of purchasing a basket of goods and services that may be fixed or changed at certain intervals, such as annually. This Indicator is used to measure consumers power though Laspeyres formula.	+	CPI
Interest rate	Indicator to measure monetary policy in the framework of investment power	+	IR
Macroprudential Policy	Indicator to measure financial stability. MPP is a variable that consists in 17 Instruments, such as: Countercyclical buffer, Conservation buffer, Capital requirements, Leverage requirements, Provisioning requirements, Credit growth limits, Loan restrictions, Limits on Foreign Currency Loans, Loan-to-value limits, Debt-to-income limits, Levy/Tax on Financial Institutions, Liquidity measures, Loan to deposit limits, Limits on FX operations, Reserve requirements, SIFI surcharges and other components	-	MPP

The data for this study were generated as secondary data downloaded from International Financial Statistics (IFS), Instat and Macroprudential Policy (iMaPP) This database contains information on the change in the gross domestic product, data on the exchange rate, inflation, and data on the change in the interest rate as one of the instruments of monetary policy. The initial database was with 240 observations and 6 variables.

The collected data were combined (pull data). Data was merged, trimmed and the final database consisted in 213 observations. The data is reported on quarterly basis. Pandemic was excluded from the analysis on purpose since it is considered a “one time event”. Covid 19 pandemic, in the framework of this study can be considered an outlier, since this study is mainly focused on analysing macroprudential regulations and their effect in preventing a possible banking crisis, under a normal economic state.

A "banking crisis" variable was also created through coding a dichotomous variable (dummy) that only takes the values 0 and 1. The value 1 is given for periods of crisis (low GDP or interest rates have been negative) and the value 0 is a value when the period is normal, so there is no banking crisis.

Based on the nature of the variables (binary data), the analysis was computed though a probit and logit regression. In a Probit regression, the standard cumulative normal distribution function Φ is used to model the regression function when the dependent variable is binary. Hence, we assume:

$E(Y \mid X)=P(Y=1 \mid X)=\Phi(\beta0+\beta1X)$ (1)

where, $\beta0+\beta1X$ plays the role of a quantile z,

provided that $\Phi(z)=P(Z\leq z)$, **where** $Z\sim N(0,1)$

such that the Probit coefficient in the original equation (1) expresses the change in z associated with a one-unit increase or decrease in X. Although the effect on z of a change in X is linear, the relationship between z and the dependent variable Y is nonlinear as Φ is a nonlinear function of X. Since the dependent variable is a nonlinear function of the regressors, the coefficient X does not have a simple interpretation.

Logit regression function:

$$P(Y = 1|X1, X2, \ldots, Xk) = F(\beta0 + \beta1X1 + \beta2X2 + \cdots + \beta kXk) = \frac{1}{1 + e^{-(\beta0+\beta1X1+\beta2X2+\cdots+\beta kXk)}}$$

This model is similar to Probit regression, except that one uses the cumulative distribution function (CDF) of another real-valued random variable X:

$$F(x) = \frac{1}{1 + e^{-x}}$$

Logit and probit differ in how they define F(x). The logit model uses the cumulative distribution function of the logistic distribution. The probit model uses the cumulative distribution function of the standard normal distribution to determine F(x). Both functions will take any number and rescale it to fall between 0 and 1. Therefore, whatever $\beta_0+\beta_X$ equals can be transformed by the function to give a predicted probability

5.1 Odds ratio /relative risk for the logit model

The odds ratio or relative risk is:

5.1.1 $$\frac{p}{(1-p)}$$

and measures the probability that y=1 relative to the probability that y=0

$$p = \frac{\exp(x'\beta)}{1 + \exp(x'\beta)}$$

$$\frac{p}{1-p} = exp(x'\beta)$$

$$\ln\frac{p}{1-p} = x'\beta$$

This study also uses the probit model to estimate the probability of a banking crisis. The regression equation to determine the relationship between macroprudential policy and the probability of a banking crisis is defined as follows:

$$P_r(y_{i,t} \; = \; 1|x_{i,t} \,) \; = \Phi(xi, t \,\beta) \; + \; \varepsilon_{i,t}$$

where Pr is the probability, indicates the country, while t indicates the year; y is a dummy variable that takes the value of one if a banking crisis occurs and zero if not; x is the set of independent variables; Φ is the cumulative normal distribution; β is a vector of maximum likelihood estimation; and ε is a term used for errors.

6 Main Findings

This section provides empirical insight and findings related to the effect of the variables mentioned in table 1 (see section above) in the probability of a banking crisis.

Table 2 shows a summary of the descriptive statistics of the final dataset. As shown in the table below, 213 observations are taken into consideration for the quantitative analysis.

Table 2: Descriptive summary

Variables	No. Obs	Mean	Std Dev	Minimum	Maximum
BCrisis	213	0.93896	0.292372	0	1
FOREX	213	29.0754	45.99629	1.24	130.63
GDP	213	5.03227	8.131516	-10.64	21.45
CPI	213	3.06816	2.845431	-4.88	14.97
IR	213	2.92995	2.638128	0.01	14.32
MPP	213	0.20657	0.405799	0	1

As stated in the table below, the correlation between macroprudential policy and banking crisis, seems to be very weak. Hence, it is not possible to predict the significance and magnitude of the relationship of Macroprudential Policy and banking crisis.

The correlation seems to be very weak for the rest of the variables. Forex and GDP have a negative relationship with banking crisis, indicating that when the currency depreciates, the probability for a banking crisis increases. Meanwhile, in periods of low (or negative) economic growth, the chances of a banking crisis tend to increase.

Table 3: Spearman Correlation matrix

	BCrisis	***FOREX***	***GDP***	***CPI***	***IR***	***MPP***
B_Crisis	1.0000					
FOREX	-0.1306	1.0000				
GDP	-0.1503	0.4847	1.0000			
CPI	0.3606	-0.2097	-0.1204	1.0000		
IR	0.30495	-0.1373	-0.0666	0.4789	1.0000	
MPP	-0.0450	-0.0254	0.0135	0.0093	-0.0543	1.0000

On the other side, in line with previous studies, the correlation table above, depicts that Inflation and interest rates have a positive (weak) relationship with occurrence of a banking crisis. Hence, an increase in inflation will stimulate a possible banking crisis, as well as an increase in interest rates, will discourage the investments, reduce GDP and lead to a possible recession (if all other variables are kept constant).

Before developing the tests, the variance inflation factor analysis was computed and some of the variables were excluded. The table below, depicts the results of the empirical analysis.

Table 3: Empirical Findings

Panel A: Probit regression output

BCrisis	**Coef.**	**Std. Err.**	**z**	**p>|z|**	**95% Conf**	**interval**
CPI	0.259***	0.049	5.27	0.000	0.162992	0.3560
IR	0.249***	0.050	4.93	0.000	0.150182	0.3482
MPP	-0.211	0.317	-0.67	0.505	-0.83306	0.4105

Panel B: Logit regression output

BCrisis	Coef.	Std. Err.	z	p>|z|	95% Conf	interval
CPI	0.471***	0.095	4.95	0.000	0.284856	0.65823
IR	0.448***	0.094	4.73	0.000	0.2625156	0.6341802
MPP	-0.424	0.650	-0.65	0.514	-1.699213	0.8506275

Based on the results mentioned in the table above, under ceteris paribus condition, for the given dataset, it is provided that in overall monetary policy has a significant impact in the occurrence of a banking crisis. Furthermore, this model provides that a high inflation scenario, leads to a possible banking crisis and high interest rates, increase the likelihood of a banking crisis.

Under these results, the economic stability is shaken during high inflation or high interest rates. Inflation reduces and shrinks the consumption power, meanwhile high interest rate discourages investments, enterprises and contribute to a lower GDP for the country. The lower the GDP, the lower the economic growth, and the higher the probability for a recession.

Considering macroprudential policies, results of this study, do not provide a significant contribution of macroprudential regulations to the occurrence of a banking crisis. This result indicates that other variables such as monetary regulations are more important, hence more attention should be paid to monetary policy, contributing in this framework to a better financial stability.

Table 4: Odds ratio

Variable	*Odds Ratio*	chi2(1)	P>chi2	95% Conf	interval
FOREX	0.991	2.94	0.0865	0.981	1.0012
GDP	0.945	3.77	0.0521	0.893	1.0005
CPI	1.699	41.28	0.0000	1.445	1.9981
IR	1.731	37.99	0.0000	1.453	2.0613
MPP	0.654	0.43	0.5125	0.182	2.3512

Considering the findings from the odds ratio table, these findings can be summarized:

- A banking crisis is 0.99 times more likely to occur than the foreign exchange rate.
- A banking crisis is 0.94 times more likely to occur than gross domestic product.
- A banking crisis is 1.69 times more likely to occur than inflation.
- A banking crisis is 1.73 times more likely to occur than the interest rate.
- A banking crisis is 0.65 times more likely to occur from macroprudential policies. But since p-value>0.05, the variable is not statistically significant

In overall, this section in terms of a quantitative perspective shows that a banking crisis can be driven mainly from the monetary instruments, rather than macroprudential policies. Nevertheless, since the countries taken into analysis are mainly developing countries, the use of these policies remains a challenge.

CONCLUDING REMARKS

The dataset of 11 countries of Balkan Region is a considerable dataset to draw credible conclusions. Nevertheless, quantitative approach is not always a one way out. Regarding the empirical findings of this article, it is found that only monetary instruments play a decisive role in preventing a banking crisis. Macroprudential regulations (consisting here in a combination of 17 instruments) do not have a significant impact on a banking crisis. Hence the hypothesis fails to meet.

Considering a qualitative approach, and the fact that all the countries analysed are developing countries, these macroprudential policies and regulations should strengthen. They may not be the most important factor, but economists (in line with the findings mentioned in the literature review section) agree that these regulation have a contribution in the financial stability of a country.

In terms of GDP, it is found that higher economic growth is associated with a lower probability of a banking crisis. This is also consistent with economic theory, because if the economy grows faster, borrowers can make higher profits, and therefore, it is easy for them to repay the debt. In this situation, commercial banks are less likely to face borrower defaults, and therefore higher economic growth will lead to a lower probability of a banking crisis.

This article concludes that most important factors that can directly prevent a banking crisis are those related to monetary policy, such as inflation and interest rate. Inflation reduces and shrinks the consumption power, meanwhile high interest rate discourages investments, enterprises and contribute to a lower GDP for the country. The lower the GDP, the lower the economic growth, and the higher the probability for a recession.

The interaction with the exchange rate regime is negative for open economies, suggesting that when they have more flexible exchange rates, these countries have more difficulty controlling overall credit. This may be because exchange rate appreciations (depreciations) associated with capital inflows (outflows) further exacerbate the domestic boom and disrupt financial cycles. There is limited support for this view although from regressions using interactions with financial openness, the coefficient of openness is only positive and statistically significant for developing countries.

Policy makers and financial regulatory authorities should be very careful about drawing lessons from the experiences of other countries. This is because the effectiveness of macroprudential policy varies significantly between countries that have different monetary policy frameworks, exchange rate policies, and capital flow measures.

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The impact of natural disaster on agriculture. Case of Albania.

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Abstract: Albania has been continuously affected by natural disasters such as floods, droughts, earthquakes with devastating consequences not only in the the economy and development of the country but also in people's lives. Therefore, the implementation of financial strategies for the minimization of risks in case of natural disasters is necessary. In this research paper we will identify the strategies that Albanian farmers use to reduce the consequences of natural disaster on agricultural sector. Finding the main factors that influence the selection of the risk minimization strategy by farmers in another objective of this study. The mythology we will use to prove the hypothesis is qualitative one. The research instrument is a questionnaire. The questionnaire will be distributed to farmers who live in areas that are more affected by natural disasters. Some strategies that farmers use to cope with risk are credit extensions, selling assets, use of personal food stocks, support of relatives and off farm employment. The use of agricultural insurance as a strategy for risk mitigation is at a low level in Albania. Farmers' risk controlling strategies in Albania are influenced by socio-economic variables such as age, gender, income etc.

Keywords: Natural disaster, risk management, strategies, mitigation, agricultural sector

1 Introduction

A natural disaster is an unfavorable outcome resulting from the natural activities of the earth, which has the power of destroying the environment, infrastructure, and/or population (Kousky, 2017). According to the Oxford dictionary a natural disaster is described as a sudden and violent natural event such as an earthquake, hurricane or flood that kills or injures many people or causes considerable damage. Klomp & Hoogezand (2017) defines a natural disaster as a natural occurrence that causes disorder of the performance of the economic system with a major negative impact on assets, production factors, production, employment or consumption.

Natural disasters adversely affect the financial indicators of the country, the devastation of physical capital and the loss of human lives. Albania is exposed to natural disasters such as earthquakes, floods, climate changes, droughts, fires, etc. Although natural disasters cannot be predicted or prevented, their economic effect can be reduced. Due to climate change, natural disasters are expected to increase. Faced with such situation, the need to act in finding effective strategies for managing risks and unexpected shocks caused by nature has increased. Insurance is an alternative method for managing the risk of natural disasters which directly affects the reduction of damage and consequences caused by the disaster. They reduce socio-economic cost to natural disasters and influence productivity growth and poverty reduction. Societies that are most vulnerable to weather hazards are those located in coastal areas and river deltas.

Albania is mainly subjected to natural disasters of hydro-meteorological and geological origin such as quakes, tidal wave, lacks, bonfires and mudslides. In Albania, the management of risks from natural disasters is generally made by local government entities. At the regional level the regions and cities assess and plan the risk. On the other hand, in Albania the General Directorate of Civil Emergencies is in charge for national risk assessment. What has been noticed over the years is that the local government faces a lack of sufficient knowledge and appropriate tools for disaster risk reduction. Natural disasters have a big influence, especially on the financial operation of developing countries, including Albania, since developed countries can usually manage the impacts of natural risks. The increase of the risk of extreme weather events increases the need to take measures to reduce the impact of these disasters. The governments have to follow a comprehensive disaster risk management strategy to prevent long-term macroeconomic consequences (Hochrainer, 2007). According to Gjokutaj (2019), the destructive effect of natural disasters on economic indicators is short-term, because in long-term the consequences are insignificant for the economy and the state budget. The destruction of assets reduces the productivity of businesses, production efficiency, disrupts the supply chain, increases inflation as a result of the decrease in supply and causes an increase in demand (Gjokutaj, 2019). According to him, disasters affect public finances, tax base, increase the expenditures of state budget and increase revenues and internal or external borrowing. Replacing destroyed assets with new and technologically advanced assets will increase post-disaster productivity. According to the World Bank (2020), disasters are associated with immediate increases in reconstruction costs, damaged infrastructure, destroyed businesses, reduced tax revenues, and increased levels of poverty.

The main objectives of the paper are:

a. The identification of the strategies that Albanian farmers use to reduce the consequences of natural disaster on agricultural sector.
b. To find the main factors that influence farmers decision to choose the strategy of agricultural risk minimization

Research question:

a. Which are the strategies that Albanian farmers use to reduce the consequences of natural disaster on agricultural sector?
b. Which are the factors that impact farmers determination to choose the strategy of agricultural risk minimization?

Hypothesis:

H_0: Baying of agricultural insurance products is the main strategy that Albanian farmers use to protect against natural disaster.

H_1: Baying of agricultural insurance products is not the main strategy that Albanian farmers use to protect against natural disaster.

2 Literature review

2.1 Natural disaster management in agricultural

The management of natural disasters in our country according to the Civil Emergencies Plan (Malaj, 2019) is carried out in cooperation with a number of institutions such as the Council of Ministers, the Sub-Ministerial Committee of Civil Emergencies, the Ministry of the Interior, the Department of Management and Response to Civil Emergencies, Line Ministries, Operational Forces, Head of Operations at the Central Level and the National Operational Center for Civil Emergencies. Law no. 8756, dated 26.03.2001 "For Civil Emergency" Climate change negatively affects the Albanian agricultural sector as agriculture is sensitive to natural risks. Weather events and temperature changes negatively affect crop production, infrastructure, irrigation system, etc. For this reason, following special strategies for preventing or reducing the consequences of climate risks is crucial since the consequences of climate risks directly affect people whose livelihood depends on agriculture. Thus, the presence of disaster risk decrease measures in the authorized context should be the focus of the Albanian government. The application of agricultural insurance as a means of risk transfer should be a necessary condition for farmers. The use of assurance as an method to mitigate production losses in the agricultural sector in our country is insignificant since Albanian producers are educated on the principle that damages caused by disasters will be compensated by the government. Also, the lack of insurance culture prevents disaster risk reduction. Developed countries use hazard maps and geographic information system technology to identify and reduce agricultural sector risks. The use of these measures, especially in disaster-prone areas, should be a priority for Albania as well. Assessment and planning of agricultural risks at the local, regional and national level by line ministries, civil emergency structures, academic institutions, municipalities and interested parties to reduce the risk in agriculture is another way to reduce the consequences of natural disasters. Education programs to increase the awareness of farmers and agribusinesses on the importance and operation of agricultural insurance by defining the roles and responsibilities of each actor that is part of the insurance scheme would also affect the reduction of the severity of the consequences of the disaster. Agricultural insurance in Albanian society should be perceived by farmers as a means of reducing personal risk. The growth of investments in agriculture and the weather conditions will be accompanied not only by the increase in the demand for insurance but also by the increase in the cost of insurance. Being a country affected by natural disasters, taking measures to prevent the negative impact of disasters is necessary. In recent years, interest of financial instruments of natural disasters has increased. International financial markets, through various instruments, allow governments to transfer disaster risk in order to manage budget instabilities. The availability of financial instruments followed by appropriate government policies for dealing with disasters is a necessary strategy for dealing with catastrophic risks.

2.2 Risk managing schemes in farming

Risk management is a necessary process for farmers to reduce uncertainty (Toro, 2011). It is identified as the permanent implementation of administration strategies, techniques and procedures in the identification, analysis, evaluation, treatment and monitoring of risk (Huirne et.al 2000). According to Chantarat et al. (2016), risk management includes a set of agricultural risk assessment activities and the creation of systems for managing and reducing the assessed risk. It is a process which must be accomplished continuously. As agricultural risks threaten income and price stability, risk management has become a challenge for the governments of many countries. For the management of these risks, farmers have used different strategies depending on their personal preferences. Schaper et al. (2010) classified risk managing schemes into four groups, which included risk mitigation, risk transfer, risk avoidance and risk retention.

Risk prevention schemes include measures that decrease the farm's disclosure to risks. According to this method of risk management, businesses in agriculture eliminate activities with a higher level of risk. Reduction is related to reducing or mitigating risks and negative consequences that affect the business. Expansion and diversification of agricultural activities is the strategy most used by farmers to reduce risks. As a result, farmers can change or diversify the means or method of production, use different crops or use better techniques in addition to the existing ones for the prevention of diseases that affect agriculture. Farmers accept risk with the idea that increased risk will increase the benefits of the economic entity. In some cases, due to high costs or the inability to identify risks, it is difficult to use other risk management strategies and accepting it is the only option for farmers. After the risk occurs, cultivators use a series of methods to manage it. The measures include taking a loan, selling assets, livestock, using savings to cope with disasters, etc. Risk transfer approach is related to transmitting the costs of unfavorable events to others.

Risk is reduced by being transferred from one group to another against payment. Farmers can choose to share the risk by insuring agricultural production, livestock, property, etc.

According to Barry & Fraser (1976), production strategy, marketing strategy and financial strategy are the methods used by farmers to manage risks in agriculture. According to them, production strategies are related to the use of new technologies, product protection, plant protection, etc. The marketing strategy refers to the management of sales, including international markets, while the financial strategy is related to practices such as borrowing, extracting income from outside the farm in order to increase investment in the farm, increase cash flows, etc. The chosen strategy for risk management is influenced by the attitude that farmers have towards risk. According to Winsen et al. (2014) risk-averse cultivators use passive risk management strategies by allowing these risks to happen and managing their consequences after the event has occurred. On the other hand, farmers who take a proactive attitude try to reduce the impact relying on external risk management strategies. Some recommended risk mitigation practices are crop diversification, intercropping, soil moisture management, irrigation, integrated pest management and savings. Risk reduction strategies are very effective in risk management (Redmond, 2005) but while affecting income stabilization, they reduce average income because they require farmers to give up the most profitable alternative (Hazell, 1992). For example, specialization in a certain agricultural product would give more income to the farmer than diversification of agricultural products. Some other practices such as fragmentation of the plot, economization of purchased inputs, use of inputs with low yield but resistant to drowning cause loss of production efficiency (Rosenëig and Binsëanger, 1993). On the other hand, inhabitants of developing countries use traditional mechanisms to cope with natural disasters, such as the diversification of agricultural products, different sources of income from families or remittances, etc. (Hochrainer, 2006).

The strategies of keeping or coping with the risk are applied by the farmers after the event occurs. Some strategies that farmers use to cope with risk are credit extensions, selling assets, using personal food stocks, support of relatives and off farm employment (Hazell, 1992). These strategies are costly as the sale of assets may affect the reduction of production or decrease the value of assets while additional credit has high interest rates. Sharing and transferring the risk is another method of risk management. Traditional ways of risk management often fail. Natural disasters and loss of assets keep farmers in poverty (Chantarat et al., 2007). Farmers, businesses and governments can avoid risk by transferring it to insurance companies. The implementation of this strategy in Albania faces many difficulties. Private insurance market in Albania is undeveloped mainly due to the low income of the population, which makes it impossible to afford the insurance payment. People continue to think that government should pay the costs of natural disasters . Additionally, the law does not oblige farmers to be insured. In many cases, insurance companies cannot sell their products because property rights, especially in areas affected by natural disasters, are missing.

2.3 Determinations of risk management strategies

Age, education, income, farm size, ownership of agricultural land and the behavior of farmers towards risk are the most important factors that influence the determination of risk management strategy (Long, 2020). Richard Kofi Asravor (2019) after his study in Northern Ghana concluded that farmers' risk controlling plans are influenced by socio-economic variables such as cultivated area, age and gender. According to him in Ghana farmers use internal strategies of risk management such as the diversification of grains, the use of better farm varieties, the use of mineral fertilizers, etc. Winsen et al. (2014) after a study of 614 farms in the Flemish region of Belgium concluded that farmers preferred to use internal risk management strategies compared to insurance or futures contracts. This result was more influenced by cultural factors. Strategies such as insurance are not very popular in Belgium.

Farmers who are ready to afford the risk are predisposed to manage it by delegating, while farmers who refuse the risk face the consequences and try to reduce their effects after the risk has occurred (Wisten et.al 2014). In a study that Huirne et. al (2000) did on 731 farms in western Germany concluded that low-cost production and agricultural insurance are the most effective risk management strategies. According to Harrington & Niehaus (2004) farmers use several strategies for risk management such as avoiding credit dependence, diversification of income, futures contracts, insurance of agricultural products, diversification of agricultural products and saving on private expenses. Farmers can use more than one risk management strategy. Bardsley et al. al (1984), as a result of a mathematical simulation of demand and supply, evaluated the efficiency of insurance as a instrument for risk management. According to them, the success of the insurance contracts was related to the spatial link of the risk, to the link of the production risk against the income from the assurance strategy and from the organizational costs. After studying the Austrian wheat industry they concluded that insurance makes little influence to risk administration in the wheat industry.

2.4 The impact of agricultural insurance in mitigation losses caused by natural disasters

Natural disasters have serious negative consequences, especially in developing countries, since developed countries cope with the consequences more easily, for example by replacing lost production with increased production in a different place (Botzen, 2019). The agricultural sector is the most affected sector by natural disasters and the protection of agricultural from natural disasters is urgent (Ykhlef & Algawiaz, 2014). Well-designed insurance instruments are recognized as basic instruments for protection against the influences of natural disasters in exposed territories. They influence the mitigation of the costs of natural disasters, reduce poverty, contribute to sustainable deveapment and life quality (Harrington & Niehaus, 2004). Disasters slow economic growth, reduce government revenues, damage private assets, destroy businesses, disrupt supply chains (World Bank, 2020) and cause human suffering, general destruction and loss of production (Bayoumi, Quayyum , & Das, 2021). According to (Bayoumi, Quayyum , & Das, 2021) natural disasters reduce growth by 0.65% to 1% and decrease production by 1.7% to 2.6%. According to their findings, uninsured losses are the ones that cause macroeconomic costs, while insured catastrophes can be insignificant or even positive for economic activity since insurance helps in reconstruction, contributes to GDP and neutralizes the negative effects of catastrophes. Thus, insurance is important in mitigating agricultural costs resulting from natural disasters. Insurance companies in cooperation with governments should provide genuine insurance policies to mitigate the risk faced by agricultural sector.

The lack of development of the insurance market in Albania is a consequence of the lack of trust that families have in insurance companies and low incomes. So, for the sale of insurance products, the government must provide the necessary physical and legal infrastructure, while insurance companies must meet the conditions of the insurance contract (Sharku & Gjata, 2018). Although disasters cannot be prevented, the process of managing their risk reduces the consequences of the disaster. Families with high incomes are more predisposed to avoid the risk of natural disasters by taking measures such as improving housing conditions to protect against floods, willingness to pay flood tax, willingness to leave the risk area, willingness to save for emergency situations, etc. (Pojani & Hudhra, 2018). According to the result of their model, individuals in the southern and central areas of Albania, as a result of the economic inability to take measures against floods and the desire to stay in their properties, are more tolerant to the risk of disasters.

3 Damages caused by natural disaster in Albania

The natural disasters that have caused the largest number of victims over the years in Albania are earthquakes and floods. From 1851 to 2020, 850 people lost their lives as a result of earthquakes and 270 others died as a result of floods. 101 deaths were caused as a result of other disasters such as storms, fires, landslides, high temperatures, etc. Below we will make a presentation of the natural disasters that have happened and the economic damage they have caused.

Table 1.

Viti	No of deaths	Humbjet ($)	Dëmi në të kora	Bagëti të humbura
2000	20	36661038	1840	22
2001	44	84646398	3350	1
2002	18	3190134817	23029	160
2003	15	65330866	3814	117
2004	5	73410925	8988	
2005	7	917899011	18894	331
2006	2	34412589	721	
2007	2	33322638	1937	
2008	16	118461423	1476	
2009	6	372951192	2869	
2010	13	4554910620	45535	31956
2011	13	39864943	4243	82
2012	7	114828328	4612	1993
2013	9	8480000	10475	84
2014	9	2143018814	1	18
2015	10	16670000	407	66
2016	20		0	
2017	6		0	
2018	21		9	193
2019	55			1120
2020	10		753	

Source: EM-DAT, International Disaster Database OFDA / CRED,

4 Methodological Framework

4.1 Method

This paper is based in a quantitative empirical research. The research instrument is questionnaire. The questionnaire is distributed to 87 farmers who have their farms in Novosel. The questionnaire contains questions about the methods used by farmers to minimize the consequences of natural disasters. The questionnaire analyzes which are the factors that stimulate farmers in risk management method selection. The questionnaire involved scale items and used a variation of a five-point Likert-type scale in which the items included "very high" to "high" and "low" to “none.”

4.2 Research instrument

In this paper, we have decided for a closed structured questionnaire. The questionnaire was organized into two sections. The initial part collects demographic factors like gender, age, education, number of family member, number of family member that work outside the farm and monthly income (Table 1). In the second section we have asked farmers on the methods they use to minimize the negative effects of natural disasters (Table 2).

4.3 Sampling and Data Collection

Information were gathered from 5 September to 20 November 2022 in Albania, Novosela. The questionnaire was distributed online and in physically. Of participants, 56.7% are male, and 43.3% are female. Of 120 participants, 35% are graduates, 24.2% have master's degrees, and 40.8% have high school qualifications. The sample characteristics are presented in Table 1.

Table 2:Demographic Profiles of the Respondents

Demographics and socio-economics	Value	Frequency	Frequency
Gender	Male	68	56.7%
	Female	52	43.3%
Age	18-25	8	6.7%
	26-34	26	21.6%
	35-44	35	29.2%
	45-54	24	20%
	55-64	20	16.7%
	Over 64	7	5.8%
Educational	High School	49	40.8%
	Graduate	42	35%
	Postgraduate	29	24.2%
Monthly income	10 000 – 30 000	11	9.2%
	30 000 – 60 000	27	22.5%
	60 000 – 90 000	41	34.1%
	90 000 -120 000	23	19.2%

	120 000 – 150 000	8	6.7%
	Over 150 000	10	8.3%
Number of family members	1	13	10.8%
	2-3	29	24.2%
	4-6	61	50.8%
	Over 6	17	14.2%
No of family members that work in farm	1	19	15.8%
	2-3	56	46.7%
	4-6	40	33.3%
	Over 6	5	4.2%
No of family members that work outside the farm	1	47	39.2%
	2-3	63	52.5%
	4-6	10	8.3%
	Over 6	0	0%

Source: Authors'construction

A descriptive analysis is presented in the table number 2. The results show that the methods most used by farmers in Novosele to protect from natural disasters are personal savings, sale of assets, livestock ect, diversifition of production and loans, use of different sources of off-farm income or remittances Buying of agricultural insurance products is the least used method by farmers to protect from natural disasters. 95.8% of farmers do not buy insurance products. The farmers in Novosele are not informed about the existence of agricultural insurance schemes. Through this descriptive analysis we verify the first hypothesis (H_1).

Table 2: Descriptive analysis

Methods used	Very high	High	Medium	Low	None
Purchase of agricultural insurance			2.5	1.7	95.8
Taking loans	16.7	22.5	20	26.7	14.1
Diversification of production	19.2	20.8	28.3	17.5	14.2
Use of different sources of off-farm income or remittances	15.8	26.7	21.7	25	10.8

Sale of assets, livestock, etc	30	19.2	26.7	14.1	10
Using savings to cope with disasters	35.8	25.8	18.4	9.2	10.8
Use of flood and rain resistant inputs	21.7	31.6	20	16.7	10
Participate in professional training		5.8	10.8	7.5	75.9
Use of modern technologies	5	14.2	15.8	36.7	28.3
Own (or collaborate with others) investment in building infrastructur	6.7	5	19.2	22.5	46.6

Source: Authors'construction

Conclusions

The main factor that caused the loss of production in Albania is the heavy rain. Lack of production sales markets, fires and plant diseases are other sources of agricultural risk in ours country. Use of different sources of off-farm income or remittances, use of personal savings and the use of flood and rain resistant inputs are the most used strategies by farmers in Novosele for minimizing the consequences of natural disasters. Age, level of education and monthly income are the factors that influence farmers decision to choose the strategy of agricultural risk minimization. The use of insurance as an instrument to mitigate production losses in the agricultural sector in our country is insignificant since Albanian producers are educated on the principle that damages caused by disasters will be compensated by the government. The lack of insurance culture prevents disaster risk reduction. Farmers in Novosele use traditional methods for managing risks from natural disasters. The presence of disaster risk reduction measures in the legal framework should be the focus of the Albanian government. The application of agricultural insurance as a means of risk transfer should be a necessary condition for farmers. Education programs to increase the awareness of farmers on the importance of agricultural insurance would affect the reduction of the severity of the consequences of the disaster.

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Creating a Private University Blockchain for More Secure Data Storage

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Abstract: Secure data storage is becoming more and more important these days. Theadvantage of databases is that the data is saved in an organized manner, so it is easyto review. Their disadvantage is greater vulnerability, as these data are recorded inan organized and structured manner so that in the event of a database being hacked,an attacker can easily see the information obtained without authorization.University databases often store sensitive student data that must be protected incyberspace. My research goal is to investigate whether it is possible to create a private university blockchain where data can be stored securely, even in the longterm. As part of the practical implementation, my goal is to create a blockchainbased database with the genesis block and determine its block sizes. This isnecessary because with the appearance of large amounts of data (Big Data),blockchain networks often become overloaded and this problem can be solved bylimiting the block size. After creating the blockchain, I define its data storageconditions, as this can only be ordered by the owner of the blockchain, in this case,the university.

Keywords: Blockchain, database, security, policy

1 Introduction

Blockchain is a distributed database technology that prevents falsification and modification of data. It was first published in October 2008 by a certain person or group named Satoshi Nakamotoon page the sketch of the Bitcoin blockchain technology. Marc Andersen, who created the first popular browser program, Netscape, said that whoever created blockchain deserves a Nobel Prize. With this, one of the biggest problems of the Internet, the trust issue, was solved in one fell swoop by creating a distributed trust network (Puskás, 2018). The use of blockchain systems can create new value in many areas, from government and administrative functions to scientific collaboration. Due to the nature of the area, it is often visibly restrained in public, but the mapping and implementation of the use of blockchains in security areas has also begun. Such areas:

- Cyber protection and data security,
- Protection of critical infrastructures,
- Disaster prevention and prevention,
- Law enforcement,
- The national defense and
- The intelligence (Kocsis, 2020).

The use of blockchain technology makes it possible to store data securely also in the education system.

2 Modern Storage Solutions

The essence of blockchain-based data management is an encryption (cryptographic) procedure where each party has at least one public and one private key pair (so-called asymmetric encryption), which are sequences of digital signals and characters. Using the public key algorithm, any user can perform data management operations on the network, during which the information and data involved in the process (e.g. sharing, "moving" data) is encrypted with its private key. The data encrypted in this way, as well as the public keys of the parties involved in the operation (e.g. sender and recipient), can be seen by any other user on the network. Still, only the parties can interpret and decode it using their private keys. The party initiating the data management operation encrypts the information with the encryption algorithm running on the network and its own unique secret key. Then it assigns the recipient party's public key to the encrypted data it determines, thus creating the coded form of the original data. From now on, only the coded data created in this way will be visible to all users in the blockchain system (Eszteri, 2020).

Before creating a blockchain, it is necessary to examine what blockchain solutions are available today. Such is the public and private blockchain.

- Public blockchain: a typical example is the Bitcoin or Ethereum network. Anyone can join the chain, start and validate a transaction. Miners are often rewarded with a in exchange for their work for validation. Its advantages include transparency and accessibility, however, we can count on the high computational demand as a disadvantage or, depending on the use, we can easily list transparency here again. The calculation operations which are necessary for the validation of the blocks are basically a significant item on the cost side, and transparency in a large company environment is not considered ideal, where the leakage of business secrets is not allowed. Proof of Work (PoW) is a widespread mechanism, but this may soon be replaced by Proof of Stake (PoS) due to its huge energy requirements.

- Private blockchain: Basically, the idea of the blockchain was based on public access, but over time, the need for private implementation also developed. In this type, it is created by the owner of the blockchain the rules, as a result of which he determines the remuneration for mining or who is entitled to access the network. It is also known as a permission-based network. Area of use where sensitive data is handled, e.g. financial or insurance sector, healthcare (Sipos 2020).

  In order to safely store sensitive university data, I therefore choose to create a private blockchain in practice.

3 The creation of a private UDSC (Universities Data Storage Chain) blockchain

As part of the practical implementation, I created a private university blockchain called UDSC. Only the administrator I defined in advance had access to this blockchain. For the sake of the speed of the blockchain, I set the size of the blocks to 1 MB, so that the data stored in the blocks can be accessed quickly enough in practice. The first diagram shows the steps involved in creating the UDSC blockchain.

University chain-util generate UDSC
the default settings would be used:
/default ~ university chain/UDSC/chainsettings.dat chainsettings.dat include:
Database addresses [receiver (cloud storage) IP address, sender (university) IP address],
Terms of GDPR database.
Next, the UDSC blockchain would be initialized, and the genesis block would be created
university chain UDSC
The server will be started in those few seconds after the genesis block has been found, then the node address needs to be connected:
UDSC@192.168.0.1:8008
After these steps, the connection can be attempted from a second server:
university chain UDSC@192.168.0.1:8008
After the message confirming the chain has been initialized, the permission is not given for connection to the database. The address would be copied and pasted: 192.168.0.2

Figure 1 The creation of a private UDSC (Universities Data Storage Chain) blockchain

(Bálint, 2021)

In the case of the constitution of an independent, university-based blockchain, the educational institution could define the favorable data storage conditions itself. These may be the following:

- Wider based access to the given blockchain,
- The definition of the blocks' size,
- The definition of the terms of use,
- The genesis block, to which all the other blocks are connected, stays in the property of the university,
- The limiting of the access to the blockchain (only the entitled should use it),
- The definition of data protection policy,
- For increased security, the blockchain may be started on multiple servers,
- The nodes are more easily supervised,
- The system becomes more transparent,
- The eventual attacks are more easily reconnaissance.
- It provides a possibility for rapid reaction, in case of a hacker attack,
- The conditions contained within the smart contract are primarily defined by the faculty (Bálint, 2021).

4 Creating a smart contract for automated data transmission

A smart contract is one based on blockchain technology a solution that automatically executes the conditions defined therein by bypassing an external third party as an enforcer. In such a case, there is no need for a lawyer neither when the contract is concluded nor when it is enforced. It only executes instructions that are predetermined in the terms of the contract. These conditions are called triggers. The following 4 conditions are required when concluding a smart contract:

- For the subject of the contract, which is actually the subject of the contract,
- To define conditions precisely. Only if they are met can the contained in the contract,
- For authentication. The subject of the contract must be authenticated with the digital signature, as well as its conditions,

- Last but not least, a blockchain is also needed where the contract can be created (Budai, 2018).

Features of the smart contract:

- He constantly checks himself,
- It runs itself on the nodes of the blockchain, so it is available at all hours of the day. The users only need an Internet connection.
- It cannot be manipulated, as the code cannot be modified afterwards. The entered data is foreign cannot overwrite (Virtuális, 2020).
- The lifecycle of the smart contract cannot be modified, its content is implemented (Környei, 2018).

The advantages of a smart contract are as follows:

- Constancy. The conditions specified in the contract are automatically implemented, if they are fulfilled.
- Transparency. The conditions recorded in the smart contract are public to other participants.
- Speed. Since there is no need for human intervention, it is stipulated in the contract conditions are automatically executed within a short time (Stefán, 2021).

Disadvantages of a smart contract:

- Human errors. Since the code of the smart contract is written by humans, errors may occur. If the programmer does not notice this in time, the faulty smart contract can enter the blockchain, where it performs a task that is not suitable for the parties.
- The code of a faulty smart contract in the blockchain cannot be modified afterwards.
- Legal issues. The vision of smart contracts in the absence of state legislation uncertain. It is not known what will happen when state bodies start regulating contracts.
- A negative arising from the decentralization structure. In case of infringement, there is no central body that can compensate the user (Honti, 2020).

As part of the practical implementation, I connected the smart contract with the university database, like this I was able to manage data access effectively. In this way, I performed the query and the access control using the algorithm of the contract. These settings are illustrated in the second second figure below.

```
function access (Obudai University database)
Input: query (Obudai University database)
Output: permission granted; permission denied
   if message (Obudai University database) exists & query (Obudai University database) valid then
      security camera enabled/disabled
         if the University of Obudai database is registered in the given list then
            admin verification
               if admin available = access is adequate then
                  return allowed
               else
               return denied
               end if
            else
            return denied
         end if
else
   return denied
end if
end function
```

Figure 2 The Definition of the Smart Contract, Linked to the UDSC
(Bálint, 2021)

When writing the smart contract, I paid special attention to sending the data to the blockchain using the smart contract, and to the cloud-based database, which is less secure. This is presented in the third figure below.

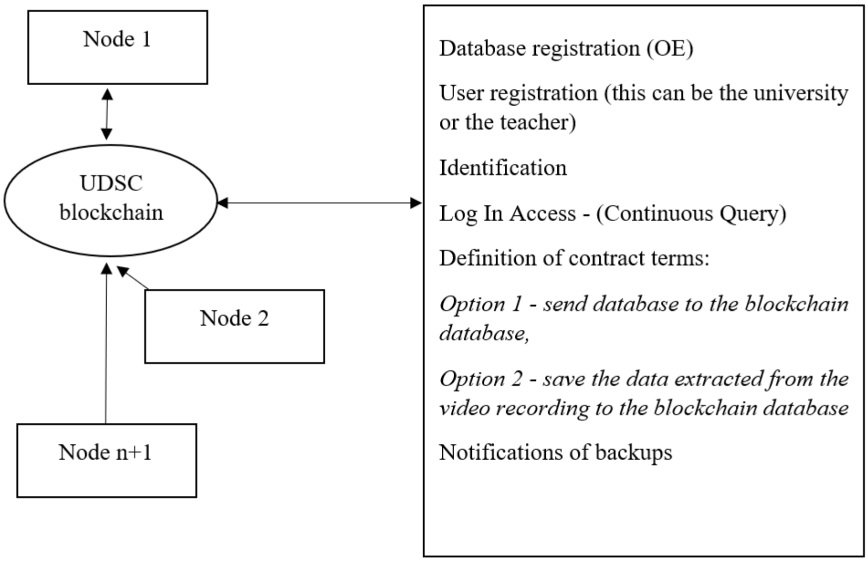

Figure 3 The Scheme of the Smart Contract and the Operation of the UDSC Blockchain

Conclusions

Nowadays, there are many data storage solutions to choose from. In addition to the traditional cloud-based data storage solution, blockchain-based data storage has also appeared. Thanks to its decentralized solution, greater database security can be achieved through its application. The potential of the blockchain has not yet been fully exploited, as the scientific world is also constantly learning about it. Storing university data is an important aspect, so after examining the possibilities of public and private blockchains, I created a private UDSC blockchain. In order to manage data more efficiently, I wrote a smart contract, which I linked to the blockchain, so that the data was sent in an automated way. In summary, I could conclude that the joint application of blockchain and smart contract means greater database security for universities than its centralized counterparts.

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Cost-effectiveness analysis and sustainable innovation in healthcare: A review of cost transferability from the MENA region

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Abstract: Healthcare systems are constantly confronted with major challenges: deliver quality services and provide access to health technology innovations while keeping costs under budget constraints. Health expenditure is following a fastgrowing paste globally, and it is important that governments and healthcare providers rethink the health-services delivery to be more sustainable. Hence, comes the role of health economists, focusing their research on sustainability and innovation in healthcare and providing insights on how to make informed decisions under the umbrella of universal healthcare. An example of this is reusing primary data from other jurisdictions and adjusting it to local settings where costs are infrequently reported such as the Middle East and North Africa (MENA) region. The aim of this paper is to systematically review the methodology and reporting quality of economic evaluation publications using costs transferred from other jurisdictions to countries in MENA. The literature search was performed in PubMed and Web-of-Science. Full-text screening and data extraction were done in duplicates. Transfering costs is a novel practice within the region where Gulf countries are slightly leading in the number of transferred costs. There is a growing interest in the study of geographical transferability of scarcely available disease-related costs to support decisions about more effective and sustainable allocation of healthcare resources. However, more efforts are needed to consolidate best practices about the transferability of disease-related costs.

Keywords: Cost-transferability; MENA region; Healthcare system; Cost-effectiveness; Heath policy

1 Introduction

Innovation in healthcare is expected to enhance the quality-of-care delivery for patients and change the health services are provided. Its aim is to improve general population's health (Huter et al., 2016). healthcare innovation can be defined as "the application of a new medical knowledge", usually a medical product, i.e., a new dug or medical technology (Johannesson et al., 2009).

It has been proven via research studies that the health of the general population has improved through the years as a result to the development of technologies used in healthcare industry. Along with these improvements, the cost of healthcare delivery has been growing exponentially and questions are increasingly asked about the added value of the expanding health innovations in relation to the cost of implementing these new technologies in the healthcare systems (Launois et al., 2014).

For a better management of healthcare resources, health economic evaluation has been established as a mechanism of making informed decisions regarding access to the newest health technologies on the market. Health economics is defined as "the comparative analysis of alternative courses of action in terms of their costs and consequences" (Drummond et al., 2015). Hence, health economic studies aim to compare both the costs and outcomes of two or more alternatives usually between an existing (standard procedure) and a new intervention. Health economics is the process of measuring the cost-effectiveness of a health technology as simply measuring the cost of an intervention is not sufficient to decide whether it is a good investment; for instance, a cheap intervention can be of a poor value for money if it has little or no health outcome (Franklin et al., 2020).

Healthcare decision-makers have been relying worldwide on health evaluation analysis when making future health policies and deciding on reimbursement and financing schemes. The Middle East and North Africa (MENA) region is no exception to this, where local governments have been soliciting health-economy experts to make informed decisions and have a sufficient use of health resources (Zrubka et al., 2020).

The MENA acronym refers to the countries geographically located between North Africa and Southwest Asia (Worldbank.org, 2022). For the purpose of this review, MENA region is defined to include the following 17 countries: Algeria- Bahrain- Egypt- Iraq- Jordan- Kuwait- Lebanon- Libya- Morocco- Oman- Palestine- Qatar- Saudi Arabia- Syria- Tunisia- the United Arab Emirates and Yemen. The region is following the lead of western world and is experiencing a steady growth in healthcare expenditure following the epidemiological shift and aging population along with the challenge of delivering quality universal health coverage (Zrubka et al., 2022).

However, health economists from the region are enduring a double threat due to the scarcity of available economic data which make conducting economic evaluations less feasible and more time and resource consuming as disease-related costs are not always accessible and already published data is usually irrelevant and outdated. As a remedy to the economic data scarcity, geographical transferability of costs from one jurisdiction to another can be handy and help with establishing reliable Health economic evaluation results in such region (Goeree et al., 2007, 2002).

Transferability of cost economic results is defined as "the extent to which particular study findings can be applied to another setting or context." (Kim et al., 2010). Another definition is introduced within the systematic review and transferability analysis of disease-related costs from the MENA region: "the extent to which costs are transferable" (Zrubka et al., 2022). In this paper, the relative error of prediction was used as a measure of transferability of economic evaluation results. Well-established guidelines and standards have been published on international level, i.e., ISPOR Good Research Practices Task Force Report on Transferability of Economic Evaluations Across Jurisdictions (Drummond et al., 2009). However, there have been few attempts of assessing cost transferability around the world and the MENA region is no exception to this either. A prior literature search of transferability practise from the region revealed that no prior research studies are available on the methodology of costs transferability nor does exist local MENA-region related best practice guidelines.

To approach this research gap, this review aims to identify economic evaluation literature using transferred costs from the region and to describe their methodology and reporting quality.

2 Methods

This paper is an extension of two previous reviews of health-related costs from the MENA region (Zrubka et al., 2022, 2020) and the search strategy was reproduced searching for hits published between January 2020 and May 2022. PubMed (www.ncbi.nlm.nih.gov) and Web of Science (www.webofscience.com) databases were searched in July 2022. Filters for full-text English-language papers were used. The included papers were: (1) full or partial economic evaluations, (2) published between 2000 and 2022reporting, (3) disease-related costs in monetary units, (4) for local MENA populations, and (5) using costs from a foreign country transferred to one or more of the selected countries (Meriem Fgaier, 2022). No restrictions regarding the study perspective, the study disease, or the type of the health economic evaluations were applied.

Duplicates were removed and both title/abstract and full-text screenings were performed in parallel by two independents reviewers. All judgments about the studies' inclusion / exclusion decisions were also performed in duplicate. The disagreements were solved upon discussions and a third reviewer was involved when no agreement was reached.

The extracted data and its process are described with further details in the published research protocol (Meriem Fgaier, 2022). The following descriptive data on included studies (author(s)' names, publication year, number of transferred costs by publication, disease as reported in the study, the International Classification of Disease- 11th Revision: ICD-11 chapters, the study perspective, the study settings and the type of economic evaluation) and published transferred disease-related costs from the MENA region (the donor country, destination country, costing year of the analysis, costing year of the transferred cost, currencies of the donor and destination publications, level of aggregation, cost items as described in the article, costs denominators, costs type, and costs components) were retrieved.

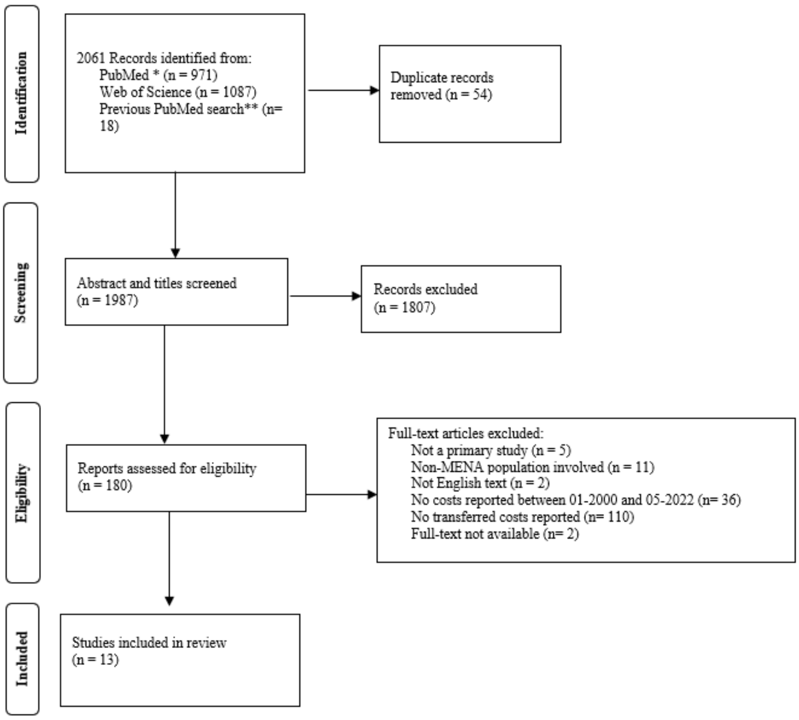
Furthermore, the details on transferability methods applied by the authors were also extracted and quality check on the reporting quality of the original and transferred costs were performed according to the Fukuda classification on reporting transperency (Fukuda et al., 2011): Category A: All components of costs were described and data for both quantity and unit cost of resources were reported for each component. Category B: All components of costs were described and data for costs in each component were reported. Category C: All components of costs were described but data for costs in each component were not reported. And Category D: Only scope of costing was described but components of costs were not described.

Finally, the included studies quality was assessed using the 28 items of the Consolidated Health Economic Evaluation Reporting Standards CHEERS 2022 checklist (Husereau et al., 2022).

3 Results

3.1 Literature review

A total of 2061 hits were identified from the databases search, from which 54 duplicates were removed. 1807 studies were excluded after title and abstracts screening. Further 167 studies were excluded based on the inclusion and exclusion criteria after the full-text screening. 13 studies were finally included in this review as shown in the PRISMA flowchart. (See Figure 1)



*PubMed search extended between 01-01-2020 and 31-05-2022.
**PubMed search the hits of two previous studies from 01-01-2000 up to December 2019.

Figure 1

Literature search summary

3.2 Description of the included studies and extracted costs

A total of 104 transferred costs were extracted from the 13 identified studies from the MENA region; Most of the studies adopted the health system perspective and two studies didn't specify their perspective: (Boutayeb et al., 2014, 2013). Included diseases were Cancer (Abdul-Khalek et al., 2020): the study estimated the economic burden of cancer care for Syrian refugees in Lebanon and Jordan), Rotavirus infection related diarrhoea, Severe Aortic Stenosis, Tuberculosis Infection, Non-Valvular Atrial Fibrillation, Diabetes, Cervical cancer, and Hepatitis A. One study (Finkelstein et al., 2021) reported transferred costs for multiple diseases namely: Coronary disease, Stroke, Type 2 Diabetes, Breast cancer, COPD, and Asthma. Another study (Alsaeed et al., 2019) didn't specify the disease: the study population was mechanically ventilated elderly patients in a tertiary hospital in Bahrain.

Out of the 104 extracted costs, ¼ were originally transferred from the United Kingdom (n=26). Only 2.9% were originally from a MENA country: United Arab Emirates.

¼ of the costs' origin was multiple countries (n= 26, 2 studies: -Finkelstein et al., 2021 and -Abdul-Khalek et al., 2020). Also, it was not possible to differentiate the original country of 9.6% of the costs (n =10) as the authors only reported in the methodology section that transferred costs were originally taken from available literature (referring to two studies from Canada (2018) and France (2020) without specifying further details on which cost was transferred from which study(Carapinha et al., 2022).

As for the destination countries of the transferred costs, most of them, were transferred to Saudi Arabia (41.4%, n= 43) and for 14.4% of them (n= 15), the destination country was not specified; Boutayeb et al., 2013 and Boutayeb et al., 2014: both studies were conducted on Arab region countries, the estimated costs were reported as an average cost for three groups of Arab countries without further details (Group 1 (Bahrain, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, UAE); Group 2 (Algeria, Egypt, Iraq, Jordan, Morocco, Syria, Tunisia); Group 3 (Comoros, Djibouti, Mauritania, Somalia, Sudan, Yemen)).

The currency for the original and destination costs was mainly USD, respectively 30.8% (n=32) and 59.7% (n= 62). The costing years of the original costs were as follows: 1990 (n=1), 2002 (n=4), 2004 (n= 4), 2008 (n=5), 2009 (n=12), 2010 (n= 26), 2011 (n= 3), 2012 (n=3), 2014 (n= 15), 2017 (n=4) and 2018 (n= 4). It was not possible to differentiate the currency of the original costs for Carapinha et al., 2022 (n= 10) and both Boutayeb et al., 2013 and Boutayeb et al., 2014 didn't specify the original costs' currency (n= 15). The costing years of the transferred costs were as follows: 2008 (n= 5), 2011 (n= 1), 2013 (n= 41), 2015 (n= 4), 2017 (n= 17), 2018 (n= 6), 2019 (n= 20) and 2021 (n= 10).

Most of the transferred costs were direct healthcare (n= 65) and the cost type was not specified in 28 of the cases (See table 1).

Table1. Description of included papers and extracted costs

Author, publication year	***ICD chapter***	***Study perspective***	***Type of economic evaluation***	***Currency of original/transferred costs***	***Costs type (n)***
Abdul-Khalek, 2020	II Neoplasms	Patient	CDA	Euro/Euro	Direct HC (n=12)
Debellut, 2020	I Certain infectious or parasitic diseases	Societal and health system	CEA	USD/USD	Not specified (n=2)
Finkelstein, 2021	Multiple*	Health system	CDA	Int$, AED, Euro/Int$	Direct HC (n=20)
Al Saeed, 2021	Not Specified**	Healthcare institution	COI	USD/USD	Total (n=4)
Carapinha, 2022	XI Diseases of the circulatory system	Health system	BIA	Not Specified***/ SAR	Direct HC (n=10)
Bastos, 2020	I Certain infectious or parasitic diseases	Health system	CCA	PPP$/USD	Direct HC (n=4)
Hersi, 2019	XI Diseases of the circulatory system	Health system	CEA	GBP/USD	Not specified (n=26)
Boutayeb, 2013	V Endocrine, nutritional or metabolic diseases	Not specified	COI	Not specified/Not specified	Indirect HC (n=6)
Boutayeb, 2014	V Endocrine, nutritional or metabolic diseases	Not Specified	COI	Not specified/Not specified	Direct HC (n=9)
Al Awaidy, 2009	I Certain infectious or parasitic diseases	Health system	CDA	USD/USD	Direct HC (n=5)
AlBedah, 2014	VI Mental, behavioural, or neurodevelopmental disorders	Health system	COI	USD/USD	Total (n=1)
Gamaoun, 2018	II Neoplasms	Health system	CMA	USD/USD	Direct HC (n=1)
Hayajnah, 2018	I Certain infectious or parasitic diseases	Societal	CEA	USD/USD	Direct HC (n=4)

Finkelstein, 2021: Seven major noncommunicable diseases: Coronary disease, Stroke, Type 2 Diabetes, Breast cancer, COPD, Asthma; **Al Saeed, 2021: Study population is mechanically ventilated elderly patients in a tertiary hospital in Bahrain; * Carapinha, 2022 (DOI: 10.1080/13696998.2021.2020569): It was not possible to differentiate the original costs currency. The authors only reported in the methodology section that transferred costs were originally taken from available literature (referring two studies from Canada (2018) and France (2020) without specifying further details on the which cost was transferred from which study).*

3.3 Methodology of transferred costs

When transferring the costs, time adjustments (n= 71) were mostly used by authors, followed by currency adjustments (n= 38), then economic adjustments (n= 51), and cost-Type adjustments were the least used (n= 68).

Only 5/13 papers justified the transferability methods. Various justifications of transferability methods were used by the authors; Boutayeb et al., 2013 and Boutayeb et al., 2014 assumed that the costs are similar for different countries in the same income group. – (Hayajneh et al., 2018) used costs from economically similarly situated countries- (Carapinha et al., 2022) used (Hersi et al., 2019) to justify applied methodology when transferring costs to Saudi Arabia context – and both (Al Awaidy et al., 2009) and (Bastos et al., 2020) reported WHO-CHOICE tool as a justification for their transferability approach. (See table 2)

Table2. Transferability methodology used by authors: Adjustments type, applied transferability methods justification, and Donor countries selection criteria

Author, publication year (n)	**Adjustment type**	**Justification of transferability method**	**Donor/ Destination countries**	**Donor country selection criteria**
Abdul-Khalek, 2020 (n=12)	Time adjustment Economic adjustment	No reference	Multiple ➔ Jordan Multiple ➔ Lebanon	Data availability from WHO-OECD-EUROSTAT
Debellut, 2020 (n=2)	Time adjustment	No reference	NS ➔ Palestine	No reference
Finkelstein, 2021 (n=20)	Time adjustment Currency adjustment Economic adjustment Cost-type adjustment	No reference	Multiple ➔ Bahrain Multiple ➔ Oman UAE ➔ Kuwait UAE ➔ Qatar UAE ➔ KSA Germany ➔ Kuwait Germany ➔ Qatar Germany ➔ KSA	No reference
Al Saeed, 2021 (n=4)	Currency adjustment	No reference	USA ➔ Bahrain	No reference
Carapinha, 2022* (n=10)	Currency adjustment Economic adjustment Cost-type adjustment	Hersi, 2019	NS (Canada or France) ➔ KSA	No reference
Bastos, 2020 (n=4)	Time adjustment Currency adjustment Cost-type adjustment	No reference	Canada ➔ KSA	No reference
Hersi, 2019 (n=26)	Time adjustment Cost-type adjustment	No reference	UK ➔ KSA	No reference

Boutayeb, 2013** (n=6)	Economic adjustment	Assuming that the costs are similar for different countries in the same income group	NS ➔ NS	Same income group
Boutayeb, 2014** (n=9)	Cost-type adjustment	Assuming that the costs are similar for different countries in the same income group	NS ➔ NS	Same income group
Al Awaidy, 2009 (n=5)	Time adjustment	WHO-CHOICE Tool	NS ➔ Oman	No reference
AlBedah, 2014 (n=1)	Time adjustment	No reference	USA ➔ KSA	No reference
Gamaoun, 2018 (n=1)	Time adjustment	No reference	NS ➔ Tunisia	No reference
Hayajnah, 2018 (n=4)	No adjustments	Similarly, economically situated countries	Argentina ➔ Jordan	Economic similarity

** Carapinha, 2022 (DOI: 10.1080/13696998.2021.2020569): It was not possible to differentiate the original costs original country. The authors only reported in the methodology section that transferred costs were originally taken from available literature (referring two studies from Canada (2018) and France (2020) without specifying further details on the which cost was transferred from which study).; ** Boutayeb, 2013 and Boutayeb, 2014: both studies were conducted on Arab countries, the estimated costs were reported as an average cost for three groups of Arab countries without further details (Group 1 (Bahrain, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, UAE); Group 2 (Algeria, Egypt, Iraq, Jordan, Morocco, Syria, Tunisia); Group 3 (Comoros, Djibouti, Mauritania, Somalia, Sudan, Yemen))*

3.4 Quality assessement

As summarized in table 3, authors reported sensitivity analysis for 63.5% of the transferred costs (n= 66) and justified the transferability methods for around one third of the cases (n=35- 33.6%).

Fukuda classification for transferred costs was as follows: B= 23.1% (n=24), C= 11.5% (n= 12), and D= 65.4% (n= 68). Only 4 studies out of 13 included had a ‘’high” CHEERS score (score => 20/28): (2): studies from KSA, (1): Palestine and (1): Jordan)

Table 3. Summary of quality assessement of included papers and transferred cost

Author, publication year	***Fukuda classification of transferred cost***	***Sensitivity analysis***	***CHEERS score***	***Number of costs***
Abdul-Khalek, 2020	C	No	15/28	N =12
Debellut, 2020	D	Yes	22/28	N =2
Finkelstein, 2021	D	Yes	11/28	N =20
Al Saeed, 2021	D	No	14/28	N =4
Carapinha, 2022	D	Yes	24/28	N =10
Bastos, 2020	D	Yes	18/28	N =4
Hersi, 2019	D	Yes	25/28	N =26
Boutayeb, 2013	B	No	6/28	N =6
Boutayeb, 2014	B	No	14/28	N =9
Al Awaidy, 2009	B	No	18/28	N =5
AlBedah, 2014	D	No	11/28	N =1
Gamaoun, 2018	D	No	18/28	N =1
Hayajnah, 2018	B	Yes	22/28	N= 4

4 Discussion

The findings from this study show that there is a growing interest in costs transferability and that the practise has started recently in the region; as only one study was published in 2009, all other identified transferability papers were published through the last decade (between 2013 and 2021). This is in consistence with findings from a systematic review and a transferability analysis of disease-related costs from the region; The review reported that an increase of publication activity after 2012 (Zrubka et al., 2022). The same paper concluded that most costs were published from Saudi Arabia which confirms the noticed lead of Gulf countries in general and Saudi Arabia in particular on transferability attempts with around 41.4% of the identified costs being transferred to Saudi Arabia settings (Oman 11.5%; Bahrain 10.6%; Kuwait and Qatar 1.9%).

Despite the available literature on international guidelines of cost transferability methodology proposing best practises, factors of transferability (Welte et al., 2004), numerous adjustment methods (Grieve et al., 2005; Perrier et al., 2014; Sculpher et al., 2004), and reporting guidelines (Drummond et al., 2009, 2005; Husereau et al., 2022), no standard approach was used in all studies when reporting the results of economic evaluation analysis and multiple adjustment techniques were reported by the authors when transferring the costs.

To the best of our knowledge, our study is the first systematic review of economic evaluation studies using transferred costs from the region. Previous systematic reviews were conducted on health economic research such as Zrubka et al., 2022 review of health-related costs for the entire MENA region up to 2019 (n = 105) and Elsharkawy et al. (Elsharkawy et al., 2018) including the entire WHO Eastern Mediterranean Region (n = 624). The latter papers systematically reviewed health economic studies from the region, where our study focused thoroughly on health economic transferability studies. Our review is the first to highlight the literature gap on cost transferability research in the region and contributes to portrait a thorough picture of the transferability methodology used by MENA authors and the quality of the transferred costs from the MENA countries.

Conclusions

Transferability is a novel practice within the region where Gulf countries are slightly leading with the number of transferred costs. There is a growing interest in applying geographical transferability of disease-related costs to overcome scarcity issues and obtain more effective and sustainable healthcare. However, more efforts are needed for solid cost-transferability results and future focus on researching cost transferability within MENA countries remains important.

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Examining factors influencing students' participation in research and development projects during obtaining their first university degree

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Abstract: Universities are a key factor of national and regional innovation. A considerable proportion of the innovative ideas and commitment to innovation-driving professions happen during university years. Accordingly, projects to develop the so-called university innovation ecosystems in universities are already widespread. In this work, we aim to assess the factors that contribute to students' participation in research and development (R&D) projects while obtaining their first university degree, which may be considered as a indicator of students' innovation potential. We analysed data from a questionnaire survey covering four countries: Poland, the Czech Republic, Slovakia and Hungary involving ≤30 year-old adults with university diploma. The data were collected between July 2022 and August 2022. Out of 1907 respondents, 333 (17.5%) participated in reseach and development (R&D) projects while obtaining their first degree. Our results showed a correlation between participation in an R&D project and whether the student participated in a scientific competition or exhibition, and if they published a paper. Of the respondents, 258 had received some kind of research, study or art grant, which also showed a link between participation in the R&D project. Furthermore, respondents, who participated in R&D activities were more likely to participate in social or public activities in the university. These results are useful in identifying touch points through which students with innovation potential can be involved in the university innovation ecosystem.

Keywords: innovation ecosystem, university innovation, innovation potential

1 Introduction

In addition to their traditional teaching and research functions, all universities have a responsibility to contribute to the development of their country and region mostly by innovative projects.(Heaton, Siegel, and Teece 2019) The Triple Helix model sees universities as a key driver of innovation, alongside businesses and government. A core function of the university in the interactions between the three named actors in the model remains to provide students with competitive skills and knowledge. This way universities provide workforce to the labour market in the corporate and public sector as well as ideas and research results for innovation. (Leydesdorff 2013) University students are at the centre of these.

Higher education has a prominent role in shaping students' attitudes towards innovation and etrepreneurship, and universities are investing to build innovation ecosystems to foster this.('EcoAction' n.d.) During their years in university, students are at a point in their lives where they are deciding on their future career paths. With the right motivational tools and the right infrastructure, they can be guided towards innovation-driven professions.(Kaloudis, n.d.) This will create a sufficient labour supply for industry, increasing the competitiveness of the country and the region.

Understanding the role of a university in student's innovative behaviour, in our research, through the evaluation of a four-country representative questionnaire, we aim to assess the factors associated with the respondents' willingness to participate in R&D projects. The primary benefit of such findings is that we can discover action points along which we can intervene to stimulate innovation at universities.

2 Literature Review

High proportion of studies on innovation interventions focuses on the impact of the workplace environment on workers' innovative behaviour. The results of these researches can be applied to innovation environments in universities by considering students as employees and universities as businesses. According to OECD's definition *"An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations."*(OECD)

Schaltegger et al. point out that innovative organisations are able to respond better to changing environments and challenges, while research by Chen et al. highlights the crucial role of individuals in the extent of innovation.(Schaltegger, Freund, and Hansen 2012) (Chen et al. 2013)

Studies on innovation have shown, the positive impact of stress on innovative thinking, (Albort-Morant et al. 2020) while other studies have highlighted the power of innovation to reduce stress and create well-being.(Dolan and Metcalfe 2012) Students starting their university studies are exposed to a significant amount of stress, that can negatively impact their well-being, adaptation and performance.(Cotton, Dollard, and de Jonge 2002)

Some of the studies focus on gender distribution, women's participation in innovation-driven professions. According to UNESCO's Women in Science 2020, 30% of the world's researchers are women. (Statista) On the other hand in Martín et al.'s study, that is about the innovative behaviour of undergraduate students in arts and humanities, they did not observe any difference in innovative behaviour between the two sexes. The same study highlighted the positive impact of autonomy in stimulating innovative behaviour.(Martín, Potočnik, and Fras 2017) This is somehow in contrast with a study about job design and innovative work behaviour, that shows that job control is positively related to innovative bahaviour.(De Spiegelaere et al. 2012)

In addition, several studies highlight the positive impact of organisational commitment and a sense of belonging on academic performance. (Pedler, Willis, and Nieuwoudt 2022) While in the case of universities, close links with industry have also been identified as an important element in strengthening innovation potential. (Abdul Razak, Murray, and Roberts 2014)

In this phase we briefly described the main approaches of the literature that investigate the mechanisms and different factors that drive innovation in the workplace and universities. The aim of our work is to explore the factors that could potentially influence the willingness of first degree students to participate in R&D projects and its correlation with pursuing an entrepreneurial career in the future, through the analysis of the results of a questionnaire survey.

3 Methods

An online survey, representative of 4 countries was carried out among young adults under 30 years of age with a degree obtained in Slovakia, Hungary, Poland or the Czech Republic. The data were collected between July 2022 and August 2022 on an online questionnaire platform by a data survey company.

The questionnaire asked respondents to recall their experiences at university while studying for their first degree. Questiones related to experiences and percepitions on opportunities relating to university functions were asked. In our analysis, we investigated which factors show significant differences between respondents who participated in R&D activities. We considered participation in R&D projects during studies for the first degree is as an indicator of innovation potential.

For cross-tabulated data, the significance of the influencing factors in the sample was tested using the chi-square test and Fisher's exact test. We used the Fisher's exact test in the cases where values in any of the cells of a in a cross-table were below five.(ScienceDirect) For variables with ordinal Likert-scale responses, we applied the Wilcoxon rank-sum test, a non-parametric test for the comparison of two independent groups. The relationships were considered significant at a P value of 0.05

4 Results

4.1 Descriptive analysis of the sample

The questionnaire was completed by 1907 respondents out of 37.97% is male and 61.88 % is female. The average age was 27 years. To get an idea of their financial background, respondents were asked to indicate their financial situation relative to the average.

Table 1. Distribution of participants based on their financial situation relative to others

Financial situation	**Number of respondents**	**%**
Much better than average	143	7,5
Slightly better than average	533	27,9
Roughly average	845	44,3
Slightly worse than average	263	13,8
Much worse than average	93	4,9
I can't, I don't	30	1,6
Total	1907	100

Almost 60 percent of respondents had their first degree in Arts & Humanities, Engineering & technology, Social science and Business & economics subject area and majority of were full time students (89.77 %).

Slightly more than 17% of the total sample said they had been involved in an R&D project during obtaining their first university degree. The highest proportion of students graduating in Hungary were involved in such projects, followed by the Czech Republic, Poland and Slovakia (Table 1).

Table 2. Respondents participating in R&D projects graduated in the four countries

Country of 1st degree	Number of respondents	Participation in R&D projects	%
Czech Republic	407	109	26,8
Hungary	412	114	27,7
Poland	468	79	16,9
Slovakia	287	31	10,8
Total	1907	333	17,5

4.2 Results of statistical analyses

Research results showed that out of the 1907 respondents those (333, 17,5%) who participated in any research and development (R&D) projects while obtaining their first degree are more typically males than females. Male students were more likely to participate in any kind of university projects (not only in research and development projects), while significantly more female respondents reported that they did not participate in any projects while obtaining their first degree (30,9%) in comparison with male respondents (19,2%).

We analyzed the socio-demographic background of respondents who participated in any R&D projects. Their families more typically have slightly or much better financial situation than the average (p=0.007). In case of these respondents, not only the economical status of the families was better than average, but their mothers' education was the less typically at the lowest level (finishing only primary school) (p=0.019).

Those who participated in R&D projects, they were significantly more likely complete a full course or degree in foreing language (p=0.029), participate in a student research or scientific competition (p<0.001), present at a scientific conference (p<0.001), publish a research paper (p<0.001) or participate in a creative or art exhibition (p<0.001).

In terms of incentives and rewards for excellence, our results show that respondents who participated R&D projects were significantly more likely to receive research, study or art grant (p<0.001). Another interesting highlight is that participation in organized social or public acivities were significantly more common among those who has participated in innovative projects (p<0.001).

From specialization point of view, there is a significant difference among respondents graduated in different faculties. Those who participated in any R&D projects were more typically specialized in computer science (p=0.012), engineering and technology (p=0.005) and life sciences (p=0.012) while less typically graduated in faculty of business and economics ($p<0.001$), social sciences ($p=0.002$) and law ($p=0.016$). Respondents participated more typically in full-time education.

There is association between participating in any R&D projects and satisfaction with their knowledge or skills gained in the university in terms of the projected value of their first degree ($p=0.043$). It was less typical among them to evaluate their knowledge or skills as useless in their work ($p=0.002$) and they evaluated their first degree higher in comparison with those respondents who did not participate in any R&D projects when obtaining their first degree ($p<0.001$).

Our data showed that these students felt that the institution had positive impact on their future career ($p<0.001$) and they also considered that their institution was better known abroad ($p<0.001$). There are other important factors related to the institution's services which are highly evaluated among respondents who participated in any R&D projects as personal contact with instructors ($p=0.044$), research opportunities ($p<0.001$), study opportunities abroad ($p=0.018$), sport facilities ($p=0.013$), student counseling or mentoring ($p=0.003$), student advocacy ($p=0.001$) and housing options ($p<0.001$).

We also examined whether respondents' current careers reflect the entrepreneurial ambitions they had during their first degree. Accordingly, we investigated the proportion of those in the two groups who were working as entrepreneurs or as entrepreneurs employing others. Results show that 5% of those who have not done research, 10% of those who have done research became entrepreneurs ($p=0.001$).

5 Discussion

Results showed that students participating in R&D projects are more ambitious and tend to put effort in different types of projects for example competitions, foreign language courses etc. In line with this, the results showed that students give greater importance to the university's support in exploiting their innovative potential, for example they rated access to research opportunities, study opportunities abroad, opportunity to take part in student counseling or mentoring and student advocacy more important. This also means that the institution has a greater investment in attracting and retaining innovative students, and possibly in facilitating them to obtain a Master's or PhD degree at the institution. This is very much linked to the issue of talent management, which is not addressed in this article. Furthermore it remains a question, whether this attitude towards innovation will remain consistent after graduation.

Our results also show that income and family background correllates with the willingness to participate in R&D research, but also that students are less entrepreneurial in different fields of study. An interesting finding is that participation in R&D projects was not common among students in business and economics area, although this field is perhaps the most exposed to the need to adapt to change, alongside technical innovation.

Based on our data, a higher proportion of men participated in the research project, which is in line with the research findings of other available research on gender differences among researchers(van den Besselaar and Sandström 2016). In studies like those, authors suggested that this situation could be addressed through targeted actions and incentives. Accordingly, the greater involvement of female students in similar projects has unexploited potential.

Our results also in line with researches mentioned in the introduction that a sense of commitment to the institution and a sense of belonging can increase the student's willingness to participate in innovative projects.(Pedler, Willis, and Nieuwoudt 2022) In our case, participation in social and public events showed a significant correlation with participation in R&D projects. This suggests that more events organized by the university can lead to higher level of innovation.

Ovbiagbonhia et al. investigated students' perceptions on learning environment for building innovation competence at their university and came to the conclusion that universities should give more focus to create a supportive enviornment for innovation.(Ovbiagbonhia, Kollöffel, and Brok 2019) This atempt of universities supported by a growing number of methodological research and international collaborations to support research on the topic, such as the EIT-HEI.

Data collection for this study was from a representative online panel and therefore provides a picture of the general behaviour and attitudes of this age group

One of the limitations of our research in terms of examining the relationship between participation in the research project and entrepreneurial careers is that we considered both self-employed and employers as entrepreneurial careers, but we have no information on what percentage of these are innovative businesses or start-ups. Furthermore, the proportion of entrepreneurs is only 10% among R&D students.

Conclusion

We investigated the factors influencing the willingness to participate in R&D projects in a large international survey. Our results show that the university has a great responsibility to provide the resources and infrastructure to support open-minded students in their innovative ideas and also to meet their needs. In addition, a targeted incentive system is recommended to reach groups that are under-represented in participation in R&D projects, such as women or students in certain disciplines or socioeconomic background. The impact of such programmes has an indirect effect on the image of the university and on student satisfaction. Further research is needed to see if there is a correlation between participation in an R&D project and current job status, life satisfaction and future expectations.

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How Cunbo Affect Consumer Purchase Intention? Analysis from Source Credibility and Parasocial Relationship

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Abstract: Cunbo is a specific "live e-commerce" form in China. Rather than celebrities, local farmers or village cadres are always endorsers to advertise their agricultural products through live streaming. Due to China's developed e-commerce, live streaming industry, and the popularity of smartphones, even farmers, can easily engage in live streaming. While most former studies focus on celebrities' effects, very few studies when endorsers were mainly farmers. Thus, this study aims to research how Cunbo affects consumers' purchase intention when endorsers are farmers. Based on source credibility theory, this study explores the effects of 3 elements (i.e., attractiveness, expertise, and trustworthiness) on Chinese consumer purchase intention through Cunbo. Meanwhile, this article considers credibility and parasocial relationship as two mediating variables to study their roles between 3 elements of source credibility and Chinese consumers' purchase intention. The Process Macro of SPSS has been used in this study as a tool to test the collected data and hypotheses. A total of 302 responses have been collected through a structured questionnaire. The findings indicate that attractiveness, expertise, and trustworthiness have a significant relationship with Chinese consumers' purchase intention toward agricultural products. Also, credibility and parasocial relationship play mediating roles between the relationships.

Keywords: E-commerce; China; Purchase Intention; Source Credibility; Parasocial relationship

1 Introduction

1.1 Background of the Study

The COVID-19 outbreak prompted a surge in live streaming viewers. The number of live streaming viewers in China has reached 562 million in 2020 based on CNNIC (China Network Information Center). In the first half of 2020, there were more than 10 million live commerce held in China, with more than 40 thousand active streamers, which had been viewed over 50 billion times. Live commerce has developed into a widely accepted business model in China.

Initially, only urban dwellers could easily access and use the Internet, so they also became the first generation of Taobao sellers. Later, with the development of the economy and Internet technology, more and more rural residents could access the Internet and became Taobao sellers (Qi & Guo, 2019). National rural internet retail sales in China reached 1.7 trillion yuan in 2019, up nearly 20 percent, and made up 16.1 percent of all social consumer goods retail sales. At the same time, agricultural items were sold online for about 397.5 billion yuan (Li et al, 2021).

Cunbo appeared with the rise of rural e-commerce. According to a widely accepted definition (What is Cunbo, 2020), Cunbo (村播) is a specific "live e-commerce" form. Local farmers or village cadres are always streamers to advertise their agricultural products through live streaming. Taobao's Cunbo program has accumulated 110,000 farmers' anchors, with more than 2.3 million broadcastings, driving the sales of agricultural products to exceed 5 billion yuan through Cunbo in 3 years (Securities daily, 2021).

Rural e-commerce has brought considerable benefits to China's economy. The divide between urban and rural regions has shrunk as a result of the growth of rural e-commerce, and many rural inhabitants' incomes have increased (Yin & Choi, 2022). Now more and more farmers are selling and advertising their products through Cunbo. China is a predominantly agricultural country; many rural residents engage in agriculture. Understanding why and how Cunbo enhances consumers' purchase intention helps streamers (farmers) of Cunbo improve how they interact with the audience and better introduce and sell local agricultural products.

Two theories are built to explore the relationship between Cunbo and purchase intention. Source credibility always refers to as the good traits of communicators that influence the receiver's acceptance (Ohanian, 1990). Source credibility affects consumer behavior. For example, celebrity endorsement improves purchase intention for cosmetic products (Rungruangjit, 20202). The parasocial relationship is a psychological relationship, which means that people develop friendship, identification, and illusions of intimacy after contact with the media persona repeatedly (Chung, 2017). Parasocial relationships can be built between consumers and streamers. Consumers have been proven to create parasocial interactions with people they follow on social media. In Cunbo, consumers are able to interact with the streamer, like asking questions about products or asking for a lower price, and the streamers will respond to consumers immediately.

1.2 Purpose of the Study

This study aims to investigate how source credibility and parasocial relationship affect consumer purchase intention through Cunbo based on source credibility model and parasocial relationship theory. This study should promote the following research objectives to fulfill the purpose:

1. Based on the source credibility model, to explore how Cunbo affects consumers' purchase intention on agriculture products by trustworthiness and expertise.

2. To explore the relationship between different levels of parasocial relationship and consumers' purchase intention and factors that enhance parasocial relationship.

Source credibility model and parasocial relationship are widely used to analyze consumer behavior. The previous studies focus on celebrity's influence on consumer behavior. Studies have shown that celebrities can enhance credibility and parasocial relationships (Rungruangjit,2022). However, in Cunbo, most endorsers are farmers; they advertise and sell their agricultural products. Cunbo, as a new form of live commerce, has not been paid much attention.

This study explores how Cunbo affects consumer purchase intention from a consumer's perspective. It can help farmers and village cadres understand consumer demand and provides valuable guidance for advertising and selling agricultural products by Cunbo.

1.3 Theoretical and Conceptual Framework

1.3.1 Source Credibility Model (SCM)

A widely used technique for assessing the effectiveness of endorsements is the source credibility model (Lim et al., 2017). Most studies have adopted expertise (or competence) and trustworthiness as key dimensions of source credibility (Fogg & Tseng, 1999). Consumers are more likely to believe the information offered by a trustworthy endorser, making credibility vital for production endorsement. Given their trustworthy knowledge, endorsers can gain the trust of customers based on expertise (Mat et al., 2019). Besides, the messages of an attractive communicator are demonstrated to be more convincing (Chaiken, 1979). Physical attractiveness influences stereotype categorization, people always form comprehensive notions of who they obverse simply based on physical attractiveness (Patzer,1983).

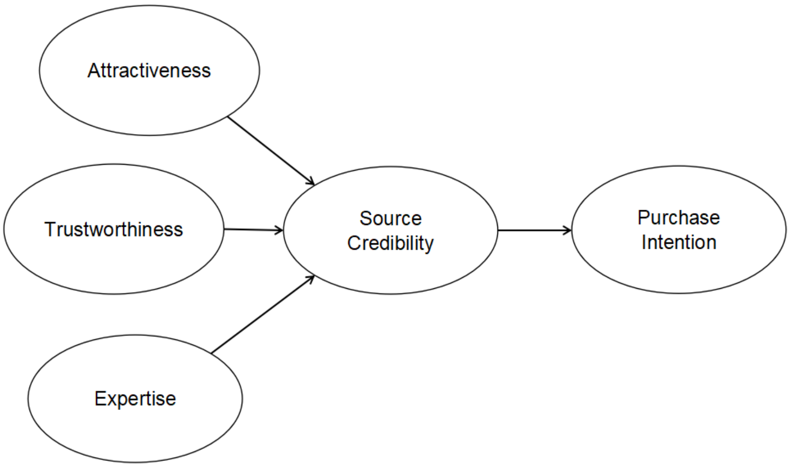


Figure 1: Theoretical Framework – SCM

1.3.2 Parasocial Relationship Theory (PRT)

The parasocial relationship is a one-sided relationship, that people (social media users) develop with mediated personas (Horton & Wohl, 1956). Nowadays, parasocial relationship not only influences traditional media but also affects Internet users (or internet social media) (Labrecque, 2014). The internet even provides a better platform for influencers and their fans to strengthen this relationship. Consumers are more likely to devote more attention to the influencers if they can be perceived as physically or socially attractive (Sokolova & Kefi, 2020). In some commerce contexts, it has been proven that consumers tend to form parasocial relationships with others who are perceived as experts. Similarly, consumers tend to form parasocial relationships with influencers who are believed as experts (Yuan, & Kim, 2016). Trust also plays an important role in this process. The study has shown that trustworthiness is a vital factor to enhance the parasocial relationship (Yuan & Lou, 2020).

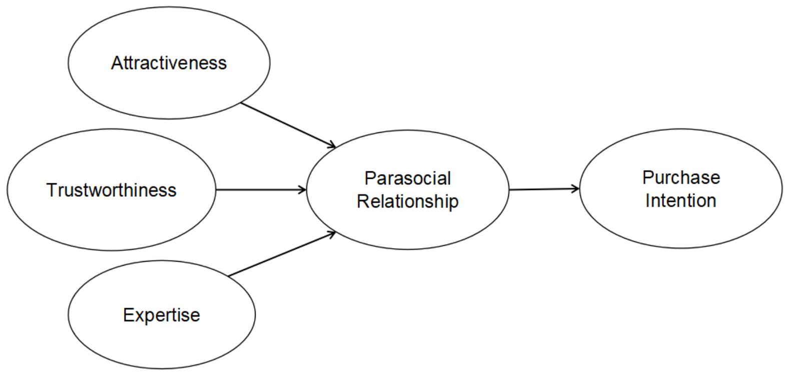


Figure 2: Theoretical Framework-PRT

Based on the review of literature, the conceptual model is presented in Figure 3.

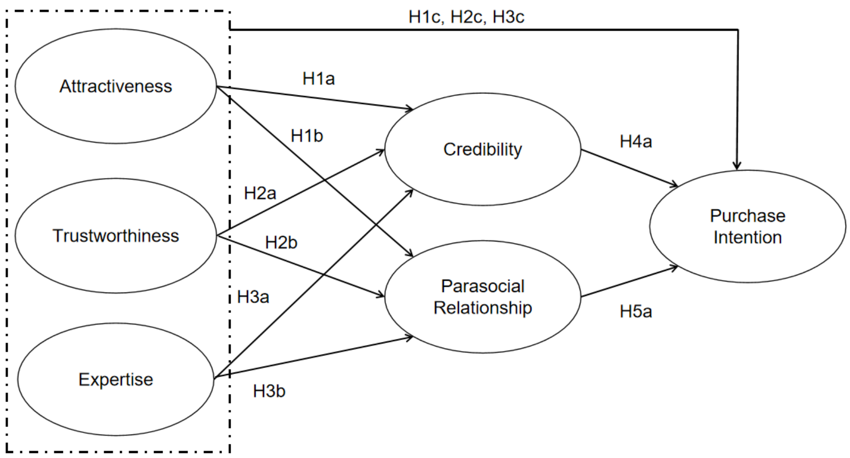


Figure 3: Conceptual Framework

2 Literature Review

2.1 Cunbo in China

Cunbo is one type of live streaming commerce. According to a widely accepted definition (What is Cunbo, 2020), Cunbo is a specific "live e-commerce" form. Unlike celebrities who endorse products, local farmers or village cadres are always streamers to advertise their agricultural products through live streaming platforms. Live streaming commerce is a development of electronic commerce which incorporates in-the-moment social engagement. On a live streaming platform, it carries out e-commerce operations and transactions (Cai, 2019).

At the Taobao Live Streaming Ceremony held on March 30, 2019, Taobao's "Cunbo plan" was officially launched, announcing that it would cultivate 1,000 farmers with a monthly income of over 10,000 in 100 counties across the country. One year after Taobao's "Cunbo plan" launched, more than 1.4 million live streams of agricultural products have been carried out on Taobao's Cunbo. In addition, the live broadcast area covers more than 2,000 counties in 31 provinces and cities across the country, attracting more than 60,000 "farmer streamers" to join Taobao's "Cunbo Program" (Chen, 2022).

China's developed live streaming industry and e-commerce industry enable farmers to have live streaming on various platforms, such as Douyin and Kuaishou, in addition to Taobao.

2.2 Live Streaming Influencers in Cunbo

According to Qi et al. (2022) 's definition, on the online live streaming platform, the influencer is a person who has some fans and interacts both within and outside of the live streaming sales events. As a result, the influencers can use the information about the demands of their followers (or future customers), which may influence consumers' purchasing behavior. These qualities set the influencer apart from conventional retailers (Qi et al., 2022). Influencers in Cunbo also need to interact with the audience or fans, mostly within the live streaming sales event, to promote their agricultural products. Most of the influencers in Cunbo are local farmers, even though few may attract many fans after providing some live streaming content.

Selling and marketing agricultural products is one of the greatest challenges under covid-19. With the traditional sales channels gradually declining, "farmer streamer influencers" emerged, and many started the trend of farmers' Cunbo to speak for their agricultural products. Due to the effective promotion of live streaming, many local farmers can sell their agricultural products to the whole country by using the live streaming platform at home. Among them, the income of nearly 2,000 new farmers in the first year of Taobao's "village seeding program" exceeded 10,000 yuan (Chen, 2022).

2.3 Theoretical Framework and Hypothesis Development

2.3.1 Purchase Intention of Live Streaming Products

Live streaming has been around for a while in China, but it has recently gained popularity in 2019 and established itself as a crucial channel for consumers and retailers (Zhou et al., 2021). During the COVID-19 epidemic, it has seen a swift increase of the growth of this industry. Chinese live streaming audience were 638 million as of June 2021, with 384 million (or 38% of all internet users) watching live streaming from online retailers. The market for live streaming in China was worth 1.2 trillion yuan (around $190 billion) in 2020 (Zhang, 2022).

Purchase intention can be regarded as a consumer's willingness to purchase a specific item (sometimes service) based on their subjective and overall evaluation (Dodds et al., 1991). Purchase intentions, according to Hsu (1987), were defined as specific exchange behaviors that emerged from customers' overall evaluations of a product. It is a perceptual response to one's perspective of an item. One of the active study topics in the literature is customer online purchase intention. The level of a consumer's desire to engage in particular purchasing behaviors on the Internet can be determined by their customer's online purchase intention (Salisbury et al., 2001). Ajzen (1991) points out that purchase intention can measure the willingness of the consumer to engage in a particular action. Based on theories, consumer intention is defined as the willingness of online purchases through Cunbo in this research.

2.3.2 The S-O-R framework

According to Mehrabian and Russell (1974), the stimulus that people receive from external environment would trigger their internal evaluation states, which can subsequently result in either positive or negative conduct (response). The organism would respond to environmental stimuli through a series of psychological or cognitive processes with some behavioral reactions. Attitude of individual is a manifestation of their internal response, and their particular conduct is a manifestation of their exterior response (Lorenzoromero & Gomezborja, 2016). This model has been effectively used in e-commerce research to examine user behaviors, including website stickiness and customer loyalty, as well as settings like conventional live streaming platforms and online brand communities (Kang, 2021).

For this study's theoretical framework, it is preferable to employ the S-O-R framework. The first reason is that this model has been used to determine the effect of interactivity on consumer engagement behavior in live streaming commerce environment (Kang, 2021). Second, Cunbo, as a type of live e-commerce, is very interactive. It needs more interaction before transactions. For example, the audience asks the influencer on Cunbo to personally pick fruit on the tree and taste to describe the taste of the fruit, which aims to get a complete picture of a product. Thus, the S-O-R framework help this article build an integrated model to reflect three dimensions of source credibility (attractiveness, trustworthiness, expertise) during interaction to affect purchase intention.

2.3.3 Source Credibility

A term frequently used to suggest a influencers' favorable traits, which influence the receiver's reception of certain message is source credibility (Ohanian,1990). Source credibility model is a widely used methodology for assessing the effectiveness of endorsements (Lim et al., 2017). Most studies have adopted expertise (or competence) and trustworthiness as key dimensions of source credibility (Fogg & Tseng, 1999). Consumers are more inclined to believe the information offered by a trustworthy endorser, making credibility vital for production endorsement. Given their professional knowledge, customers will trust endorsers more based on expertise (Mat et al., 2019). Besides, the messages of an attractive communicator are demonstrated to be more convincing (Chaiken, 1979). Physical attractiveness influences stereotype categorization. People always form comprehensive notions of whom they obverse simply based on physical attractiveness (Patzer,1983). This research is built on the theoretical underpinnings of Ohanian's (1990) source credibility model. It describes source credibility as a concept which contains three components, including influencer'a attractiveness, trustworthiness, and expertise. Many former researches had focused on celebrity under this model, which also showed that all of these components had a significant impact on purchase intention under celebrities' endorsement. However, previous studies mostly focus on celebrity's influence on consumer behavior, and endorsers are always celebrities in live commerce. The endorser (or seller) in Cunbo are always local farmers or village cadres who advertise and sell their agricultural products through live streaming, which has not been studied yet under this model.

2.3.4 Attractiveness

In this paper, "attractiveness" refers to the physical traits or qualities that may attract the desired audience due to personal features and physical appearance (Ohanian,1990). Chaker et al. (2019) describe it has a "beauty premium", because attractiveness positively affects both personal and professional life. Attractive salesperson is perceived as more reliable than ordinary one (Kulesza, 2014). In the social psychology literature, the role of attractiveness is well-established, which suggests that exposure to or interaction with attractive people tends to generate favorable feelings and even desires to create a close connection (Lemay Jr, Clark, & Greenberg, 2010). Consumer intentions are significantly impacted by physical attractiveness. Endorsers with appealing traits might influence buyers' intentions to buy (Kahle & Homer, 1985). Therefore, the following hypotheses were made:

H1a: Attractiveness of Cunbo live streamer influencer is positively associated with credibility Cunbo e-commerce.

H1b: Attractiveness of Cunbo live streamer influencer is positively associated with parasocial relationship (PR).

H1c: Attractiveness of Cunbo live streamer influencer is positively associated with purchase intention (PI).

2.3.5 Trustworthiness

Ohanian (1990) defines trustworthiness as the amount of faith that consumers have in influencers' ability to communicate the claims they consider to be the most reliable. Customers are more willing to trust the information offered by a trustworthy endorser, so trustworthiness is crucial for practical endorsement. According to AlFarraj (2021), 40% of respondents between 18-24 put more faith in influencers than actual brand promotion. Additionally, trustworthiness is related to credibility. Trustworthiness is an important component of constructing the credibility of peer endorsers (Munnukka, 2016). Moreover, customers are more likely to buy from endorsers who have won over their supporters' trust by effectively fostering favorable sentiments toward the things they promote (Tripp et al., 1994). Endorser with a high trustworthiness score might alter the attitudes of consumers and their intent to make purchases (Mat et al., 2019). Accordingly, the following hypotheses were established:

H2a: Trustworthiness of Cunbo live streamer influencer is positively associated with credibility.

H2b: Trustworthiness of Cunbo live streamer influencer is positively associated with parasocial relationship (PR).

H2c: Trustworthiness of Cunbo live streamer influencer is positively associated with purchase intention (PI).

2.3.6 Expertise

The fundamental definition of expertise is the level of the endorser's perceived knowledge, experience, or abilities to sell the product (Van der Waldt, 2009). It is believed that different celebrities have varying levels of product expertise. For instance, athletes are believed to have extensive knowledge of sports items, whereas celebrities are believed to be knowledgeable about beauty products (Gong & Li, 2017). The expression based on professional expertise shows credibility, which depends on knowledge to promote products(Mat et al., 2019). Expertise will not only impact credibility perceived by the influencers but also affect customer purchase intention and behavior (Schouten, 2019). The endorser who owns high-expertise is also more convincing and positively influences customers' attitudes and buying intentions (Goldsmith et al., 2000). Therefore, the following hypotheses were proposed:

H3a: Expertise of Cunbo live streamer influencer is positively associated with credibility.

H3b: Expertise of Cunbo live streamer influencer is positively associated parasocial relationship (PR).

H3c: Expertise of Cunbo live streamer influencer is positively associated with purchase intention (PI).

2.3.7 Credibility

Endorsers are frequently employed in advertisements to increase message's credibility. Consumer's attitude toward endorsers always affects their perceived credibility toward advertisement (Clow et al., 2006). Many researchers have studied the effects of celebrities as endorsers on consumer behavior (Munnukka, 2016). Moreover, Pornpitakpan (2004) points out that celebrity endorsers' perceived credibility enhance the purchase intention of consumers under the model of source credibility. Based on literature review, it has shown that past studies have not researched credibility and the dimensions of source credibility when the endorser is such a special group of people (local farmers and village cadres). Additionally, mediation effects of credibility also have not been studied on Cunbo. Thus, the following hypotheses were made:

H4a: Credibility Cunbo e-commerce is positively associated with Purchase Intention (PI).

H4b: Credibility Cunbo e-commerce mediates the relationship between attractiveness of Cunbo live streamer influencer and purchase intention (PI).

H4c: Credibility Cunbo e-commerce mediates the relationship between trustworthiness of Cunbo live streamer influencer and purchase intention (PI).

H4d: Credibility Cunbo e-commerce mediates the relationship between expertise of Cunbo live streamer influencer and purchase intention (PI).

2.3.8 Paraoscial Relationship

The parasocial relationship theory, which has its origins in media studies and psychology, has described the reasons certain customers heed certain influencers' suggestions but not others (Horton & Wohl, 1956). The phrase "parasocial relationship" describes an intimate, one-sided relationship that a viewer develops over time with a media influencer or celebrity as a result of frequent interactions with the performance via mediated reality (Dibble et al., 2015). Because of its functional characteristics that increase viewer's contact with influencers through increased interactivity, online environments enhance the growth of parasocial interactions between audiences and influencers (Labrecque, 2014). In prior studies, researchers have found that parasocial relationship is highly associated with source credibility. A higher source credibility enhances the formation of a stronger parasocial relationship. For example, Rungruangjit (2022) investigates the relationship between parasocial relationships and purchase intention under the influence of celebrities' endorsement through live streaming commerce. These studies' results have told that parasocial relationship is highly positively associated with increasing consumer's purchase intentions. However, the endorsers in Cunbo is a special group. The endorser (or sellers) in Cunbo are always local farmers or village cadres. Previous research has not investigated the effect of parasocial relationship when these kinds of people (much closer to common people, instead of celebrities) are endorsers and to what degree the audience will form parasocial relationships with them. Thus, the following hypotheses were made:

H5a: Parasocial relationship (PR) is positively associated with Purchase Intention (PI).

H5b: Parasocial relationship (PR) mediates the relationship between attractiveness of Cunbo live streamer influencer and purchase intention (PI).

H5c: Parasocial relationship (PR) mediates the relationship between trustworthiness of Cunbo live streamer influencer and purchase intention (PI).

H5d: Parasocial relationship (PR) mediates the relationship between expertise of Cunbo live streamer influencer and purchase intention (PI).

3 Methods

3.1 Data Collection and Sample Characteristics

This research uses online questionnaire to explore customers' attitudes and online purchase behavior through Cunbo. Participants are Chinese online customers who have the experience watching Cunbo or purchasing agricultural products through Cunbo and have different education levels, and monthly incomes. Two filter questions were asked at the start of the poll to make sure that the participant was eligible. The following filter questions were posed to the participants: 1) Have you seen influencers (farmers) promote and sell agricultural products on any live-streaming platforms? 2) Have you purchased any agricultural products after watching their promotion? The participants who answer yes, which means they have relevant experience, can continue to answer the questionnaire.

The participant demographics are shown in percentage form in Table 1. Effective responses are collected by 302 participants with 143 males and 159 females. The concentration of their ages is between 18-37, which accounts for 76.82%. 88.41% of them have 1500-6000 monthly income.

Table 1 Demographics of Participant

Demographics	Frequency %
Gender	
Male	47.35
Female	52.65
Age	
≤17	2.98
18-20	17.88
23-27	21.85
28-32	19.54
33-37	17.55
38-42	9.6
43-47	8.28
>48	2.32
Monthly income	
Less than 1500 RMB	2.98
1501-3000 RMB	39.4
3001-4500 RMB	28.81
4501-6000 RMB	20.2
6000-7500 RMB	5.96
>7500 RMB	2.65
Frequency of purchasing agricultural products by e-commerce platform (Taobao, Meituan, Jingdong, etc.)	
never	0.33
sometimes	9.93
usually	64.57
always	25.17
Frequency of watching Cunbo	
sometimes	9.6
usually	58.61
always	31.79
The money spent on purchasing agricultural products through Cunbo (every month)	
<200 RMB	39.4
200-400 RMB	38.74
400-600 RMB	15.23
600-800RMB	3.97

800-1000 RMB	1.66
>1000 RMB	0.99
How many sellers(influencers) on Cunbo do you often follow?	
1-2	35.1
3-4	37.42
5-6	25.5
>7	1.99

3.2 Measures and Reliability Tests

Measures used in this study came from other studies. The constructs include attractiveness (ATT), trustworthiness (TRU), expertise (EXP), credibility (CRE), parasocial Relationship (PR), and purchase Intention (PI). All the characteristics ranges from 1 (Strongly disagree) to 7 (Strongly agree), were evaluated by using a seven-point Likert scale. A pilot test was conducted with 54 people to collect responses in order to pretest the reliability of the measurements. All measurement items should be preserved for the official reliability tests because the results of the pilot test did not show any reliability issues.

Cronbach's alpha, also known as tau-equivalent reliability, is a reliability coefficient that offers a mechanism to assess how reliable tests work on the inside. The dependability of variables on different scales is evaluated using this coefficient, which has a range of 0 to 1. Cronbach's alpha was employed to evaluate the consistency of the variables. With a minimum desired effect size of 0.7, Cronbach's alpha reaches an adequate reliability coefficient (Bujang et al., 2018). All of the effective responses to questionnaires were gathered in two months. Table 2 shows Cronbach's alpha value for each variable. According to the results, these all values were more than 0.7, which indicates that all of the variables' reliability is acceptable.

Table 2 Cronbach’s Alpha (α) of Each Variable

Variables	No. of Items	α
Attractiveness (ATT)	5	0.888
Trustworthiness (TRU)	5	0.887
Expertise (EXP)	5	0.866
Credibility (CRE)	5	0.859
Parasocial Relationship (PR)	5	0.857
Purchase Intention (PI)	5	0.865

3.3 Correlation Test

The r coefficient, often known as the correlation coefficient, measures the correlations between different variables. The correlation r number, which ranges from -1 to +1, can be either positive or negative to indicate a positive or negative correlation connection. It shows that the two variables are positively associated if the r value is between 0 and +1, or they are negatively associated if the value is negative. The correlation between two variables is stronger the closer the r value is near |1|.

Table 3 correlation analysis

Variables	ATT	TRU	EXP	CRE	PR	PI
ATT	1					
TRU	0.393**	1				
EXP	0.252**	0.340**	1			
CRE	0.271**	0.330**	0.419**	1		
PR	0.280**	0.457**	0.410**	0.408**	1	
PI	0.479**	0.470**	0.533**	0.524**	0.462**	1

**P<0.01. Correlation is significant at the 0.01 level (2-tailed).

*P<0.05. Correlation is significant at the 0.05 level (2-tailed).

The result of the correlation analysis between different variables are showed in table 3. The absolute magnitude of the observed correlation coefficient (two variables), which ranged from 0.90 to 1.00, will get a high correlation, according to the method of interpretation of a correlation coefficient described by Schober (2018). A significant correlation between the two variables is shown by a r value of between 0.7 and 0.89. A moderate correlation exists when the two variables' r values are between 0.4 and 0.69. Other values (<0.4) show no significant or negative correlation. Most variables in the data set have a modest association with other variables in this research.

4 Results

4.1 Evaluation of Measurement Results

This study uses regression model, a statistical method for examining the relationships between variables, to analyze. In most cases, the researcher aims to determine the relationship between one variable and another (Sykes, 1993). Mediation is the additional variable to the relationship between X and Y. A simple mediation model is showed in figure 1, In this model, X causes the mediator (M), and M causes Y, resulting in the relationship X→M→Y (MacKinnon, 2007). In the model that predicts M from X, a is the coefficient for X, while b and c' are respective coefficients that predicts Y from M and X. The product of a and b measures the indirect effect of X on Y via M, whereas c' measures the direct effect of X (Hayes, 2009).

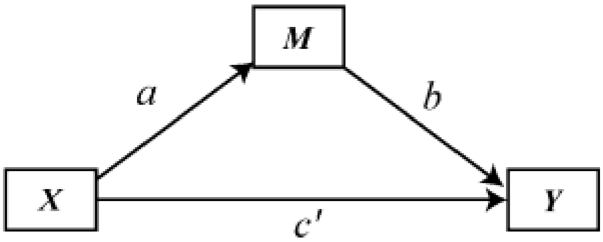


Figure 4 Mediation Model

In hypothesis model of this research, attractiveness (ATT), trustworthiness (TRU), expertise (EXP) are three independent variables that each is associated with purchase intention (PI). Credibility and parasocial relationship (PR) mediate the relationship between three independent variables (ATT, TRU, EXP) and purchase intention.

4.2 Hypothesis Analysis

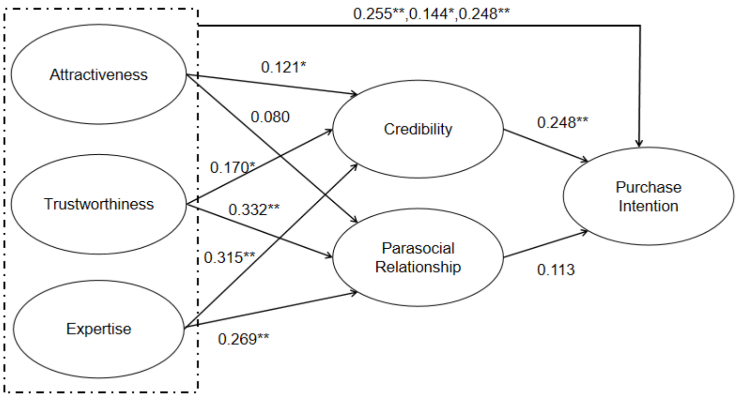
The finding based on structural model analysis is shown in Table 4. In H1a, $\beta = 0.121$, $p<0.05$, which indicates that attractiveness of Cunbo live streamer influencer is greatly positively associated with credibility of Cunbo e-commerce. Thus, H1a is supported. In H1b, $\beta = 0.08$, $p=0.136>0.05$, so H1b is rejected, which indicates that attractiveness of Cunbo live streamer influencer does not greatly affect parasocial relationship. In H1c, $\beta = 0.255$, $p<0.01$, hence H1c is supported so attractiveness of Cunbo live streamer influencer is greatly associated with purchase intention. In H2a, $\beta = 0.170$, $p<0.01$, so H2a is supported, which shows that trustworthiness of Cunbo live streamer influencer is significantly associated with credibility of Cunbo e-commerce. H2b, $\beta = 0.322$, $p<0.01$, so H2b is supported, which indicates that trustworthiness of Cunbo live streamer influencer is significantly associated with parasocial relationship. In H2c, β =0.144, $p<0.01$, so H2c is supported, which shows that trustworthiness of Cunbo live streamer influencer significantly impact purchase intention. In H3a, β =0.315, $p<0.01$, so H3a is supported, which means that expertise of Cunbo live streamer influencer significantly impact credibility of Cunbo e-commerce. In H3b, β =0.277, $p<0.01$, so H3b is supported, which shows that expertise of Cunbo live streamer influencer significantly impact parasocial relationship. In H3c, β =0.269, $p<0.01$, so H3c is supported, which means that expertise of Cunbo live streamer influencer significantly impact purchase intention. In H4a, β =0.248, $p<0.01$, so H4a is supported, which indicates that Credibility Cunbo e-commerce is positively associated with purchase intention. In H5a, β =0.113, $p=0.22>0.05$, so H5a is rejected, which indicates that parasocial relationship does not greatly affect purchase intention.

In table 6, conclusions based on hypothesis test result are shown.

Table 4. Hypothesis Analysis

Hypotheses	Path	Coefficient	*t* value	*p*-value
H1a	ATT→CRE	0.121	2.170	0.031*
H1b	ATT→PR	0.080	1.493	0.136
H1c	ATT→PI	0.255	5.683	0.000**
H2a	TRU→CRE	0.170	2.947	0.003**
H2b	TRU→PR	0.332	6.003	0.000**
H2c	TRU→PI	0.144	2.971	0.003**
H3a	EXP→CRE	0.315	6.047	0.000**
H3b	EXP→PR	0.277	5.267	0.000**
H3c	EXP→PI	0.269	5.718	0.000**
H4a	CRE→PI	0.248	5.269	0.000**
H5a	PR→PI	0.113	2.310	0.22

**P<0.01. Correlation is significant at the 0.01 level (2-tailed).
*P<0.05. Correlation is significant at the 0.05 level (2-tailed).



**P<0.01. Correlation is significant at the 0.01 level (2-tailed).

*P<0.05. Correlation is significant at the 0.05 level (2-tailed).

Figure 5 Result of hypothesized model

Table 5 shows the results of the mediation analysis of credibility (CRE) and parasocial relationship (PR), taken as the mediation factors between three independent variables (ATT, TRU, EXP) and purchase intention. The total, direct, and indirect impacts are computed by using SPSS 24 and Hayes Process Macro. The indirect effects via CRE and PR are significant because $p < 0.01$, showing that CRE and PR plays a mediation role between three independent variables (ATT, TRU, EXP) and purchase intention under Cunbo. The total effects of variables, like ATT→CRE→PI and ATT→PR→PI, may be the same due to their zero-order correlation with dependent variables, based on Alwin (1977).

In table 6, conclusion of hypothesis test results is demonstrated.

Table 5 Mediation analysis

Path	Effect	Coefficient	SE	*t* value	*p*-value	LLCI	ULCI
ATT→PI	Direct	0.3182	0.0409	7.7807	0.0000**	0.2377	0.3987
TRU→PI	Direct	0.2759	0.0460	5.9944	0.0000**	0.1853	0.3665
EXP→PI	Direct	0.3558	0.0464	7.6730	0.0000**	0.2645	0.3804
ATT→CRE→PI	Total	0.4195	0.0444	9.4404	0.0000**	0.3320	0.5069
ATT→PR→PI	Total	0.4195	0.0444	9.4404	0.0000**	0.3320	0.5069
TRU→CRE→PI	Total	0.3969	0.0431	9.2155	0.0000**	0.3132	0.4816
TRU→PR→PI	Total	0.3969	0.0431	9.2155	0.0000**	0.3132	0.4816
EXP→CRE→PI	Total	0.4987	0.0457	10.9168	0.0000**	0.4088	0.5332
EXP→PR→PI	Total	0.4987	0.0457	10.9168	0.0000**	0.4088	0.5332
Indirect effect	Effect	Coefficient	Boot SE	Boot LLCI		Boot LLCI	
ATT→CRE→PI	Indirect 1	0.1012	0.0335	0.0404		0.1719	
ATT→PR→PI	Indirect 2	0.0875	0.0289	0.0372		0.1503	
TRU→CRE→PI	Indirect 3	0.1154	0.0350	0.0544		0.1920	
TRU→PR→PI	Indirect 4	0.1210	0.0336	0.0630		0.1939	
EXP→CRE→PI	Indirect 5	0.1429	0.0356	0.0771		0.2169	
EXP→PR→PI	Indirect 6	0.1123	0.0327	0.0563		0.1841	

Table 6 Summary of Hypothesis

Hypothesis	Results
H1a: Attractiveness of Cunbo live streamer influencer is positively associated with credibility of Cunbo e-commerce.	Supported
H1b: Attractiveness of Cunbo live streamer influencer is positively associated with parasocial relationship.	Rejected
H1c: Attractiveness of Cunbo live streamer influencer is positively associated with purchase intention.	Supported
H2a: Trustworthiness of Cunbo live streamer influencer is positively associated with credibility of Cunbo e-commerce.	Supported
H2b: Trustworthiness of Cunbo live streamer influencer is positively associated with parasocial relationship.	Supported
H2c: Trustworthiness of Cunbo live streamer influencer is positively associated with purchase intention.	Supported
H3a: Expertise of Cunbo live streamer influencer is positively associated with credibility of Cunbo e-commerce.	Supported
H3b: Expertise of Cunbo live streamer influencer is positively associated parasocial relationship.	Supported
H3c: Expertise of Cunbo live streamer influencer is positively associated with purchase intention.	Supported
H4a: Credibility Cunbo e-commerce is positively associated with Purchase Intention.	Supported
H4b: Credibility Cunbo e-commerce mediates the relationship between attractiveness of Cunbo live streamer influencer and purchase intention.	Supported
H4c: Credibility Cunbo e-commerce mediates the relationship between trustworthiness of Cunbo live streamer influencer and purchase intention.	Supported
H4d: Credibility Cunbo e-commerce mediates the relationship between expertise of Cunbo live streamer influencer and purchase intention.	Supported
H5a: Parasocial relationship is positively associated with Purchase Intention .	Rejected
H5b: Parasocial relationship mediates the relationship between attractiveness of Cunbo live streamer influencer and purchase intention.	Supported
H5c: Parasocial relationship mediates the relationship between trustworthiness of Cunbo live streamer influencer and purchase intention.	Supported
H5d: Parasocial relationship mediates the relationship between expertise of Cunbo live streamer influencer and purchase intention.	Supported

Discussion

Cunbo is a new form of e-commerce in China, whose appearance attributes to the developed live streaming industry and Internet popularization. E-commerce is always a popular topic in research. Source credibility is critical for influencing consumers to create parasocial relationship in e-commerce, according to several research that have utilized the parasocial relationship theory to examine the relationship between parasocial relationships and sources (Rungruangjit, 2022). Nevertheless, most former studies have discussed the effects of celebrity endorsement, but few talk about the effects when endorsers are farmers and more ordinary people.

This paper aims to explore the effects of 3 elements (i.e., attractiveness, expertise, and trustworthiness) on Chinese consumer purchase intention through Cunbo. Meanwhile, this article considers credibility and parasocial relationship as two mediating variables to study their roles between 3 elements of source credibility and Chinese consumers' purchase intention. Consequently, the results of this study lead to a better understanding of the new burgeoning Cunbo. This study hopes to provide a basic understanding of Cunbo and provide some basic guidelines for influencers on Cunbo or relevant departments.

Conclusion

This study examines how Cunbo affects consumer's purchase intention by considering source credibility and parasocial relationship. Most hypotheses, except for H1b and H5a, have been supported based on the analysis of the result. It indicates that credibility can strengthen consumers' purchase intention through three dimensions (attractiveness, trustworthiness, expertise) of source credibility (Lu & Chen, 2021; Xiao & Chan, 2018; Rungruangjit, 2022), which is consistent with former research focusing on celebrity endorsers (Rahmi et al., 2017; Weismueller et al., 2020). An important finding is that parasocial relationship does not significantly affect purchase intention on Cunbo, which is inconsistent with form researches that focus on celebrity endorse effectiveness. Capland and Turner (2007) pointed out that consumers feel more confident giving their personal information while using live streaming commerce. Customers can create parasocial connections through live streaming commerce and reduce stress in real life. However, different social and cultural environments may led to different perceptions of the parasocial relationship.

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Acknowledgements

Theoretical Implications

This study confirms and builds upon other research findings, as well as presents a number of critical theoretical implications. Although e-commerce has been a popular area to research due to its rapid development and huge economic benefits, Cunbo is still a very new form of e-commerce, whose characteristic is that endorsers are always farmers, or more ordinary people, contrary to celebrity. Most studies have focused on celebrity's influences in e-commerce (eg. Rahmi, 2017; Rungruangjit, 2022; Weismueller, 2020;). This study focuses on the special endorser group and explores the effects of this group, which aims for developing new perspectives on farmer endorser effects.

Additionally, this research also discovers that parasocial relationship mediated the relationship between Cunbo influencer's qualities and consumer's purchase intentions when the parasocial relationship theory and the source credibility model were combined, which is consistent with former research that studied endorsement effectiveness when celebrity acts as endorser (Rungruangjit, 2022). Furthermore, it was discovered that endorsers' attractiveness and parasocial relationship might not directly influence consumers' purchase intentions. However, the results show that the parasocial relationship mediates the relationship between attractiveness of Cunbo live streamer influencer and purchase intention. Thus, in Cunbo, different from celebrity endorsement, it can be inferred that influencers in Cunbo must also be able to build parasocial connections with customers in addition to being attractive.

Managerial Implications

In China, it is easy to be an influencer on live streaming platforms. Moreover, the government has encouraged more and more farmers to participate in e-commerce because it greatly increases income level and boost the economic development (Tang et al., 2021). Thus, in the future, more farmers may choose Cunbo as an effective method to advertise and sell their products. Different from common live streaming commerce, Cunbo is still a new area. Compared with celebrities, endorsers in Cunbo are less skilled. However, as more and more people enter this area, it will keep on improving and standardizing. Long-term market competitiveness will finally move toward competition with online endorsers' skills. Even now, some farmers attract massive followers through their characteristics and skills, even can be regarded as celebrities. However, taking into account the characteristics of farmers, most of them have a relatively low level of education, and it is less possible for them to realize how most successfully advertise or sell their agricultural products on their own. Therefore, governments and relevant platforms should guide and teach them in some ways which aim to increase promotion efficiency, and this paper may provide some perspectives for them.

Moreover, consumers require influencers who can engage them in light-hearted and amiable dialogues, speak to them as if they are friends, and clearly and politely respond to their inquiries in the context of live streaming commerce, where goods are sold in real time (Rungruangjit,2022). As a result, parasocial relationships should be an important aspect to examine. Building solid parasocial relationships with customers can help influencers strengthen their buying intentions. During the interaction, the audiences ask questions about the products, and live streamers need to answer based on their expertise. As the result shows, expertise plays a vital role in increasing consumers' purchase intention. Therefore, influencers on Cunbo should increase their expertise in order to strengthen credibility and solidify parasocial relationships to enhance consumer’s purchase intention. Additionally, governments can help train farmers as a method of supporting.

Limitations and Future Research

There are certain restrictions on this study, which presents chances for more research. First, this study only focused on Chinese consumers; most participants are relatively young. Additionally, this study only focuses on agricultural products which are frequently sold in Cunbo without accounting for any specific goods information, including price or product category. Future research should thus identify product categories and pricing points in order to provide more precise results. Second, Taobao's "Cunbo plan" was officially launched in 2019, which indicates that it is a new and dynamic market. As more people enter this area, there could be a lot of potential changes in the Cunbo industry. Third, few farmers have attracted many followers through their characteristics and performance, even can be regarded as celebrities. This research does not accurately exclude this small group of the endorser. Some participants may consider them when filling the questionnaire. Thus, future studies should specifically exclude this type of endorser.

Fourth, the link between the respondents' demographic traits, which may operate as moderating variables affecting the present dependent variables, was not tested in this study. The demographic information is just used for determining reliable responses. For instance, the people who do not know Cunbo are excluded because it is impossible for them to make effective responses.

Additionally, the demographic data in Table 1 gives some information to comprehend the traits of the respondents. For instance, according to the demographic profile, people ages 18-37 make up the majority of the audience of Cunbo. Thus, future studies can examine age differences because age may also contribute greatly consumer’s attitude toward Cunbo.

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The Impact of Digital Supply Chain on the Pharmaceutical Industry Performance in the Post-Pandemic Era: A Case Study for JDL

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Abstract: The COVID-19 epidemic had a tremendous impact on both the worldwide economy and society, differing to varying degrees in major economies all over the world. This study investigates how disruptive technologies like digital technology affect JD Logistics' performance in pharmaceutical supply chains and to find out how JD Logistics used digital supply chain tactics during the COVID-19 epidemic and how it responded to the lessons learned in terms of innovation. Using multiple online resources, such as websites and blogs, that guide and review the solutions done by JD Logistics and other leading companies with case study analysis. The study includes both theoretical and practical insights regarding the deployment of the digital supply chain in the post-pandemic age. It is found that the supply chain service of resource network, operation standardization, quality compliance, and process visualization are essential to pharmaceutical logistics. This paper enhances the existing body of knowledge by outlining potential areas for future studies into how the management and performance of a firm with a pharmaceutical business are affected by the digital supply chain.

Keywords: Digital supply chain; JD Logistics; Smart logistics systems; Digital technologies; Post-pandemic; Industry 4.0

1 Introduction

1.1 Background of the Study

The unexpected and rare pandemic outbreak of COVID-19 in early 2020 had a ripple effect on the global economy and severely disrupted global supply chains (Queiroz et al., 2020; Verma & Gustafsson, 2020). With repeated outbreaks, the COVID-19 crisis has become the biggest threat to global stability. As part of efforts to prevent the spread of the virus, borders have been closed, and social distance measures have been taken, but at the same time, global supply chains have been severely disrupted, crippling world trade. The supply of products has been severely impacted. The effect of COVID on the production links of the worldwide supply chain is profound, especially the damage to raw materials. The shortage and deployment difficulties of critical materials will make it impossible for enterprises to carry out standard procurement and production. Sherman (2020) reported that as of February 21, 2020, 94% of Fortune 1000 companies experienced supply chain disruptions due to COVID-19. Massive layoffs and closings occurred in the weeks following the crisis, according to a survey of small businesses completed on April 4, 2020. (Bartik et al., 2020). Although the research on operations management has extensively researched supply chain management during emergencies, this catastrophe—one that affects nearly all industries across all nations—has not happened recently (Shen & Sun, 2021). Although some enterprises resume working smoothly, they are also faced with trans-regional logistics difficulties and other problems, which will inevitably have a profound impact on the regular supply of products. Supply chains are being made more resilient, collaborative, and networked in the wake of the COVID-19 pandemic (Harapko, 2021).

The COVID—19 pandemic has occurred at a time when the supply chain is undergoing a transition to Industry 4.0 (Frederico, 2021). This pandemic emphasizes changing traditional supply chain models, structured consumption models, and market digitization (Kilpatrick & Barter, 2020; Kim, 2020). A poll of supply chain executives revealed that 64 percent believe the epidemic will hasten the digital revolution (Harapko, 2021). Due to technological advances, supply chain design and operations have evolved into a data-driven, reconfigurable, and viable network approach (Moghaddam, 2017). Agrawal, Dutta, Kelly, and Millan (2021) have noted that Industry 4.0 technology has played an essential role in many companies' pandemic responses. Advanced technologies have dramatically transformed the current period, and digitalization can create new chances for businesses by enhancing the entire value chain (Kilimis, 2019). Still, the crisis has put further pressure on the future of digital operations. One of the key outcomes of the most advanced digital transformation is the visibility and transparency of the end-to-end supply chain established in leading technology companies (Dolgui and Ivanov, 2022).

1.2 Purpose of the Study

A substantial gap might be verified regarding the studies on the pharmaceutical supply chain, Industry 4.0, and COVID-19. Implementing disruptive technologies is critical to achieving faster and more resilient supply chains (Frederico, 2021). As disruptive technologies play an increasing role, understanding organizational performance in new decision settings is a crucial research area. However, findings also show that using technologies like RFID or AGVs includes technological and managerial challenges that call for project management, practical training session, and senior management engagement (Baker and Halim, 2007; Papadopoulos et al., 2011). Further research is needed to consolidate the emerging digital supply chain field's theoretical foundation (Ivanov and Dolgui, 2020). A new survey from McKinsey (Agrawal, Dutta, Kelly, and Millán, 2021) suggests that companies that had already implemented digital technologies have fared better during the pandemic. At the same time, few cases are studying the pharmaceutical supply chain. Studying the numerous causes of uncertainty in this situation is essential, as is figuring out how businesses should react in such a continually changing environment (Cohen & Lee, 2020). Companies are under increasing pressure to discover innovative methods to generate significantly and provide it to their consumers in the world of global competition today (Alesiuniene et al., 2021). It is also simple to think that the pharmaceutical supply chain may be falling behind in adopting digital technologies due in part to the challenge of integrating strategies that have been successfully used in other industries (Beaulieu et al., 2020; Su et al., 2011). In pandemic conditions like COVID-19, which we explore next, these peculiar problems with pharmaceutical supply networks are amplified. Therefore, studying the impact of the digital supply chain on pharmaceutical logistics can help more companies reduce the risks in the trend of the normalized pandemic era.

This study differs from previous ones in the following aspects. First, our analysis offers pertinent insights into how businesses should respond to long-term crises by outlining the unique features of JD Logistics' pharmaceutical logistics and its operational systems, strategies, and performance throughout the pandemic. In addition, different from other studies based on the global epidemic, this study will pay more attention to the background of China's standard epidemic prevention policies and the measures enterprises can take when the outbreak comes.

Given the importance of digital transformation, the research questions are as follows:

RQ1: How has the digital supply chain affected pharmaceutical logistics?

RQ2: Which digital technologies are primarily used in the pharmaceutical industry?

RQ3: How should companies address long-term disruptions?

This study aimed to identify future research topics related to the impact of digital supply chains on medical logistics management and performance. The remainder of this research is organized as follows. In Section 2, we reviewed the related literature, including digital supply chain, pharmaceutical logistics, and the impact of COVID-19 on the behaviors of both companies and customers. In Section 3, we introduced standard digital technologies using an umbrella review and the formation of JD Logistics with details about information systems using the case study method. Before we discuss the practical strategies companies can take in the future, in Section 4, we analyzed the issues we found based on the systematic review of previous studies and the challenges that JD Logistics is facing. Finally, the main conclusion and recommendations are discussed and summarized in Section 5.

The analysis encompasses practical insights into the digital supply chain and its implementation in the post-pandemic era.

2 Literature Review

2.1 Industry 4.0

The digitization needed by Industry 4.0 has captured the attention of corporate executives and policymakers across the nation since the term "Industry 4.0" was first popularized in 2011. (Ghobakhloo, 2018; Nascimento et al., 2019). Industry 4.0 is the transformation of manufacturing through the incorporation of new technologies such as artificial intelligence, cloud computing (Adel, 2022), analytics, the Internet of Things (IoT) (Ageron et al., 2020), and machine learning (Shen & Sun, 2021) into production facilities and whole operations (What is Industry 4.0 and how does it work?). It was previously thought that Industry 4.0 would be the digital era, but this idea has evolved over the last few years (Xu et al., 2018). Academic, governmental, and commercial partners frequently describe Industry 4.0 as the digitalization and smartening of manufacturing facilities (Kang et al., 2016), production lines, and value chain participants (Liao et al., 2017; Qu et al., 2019). The development of digital technology has ushered in a new productive paradigm (Ehie and Ferreira, 2019). The manufacturing and supply of goods and services may be fueled by merging documentation from many sources and places, thanks to digital technology (Mussomeli et al., 2018). In the Industry 4.0 world, cloud computing systems, advanced robots, and intelligent technologies (Adel, 2022) engage with each other and the ecosystem to share information and eventually decide with hardly any human involvement (Gilchrist, 2016). Industry 4.0 aims to overcome the difficulties of escalating production complexity brought on by elements including escalating inter-firm competition, a range of products, and satisfying the individualized wants of clients (Brecher, Muller, Dassen, and Storms, 2021). By guaranteeing real-time visibility of manufacturing assets through analysis of production operations data to produce better value for businesses, Industry 4.0 delivers unprecedented visibility, and insight from previously isolated information (What is Industry 4.0 and how does it work?). Advancement in SCM is a crucial component for firms to obtain new prospects and sustain their competitiveness in today's business circumstances (Kunrath et al., 2022). Those technologies invented through Industry 4.0 might be used to enhance the historical advantages of supply chain management, such as highly individualized manufacturing and real-time coordination of internal and external data flows (Buyuko ̈zkan and Go ̈cer, 2018; Zangiacomi et al., 2020).

2.2 The Supply Chain and Digitalization

Supply chains should be viewed as having a close relationship to business operations where inputs are transformed into outputs of positive magnitude (Tsipoulanidis & Nanos, 2022). Studies from Christopher (1999) mentioned that a supply chain is a group of entities that organizes purchasing, manufacturing, and distribution operations from gathering resources down to delivering goods or services to add value for the ultimate consumer. SCM is associated with optimizing the supplier network and including suppliers in the product design and manufacturing processes, according to the standpoint of procurement and supply management (Lamming, 1993; Krause, 2007). Supply chain executives must contend with ever-changing market situations, emerging global marketplaces, and highly competitive conditions as global markets develop (Mehra & Agrawal, 2003; Mehra & Inman, 2004). Many supply chain integration solutions have been proposed since the early 1970s, including enterprise resource planning (ERP) (Beaulieu & Bentahar, 2021), distribution resource planning (DRP) (Ho, 1992), and electronic data exchange (EDI) (Poirier and Reiter, 1996; Bentahar et al., 2016).

The digital supply chain refers to a variety of advanced digital technology (What is a digital supply chain? — reciprocity, 2022; Beaulieu et al., 2020), including long-standing ones like EDI and electronic lists as well as more modern examples like virtualization, the Internet of Things, big data analytics (Raghupathi & Raghupathi, 2014), and blockchain (Chang et al., 2019), and artificial intelligence (Dossou et al., 2021; Ehie and Ferreira, 2019). Innovations in technological tools provide the ground for the digital revolution (Queiroz et al., 2019; Wang and Wang, 2020). For example, due to the utilization of cloud computing, the business has seen a lot of good transformation (Gupta et al., 2022). Because there are cloud options available and there is much competition, the expense is also reasonable. As a result, it is simpler and less expensive (Nagarajan & Minu, 2018) than traditional data-storing techniques (Gupta et al., 2022). The government and businesses will prioritize this since logistics companies with solid innovation in supply chains have shown proficiency in quick delivery and reaction during the epidemic (Liu et al., 2022). Digital supply chains help companies make real-time predictions and suggested actions by integrating internal systems and data with external information (What is a digital supply chain? — reciprocity, 2022). The outbreak of COVID-19 has made it difficult for traditional supply chains to meet the needs of merchants and customers. The digital supply chain realizes end-to-end digitization from companies to market, a new trend in industry 4.0 development.

2.3 Pharmaceutical Industry and Logistics

The complex procedures, activities, and businesses engaged in creating, producing, and distributing pharmaceuticals are referred to as the pharmaceutical industry (Shah, 2004). High R&D expenditures, stringent quality requirements, prolonged manufacturing durations, high recycle ratios, and shortened product cycles are its defining characteristics. All these factors can boost sales margins along the pharmaceutical supply chain (A. Narayana et al., 2014). To generate long-term value for investors, Beaulieu et al. (2020) define the management of the supply chain in the pharmaceutical sector as the strategy implementation and digital innovation of the entire supply chain of volumes, together with patients, materials, cosmetic and pharmaceutical materials, laundry products, food service, and recycling. Many factors, including stakeholders' attitudes, will affect providers. Due to the distinctive nature of its goods and the complexity of its market interests, the pharmaceutical business has become one of the most dynamic and challenging industries (Tripathi, Talukder, and Rangarajan, 2021). Also, logistics for the pharmaceutical industry has a different standard compared to other products. It has a set of joint procurement but needs to maintain the quality of medicine during transportation (Gizaw, Bogale, and Gudeta, 2021).

There are several ways to interpret the word "logistics." Logistics is the foundation of any manufacturing or marketing business (Lavassani et al., 2008). How the items are supplied to the final consumer affects the corporate's quality (Alesiuniene et al., 2021). Merchandise and resource movement from the producer or supplier to their ultimate consumers and the flow of items from the input materials stage down to the end-user are all involved in the entire value chain (Alesiuniene et al., 2021; Bertodo, 2002). Many seriously affected logistics businesses have become counterproductive and have been combined or had their integrated companies because of the stagnated market and other effects brought on by the pandemic (Liu et al., 2022). Digitization of logistics is very feasible, especially in emerging countries like India (Burroughs & Burroughs, 2020); this sector depends heavily on traditional procedures, which results in resource and time waste and, ultimately, dissatisfied consumers (Gupta et al., 2022). Numerous scholars have used numerical simulations to analyze the supply chain of pharmaceuticals from an operational research paradigm (Feibert et al., 2017). For instance, to enhance batch sizes and timeliness (Dobson, Tilson, & Tilson, 2015), to decrease quality control and quality waste (Tilson, Dobson, Haas, & Tilson, 2014), and to manage the supply chain's complexity because of the market for health products is unexpected. Dimensions must be considered (Jurado et al., 2016).

2.4 The impact of COVID-19 on Customers and Organizational Behavior

The supply chain breakdown and the epidemic's spread among the populace occur simultaneously (Ivanov, 2020). People play crucial roles in the supply chain as employees and buyers of goods (Hald & Coslugeanu, 2021). The outbreak and related measures have profoundly changed customers' behavior (Sheth, 2020). Since the COVID-19 pandemic, people have opted to buy needs via e-commerce platforms to minimize personal interaction (Liu et al., 2022). Consumer expenditure in Denmark decreased by 27% in the seven weeks after the lockdowns, according to Andersen et al. (2020). There are new expectations because of this unique situation. For instance, the request for shipping and delivery services has significantly expanded because of extensive social distancing policies (Gray, 2020).

For many pharmaceutical enterprises, the traditional pharmaceutical production and marketing chain has many levels, difficult quality control, and a complex interest chain, resulting in the high cost and low timeliness of medicine in the circulation link. With the deepening of its layout in the pharmaceutical field, JD Logistics is becoming increasingly popular in the traditional medicine industry with its solid pharmaceutical business supply chain capability. According to JD's management, the company has undergone organizational and technological reform to establish effective connections with other businesses, which promotes more excellent order to achieve business objectives (Liu et al., 2020). As a group of early social logistics enterprises involved in pharmaceutical logistics, JD logistics, through infrastructure layout and integrated supply chain service advantage, strives to build resource network, operation standardization, quality compliance, and process visualization of supply chain services to provide the most value in pharmaceutical circulation field of supply chain solutions.

2.5 Total Quality Management

The goal of total quality management (TQM) (Feibert et al., 2017), which focuses on constant improvement, is to continuously improve people, communities, and organizations (Kanji & Asher, 1993; Miller, 1995). Although supply chain management (SCM) ideas have received much attention lately, there are frequently limited views between them and the viewpoint of quality management (Kushuwaha & Barman, 2010). However, over the past ten years, businesses have realized that they must not only continuously enhance their products' quality and cater to the wants of their local clients but also compete effectively in rapidly evolving international marketplaces (Kushuwaha & Barman, 2010). The groundbreaking method of total quality management (TQM) is for good operation (AHIRE et al., 2009). Researchers consider TQM a management system (Keng-Boon, 2009) made up of principles, practices, and equipment that attempts to improve the customer experience while using fewer expenses (Klefsjö et al., 2001). Most explanations of TQM begin with ideals like putting the customer first, putting the process first, basing choices on facts, letting everyone be committed, improving continually, and leadership commitment (Ahmadi & Helms, 1995). These principles help define leadership style. Effective TQM adoption might result in several direct and indirect advantages, including optimized staff motivation, a more robust market landscape, enhanced efficiency, and better cost management (Chen et al., 2004). The TQM methodologies and tools that Chen et al. (2004) used to implement TQM in a medical and pharmaceutical logistics (Marinkovic et al., 2016) company are discussed in this case study. It also examines the sales department's merging and development during the execution phase in response to stating the significance of hiring quality personnel (Chen et al., 2004). Professionals must have the techniques to work on the procedure and monitor the program's performance and the current accomplishment level effectively and efficiently (Kanji & Asher, 1996).

2.6 Theoretical Framework

Supply chain operations reference model (SCOR)

The Supply Chain Council developed the SCOR framework to help simplify the language used to describe Supply Chain management by dividing it into four processes: planning, sourcing, making and delivering (Prakash and Sandeep, 2013). The SCOR model is a critical framework that includes supply chain management techniques, business process reengineering, and a supply chain measurement instrument (Ntabe et al., 2015). The technology environment has changed fast in recent years, but the most famous models measure single metrics by examining the entire supply chain (Cetinkaya et al., 2011). By connecting corporate operations to a cohesive structure, SCOR, according to Haider and Mohailan (2020), offers a distinctive framework for comprehending supply chain models and enhances the efficacy of supply chain management and related supply chain improvement initiatives. This model is divided into two parts. The first section oversees analyzing supply chain operations using models and schematics, and the second section produces critical metrics for these processes (Lepori and Bollecker, 2018). Utilizing the SCOR model's assessment methods enables firms to implement management practices that guarantee customer happiness, boost delivery flexibility, improve product dependability, and cut costs (Minculete and Olar, 2018). SCOR approves the building block approach and provides full traceability (Saleheen, Habib, and Hanafi, 2018). SCOR outlines program types and arranges them to meet the requirements of the supply chain.

3 Method

Researchers frequently employ the systematic review, which incorporates a repeatable scientific procedure (Tranfield et al., 2003). However, in our study, we decided to undertake an umbrella review to integrate universal and particular implications thoroughly. At the same time, we used a qualitative case study method in line with previous latest studies, considering platform building has often been motivated by the marketplace and experience rather than theories. Case study research is regarded as a reliable way to find contextual information that is practically applicable (Wu and Choi, 2005). Given that this project is exploratory, case study research gave us more flexibility to adjust to the conditions and language utilized in other businesses (Yin, 2009). To discover its broad characteristics, we want to explain the realistic environment of the digital supply chain paradigm in pharmaceutical logistics through the case of companies in this part. Secondary data, in particular the firms' websites, was used to gather the information needed for the leveraging.

3.1 Identification of a Literature Review

Periodic reviews of the literature on the pharmaceutical supply chain have yielded a lot. Utilizing this information will speed up the process of finding digitalization technologies that might be used in the supply chain. Instead of doing a brand-new comprehensive literature study, we draw on prior observations. We used the following keywords to find publications in this field of study: digitalization, supply chain, and pharmaceutical. We investigated through the Web of Science, one of the unrivaled breadths of world-class research literature linked to a rigorously selected core of journals to ensure the quality of our literature reviews.

The search for the articles was based on the following keywords: medical, pharmaceutical, and digital supply chain. We also excluded several articles that focus on pharmaceutical materials, chemistry, sustainable medicines, planning production, 3D printing, and reports that are unrelated to us. After reviewing and analyzing all the studies we found, 24 articles were reserved to illustrate our thinking.

It is worth noting that these articles are all related to supply chain management, although some publications mainly introduce other concepts such as coping strategies, system design, and lean principles. These articles may be limited in their design development, but that does not mean they are irrelevant to supply chains.

3.2 Case Study for JD Logistics

JD Logistics is an outstanding supply chain solutions and logistics services provider in China (Company profile. JD Logistics). According to its official website (Company profile. JD Logistics, n.d.), with more than 190,000 commercial clients and services for fast-moving consumer goods, clothing, furniture, home appliances, 3C, automobiles, and fresh food, JD Logistics climbed to the position of largest effective supply chain logistics network in China by 2020. Online e-commerce platforms now work more closely with a range of sectors because of the pandemic, and they serve as a crucial observation point for how the epidemic is affecting the supply chain (Shen and Sun, 2021). JD Group still achieved good performance during the outbreak with the advantage of self-established logistics.

3.2.1 Formation of JD Logistics Service Quality

China was late in developing its logistics industry. Despite recent strong growth, there is still tremendous opportunity for service performance advancement and a significant disparity compared to wealthy nations (Yang, 2021). One of the obstacles preventing China's logistics from developing is the caliber of the services provided in the field of logistics. For JD.com, there are two main distribution modes: self-run logistics and cooperation with third-party logistics. JD.com ran "23 Asia No.1" logistics parks, the most significant and innovative distribution units in Asia (Galea-Pace, 2020). They are the most extensive and automated fulfillment facilities of any e-commerce firm in the world, and the company has a network of 600 warehouses totaling 15 million square meters (Galea-Pace, 2020). Also, JD Logistics announced its partnership with third-party logistics companies ahead of the Double 11 online shopping festival in 2019. Since JD Logistics is attempting to diversify and now only takes orders placed on JD.com platforms, the decision could assist it in generating additional charges from outside sources (Li & Yuan, 2019). It will also make it possible for JD Logistics, which had a long history of losses until turning a profit this year, to fight effectively with other logistics businesses (Li & Yuan, 2019). During the epidemic, various delivery endpoint types were employed. JD.com debuted its first "mini shipping station" last year (Shen & Sun, 2021). Only a small number of items were stored and transported at this station, and the shipping and pickup services required strict personal protection equipment (Shen & Sun, 2021). Throughout the services, remote tracking was utilized. According to research by Shen & Sun (2021), the contactless delivery method performed effectively. Despite the high number of orders placed during the pandemic, JD.com's adaptable offerings allowed for a lower-than-usual percentage of consumer complaints (Shen & Sun, 2021).

3.2.2 Formation of JD pharmaceutical business

Based on a report made by one of JD’s employees, Yang (2021), pharmaceutical e-commerce can serve consumers anytime and anywhere they require medicine, thanks to the integration of online and offline activities and the availability of last-mile shipping solutions on the market. According to Yang (2021), JD.com has seen that its growth in a variety of areas, such as full-category expansion, omnichannel operations, medical services, and more, is a proactive reaction to the shifting demands of consumers in China. As Zhang (2022) mentioned, with “more than 15% of China's pharmaceutical retail sector”, JD has established itself as the country's top pharmacy retailer. To create the largest and most comprehensive e-commerce environment in the sector, JD's pharmaceutical business has further expanded to include “B2C (Business-to-Consumer), B2B (Business-to-Business), and O2O (Online-to-Offline) transactions” (Zhang, 2022). JD is also simultaneously utilizing its statewide distribution network, which reaches 99% of China's population, to ensure medicine delivery to those residing in the country's outlying regions (Zhang, 2022). As a critical component of JD Health's B2C business, JD Pharmacy has grown to reach China's leading pharmaceutical e-commerce platform, with a growth rate that is four times faster than China's industry average (Zhang, 2022). Zhang (2022) figures out that JD launched its B2B business in addition to its B2C operations by creating a network to purchase pharmaceuticals named "JD Pharmaceutical Procurement" to enhance the effectiveness of existing methods for data distribution and raise informational transparency. In addition, Zhang (2022) said JD also created a multichannel medication delivery solution in collaboration with offline shops to increase the commercial gain for clinics while offering patients quick access to medications. Customers may use the platform to submit purchases with neighboring clinics based on geographical locations, and the business guarantees that the medicines will be delivered within 30 minutes (Zhang, 2022).

3.2.3 Smart logistics platforms and technical support of JD Logistics

Supply chains grow more complicated and customers more demanding as e-commerce becomes more widespread. As a result, an increasing number of businesses, like JD.com, are looking to technology to aid in the more effective management of their supply chains. Through the intelligent platform, JD Logistics gives demand-side and supply-side sustainability parties more influence (Chan et al., 2018). JD.com has constantly invested in digitization to reduce costs and enhance service quality. To develop a distinctive core competency for JD Group, the Qinglong software platform of JD Logistics depends on a quick and effective logistics distribution network (Li & Zhong, 2021). Each JD Group user's transaction processing procedure relies on a collection of sophisticated logistical systems that JD refers to as "Qinglong" (Li & Zhong, 2021). To accomplish feedback controller monitoring, JD Logistics has a team linked with clients and vendors at the institutional level (Liu et al., 2020). JD.com successfully manages logistical tasks, including warehousing, shipping, distribution, and sorting, with the help of this collection of systems.

Quality control platform

JD.com has exacting standards for product quality. The quality management system monitors and gathers on-site aberrant data, such as transportation inefficiencies during the execution of the company process, to prevent harm brought on by shipping (Li & Zhong, 2021). Its self-developed "Commodity quality Management system" can use many transactions and review data, perform a risk assessment and screening of the goods on sale, and proactively find potential quality risks. JD’s quality management system will be different attributes of the quality problem stratification, and then according to the severity of the problem classification; At the same time, the system monitors the whole process of goods, records the information of goods at each node, and can be accountable to suppliers and even producers. The quality control system guarantees prompt detection of aberrant deliveries while providing excellent assurance to lower shipping costs (Li & Zhong, 2021).

Waybill and routing system

The routing system of JD.com can provide an evaluation standard for the operation efficiency of the logistics network based on the practical operation of the logistics network. At the same time, it can be collected by the downstream-specific data processing system and finally aggregated into logistics information that can be queried and counted for logistics customer service, front-line personnel, and network planning. According to Li & Zhong (2021), the waybill system also offers assistive technologies like the resolution platform and the ability to contact it for external inquiry features like progress and payment options.

Monitor and JIT system

In the warehousing and production process, JD.com implements the JIT production mode. All users' orders will be released at the appropriate time, packed, sorted, and delivered, and the goods will be delivered according to the promised time to customers. JIT systems divide orders into waves to affect warehouse production and distribution. JIT orders have a concept of priority. The higher the priority, the earlier the warehouse production and delivery. The Qinglong system provides a hierarchical installation strategy, thus opening the option for worldwide monitoring to assist leaders and managers in the final choice (Li & Zhong, 2021). Managers and supervisors may keep track of each area's operational state in real-time and make prompt general preparations based on how efficiently each connection works (Li & Zhong, 2021).

4 Results

4.1 Technology Trend of Industry 4.0 in the Pharmaceutical Industry

The ability to reduce production costs, enhance product quality while boosting operating profits via growing industry shares, planning a project that better serve customers, and gain a tactical advantage that enhances all company's operations are functionality that digitalization enhances (Ehie & Ferreira, 2019). The technology trends in the pharmaceutical industry are identified in blockchain and the internet of things (IoT), according to the literature reviews in the methodology. Although the publications from the existing literature will serve as the foundation of our discussion, we will also reference additional sources that support the proposed effort.

Blockchain is an innovation with many uses, including cryptocurrencies, financial institutions, risk management, and social and government assistance (Bamakan et al., 2020). It offers a couple of different ledgers that are digitally accessible to every network member, allowing them to monitor and confirm transaction-related data, resulting in most sectors being interested in it (Abbas et al., 2020). The preceding block's hash value is included in each new block. As a result, all blocks are connected by their codes. Consequently, whenever a block's information is changed, its hash code alters, and all subsequent blocks must be modified (Bamakan et al., 2020). It is the ideal choice for managing and safeguarding the pharmaceutical medication supply chain process.

The Internet of Things is particularly effective in detecting heat in real-time in the pharmaceutical and biotechnology sectors (Bamakan et al., 2020). It provides the opportunity to remain updated with rules, lower operational waste costs through exchanges, and locate items promptly at any phase (Balachandar and Chinnaiyan 2020). All items will have recognition, sensing, connecting, and computational power thanks to the IoT ecosystem, enabling them to communicate and exchange data with one another and create cutting-edge services online (Dossou et al., 2021). On the other hand, the organizational system will have to handle a vast number of data produced by these tracking apps, which might result in additional expenses for buying and subscribing to local databases.

Table 2

Research technologies resulting from the list of publications on pharmaceutical supply chain

Authors	**Blockchain**	**Internet of Things (IoT)**
Argiyantari et al. (2020)		
Saeed et al. (2022)		
Bamakan et al. (2021)	x	
Marnnolejo-Saucedo & JA (2020)		
Kumar et al. (2022)		
Munir et al. (2022)		
Musamih et al. (2021)	x	
Ertz et al. (2022)		
Harrington et al. (2017)		
Raijada et al. (2021)		
Sarkis et al. (2021)		x
Singh et al. (2020)		
Erokhin et al. (2020)	x	x
Sigley & Powell (2022)	x	
Park & KM (2021)	x	
Parvathi et al. (2022)		
Velmovitsky et al. (2021)	x	
Mackey & Cuomo (2020)	x	
Jiao et al. (2022)	x	
Alkhoori et al. (2021)		x

Tan et al. (2020)	x	
Virgolici et al. (2022)	x	

4.2 Identified issues from previous studies

The difficulties that pharmaceutical logistics will face over the coming years have been emphasized. The papers suggested for this special issue add to the body of knowledge on medical logistics. A greater understanding of logistics concerns on SCM approaches, including upgrading process, quality control, distribution network design, and performance in this context, is provided through global case studies.

Martin Beaulieu, Omar Bentahar, and Smail Benzidia's *"The Evolution of Healthcare Logistics: The Canadian Experience"* offer the chance to examine the history of pharmaceutical logistics and try to identify the crucial developmental trends to the long-term viability of healthcare delivery systems. Researchers interviewed top executives of the advanced infrastructure departments of several institutions to emphasize the role of logistics in medical groups before and after transformation, with more than ten interviews (Beaulieu et al., 2020). When introducing various information systems, the respondents emphasized the difficulty of harmonizing the different logistical procedures left over from the previous architecture (Beaulieu et al., 2020). The research also made clear that to enhance practices in data processing and transportation performance assessment, it would be necessary to integrate emerging innovations like big data analytics and artificial intelligence as well as more customer and coordinated information management systems (Beaulieu et al., 2020).

The difficulty facing medical systems worldwide is rising expenditures brought on by an aging population and more advanced therapies (OECD, 2015). Patients also call for affordable, high-quality healthcare (Feibert et al., 2017). In their article *"Benchmarking healthcare logistics processes a comparative case study of Danish and US hospitals,"* **Diana Cordes Feibert, Bjørn Andersen & Peter Jacobsen** listed several considerations pertinent for developing and measuring processes available to executives in medical logistics as part of the study's contribution to the scant research on assessing in medical logistics. The comparative case study explores various case studies at five Danish hospitals and two case studies at a US hospital. It was determined that the "output quality, consistency, employee engagement, probability of errors, and security of supply" were the five most crucial decision factors.

Vimal Kumar, Kyaw Zay Ya, and Kuei-Kuei Lai, in their paper *"Mapping the key challenges and managing the opportunities in supply chain distribution during COVID-19: a case of Myanmar pharmaceutical company,"* recognizes the significant supply chain issues and oversee the possibilities that this pharmaceutical firm implemented. The study used a case study plus interviews with managers to create a thorough linkage to evaluate subordinates to reduce uncertainty. The upper main issues have been listed as being the influence of legal factors, postponement in the migration of data, poor online service, limited awareness of how to use the digital channel, poor knowledge exchange on the website by staff members, and communication processes from higher leadership to tactical level," in both.

4.3 Challenges for JD Logistics

As an e-commerce giant, JD's most outstanding ability is its logistics capability. Its entry into the Internet medical field will likely start from pharmaceutical e-commerce. However, the effectiveness of drugs and devices is higher than the current logistics system of JD, and there are still many problems and challenges to be solved.

First, the uncertainty of demand planning. According to the 2021 annual report, JD Logistics was listed as a critical enterprise of COVID-19 vaccine transportation by the Ministry of Transport in 2021, responsible for the vaccine distribution business in Beijing, and gradually carried out several vaccine transportation cooperation projects. In addition, JD Logistics has also become the general warehouse and logistics service provider of athletes' food materials for international sports events, providing integrated logistics services such as procurement, storage, transit, and cold chain logistics distribution.

Second, the hardware and software facilities are not complete. According to the interim report for JD Logistics, until June 30, 2022, JD Logistics operates more than 30 dedicated medicines and medical device warehouses with a functional area of more than 200,000 square meters. In addition to the shortage of infrastructures such as transportation and storage, the lack of information technology and management level is also an important reason for the backward development of logistics hardware. Third-party logistics also needs to actively carry out work and cultivate talents to develop and strengthen themselves; Unfortunately, JD Logistics has significant investment and advanced infrastructure but has not reached a certain level in management and other aspects.

Lastly, industry competition increases risks. According to the company's prospectus, by the first half of 2020, JD Health's self-operated business pharmaceutical sales revenue accounted for 29 percent, and non-medical revenue accounted for 71 percent. The upward growth rate of JD health medicine revenue is due to prescription outflow, procurement with quantity, category adjustment dosage forms that are not convenient for online sales are put into e-commerce, C2M OEM products are expected to be online in the future as more basic medicines join the collective purchase, and prescription outflow accelerates. There is still room for improvement in medicine growth. JD Logistics' main competitors in the pharmaceutical e-commerce field include, but are not limited to, retail pharmaceutical companies and companies providing online medical and health services. These companies also have advantages in technology, research and development, marketing, distribution, retail, and other resources. They may have a long history of operation, a more extensive user base, or broader and deeper market coverage. JDL's competitors may respond more quickly and effectively to new opportunities, technologies, standards, or user needs and be able to cope with or withstand significant regulatory changes and industry evolution.

5 Conclusions

5.1 Conclusion

Our analysis also creates new avenues for investigating pharmaceutical logistics and advancement tactics. First, there are not many literature reviews on the pharmaceutical logistics supply chain since the epidemic, and there are few studies on China's unique conditions. Through analyzing the current literature review and the strategies of the leading logistics company JD Logistics, our research innovatively puts forward the technology that pharmaceutical logistics can invest heavily in the future. In addition, based on the original big data technology, we proposed a more meaningful and influential blockchain concept.

In the battle against COVID, the critical role of emergency logistics, medical logistics, and so on has become increasingly prominent. It can be expected that strengthening logistics infrastructure construction will become an important direction in the future. The first is the research and application of new technologies, especially blockchain, big data, cloud computing, and other technologies. Blockchain technology can ensure that the transaction data in the supply chain is not tampered with, effectively solving the security problem of credit data, especially for the entire transaction process can be effectively recorded and can reduce medical risks. With blockchain, customer records may remain secure and private while receiving high-quality care at a relatively affordable price (Bamakan, et al., 2020). Big data and cloud computing can carry out a risk assessment, risk warning, risk pricing, quantification, and visualization for financing enterprises. The vendor can best explain the client's needs and tailor the deployed platform for specific workflows owing to big data tools and methodologies (Morawiec & Soltysik-Piorunkiewicz, 2022). The second is the innovation of the medicine supply chain mode. In the process of pharmaceutical circulation, drug quality, drug safety, and drug traceability are all essential areas closely related to the innovation of drug circulation supply chain mode and government supervision. As the country pushes forward the separation of pharmaceutical industries and vigorously builds a public health system, the supply chain finance platform built by medical institutions is also gradually landing.

5.2 Implications

5.2.1 Theoretical Implications

This paper makes a theoretical contribution to research on pharmaceutical logistics. Firstly, there is a trend of intellectual development in pharmaceutical logistics. Informatization is the critical factor for the successful expansion and reduction of management costs of pharmaceutical circulation enterprises and the most basic support for better and faster response to customers. To better reduce the pharmaceutical logistics distribution cost, we must rely on applying the new technology of the Internet. Warehouse management, transportation management, temperature control supervision, positioning management, and other processes need to use more advanced information technology to help fresh e-commerce to achieve safety traceability, quality can be monitored, and order information can be tracked. Intelligent pharmaceutical logistics should be realized through the application of big data, the Internet of things, and other technologies, which will significantly improve the efficiency of logistics distribution and better manage and control the whole logistics distribution.

Secondly, the pharmaceutical logistics market maintains rapid development, and evidence of the pharmaceutical market space is enormous. It also reflects the characteristics of medicine as a sunrise industry, and the current market pharmaceutical logistics mixed, market, brand, etc., have not yet integrated. The pharmaceutical logistics field is mainly led and guided by policies to guide the development of the industry. With the implementation of various approaches, the pharmaceutical circulation links are compressed, and the gross profit is gradually reduced. The leading enterprises have also implemented lean logistics management to reduce costs, increase efficiency, and improve competitiveness. It is necessary to work for the sustainable development of each enterprise to build an exemplary medical logistics distribution system.

5.2.2 Managerial Implications

The findings of this research provide managerial implications for companies that are doing pharmaceutical logistics business. The sudden outbreak of COVID-19 in early 2020 deepened the public's understanding of the importance of developing pharmaceutical logistics. Upgrading of information technology, emergency management system, supply chain innovation, and Internet Plus has become the focus of national construction and development. Against everyday epidemic prevention and control, the informatization construction of the pharmaceutical logistics industry makes it possible to reduce costs and increase logistics efficiency, drug traceability, pharmaceutical e-commerce, and other model innovations. The informatization of pharmaceutical logistics is the main direction of the development of pharmaceutical logistics in the future.

The application of information technology in pharmaceutical logistics is mainly reflected in the realization of multi-code coexistence, which can be checked in place, can be traced in an area, the establishment of a medicine information traceability system, in addition to the uncrewed vehicle, unmanned warehouse, and other advanced technologies, to create a standardized, standardized, technical smart pharmaceutical logistics.

In the future, from the perspective of the Chinese environment, the internet plus is still the development direction of the industry. The strategy intends to incorporate digital technology to advance the financial sector, enhance people's quality of life, and even change governmental operations (Wang et al., 2016). According to Wang et al. (2016), Internet Plus will significantly advance over the coming years and transform China's industrialization and entrepreneurial framework. Although the policies of China's pharmaceutical e-commerce industry may be repeated, the general direction is relatively specific: The Internet Plus is the opportunity to develop the pharmaceutical circulation industry. The epidemic has brought about changes in new business models in the distribution field. Future medical e-commerce should include online transactions among enterprises in the medical circulation link and the retail drugs and the online retail of pharmaceutical circulation enterprises to consumers. Therefore, a perfect logistics distribution system is indispensable.

5.3 Limitations and Future Research

This study has certain limitations, which present chances for further research. Even though the analysis was carried out with meticulous integrity, another research has to be done. Although our research object is JD Logistics, due to the confidentiality of the data, we cannot release its specific data in the field of pharmaceutical logistics. No further evaluation can demonstrate the validity and dependability of the solutions. Thus, recommendations on logistics performance are made solely on archival research.

The corporation should do more studies to confirm the viability of the solutions suggested from the standpoint of logistics management. JD Logistics should put the suggestions into practice for the operators and assess the results to compare them to prior performance. I can state that excellent logistics management may raise process efficiency in the pharmaceutical business while providing the same contribution if total operator quality of services is offered.

Exceptional case management should also be the focus of future studies. The existing system and procedure still don't have a soundtrack and trace feature to identify lost or misplaced products. The time spent on anomalous cases is considered a profitability loss and should be reduced or eliminated.

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Analysis of the financial attitudes of men and women in Hungary

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Abstract: Many studies examine the role of attitudes to money in determining an individual's financial management and financial well-being. Attitudes towards money play a crucial role in the life of adults when they finish high school, begin to leave their homes, or prepare to start a family. Our society prepares women and men for partly different roles, which gives rise to differences in behavior towards personal and family finances. The article presents the results of a Hungarian research that explores the financial attitudes of women and men using the money attitudes questionnaire published by Lay and Furnham (2018). Convenience sampling of 212 people was applied, and the questionnaire included the following dimensions: achievement and success, saving concerns, mindful and responsible, power and status, and financial literacy concerns. We suggested two hypotheses. First, women would score higher than men in the dimension of saving concerns. Second, men would score higher than women in achievement and success dimension. As a result of the research, both hypotheses were confirmed and the correlations between the dimensions, and the relationships between each dimension and salary were analyzed.

Keywords: money; financial attitude; gender; saving; spending

1 Introduction

Attitudes towards money play a crucial role in the life of adults when they finish high school, begin to leave their homes, or prepare to start a family. Compared to men, starting a family is a greater burden for women, on average they start working later and earn less during their careers, they live longer, but they do not have adequate pensions or survivorship attitudes (Chen and Volpe, 2002). According to some research, women face more challenges in financial management (Anthes and Most, 2000; Timmermann, 2000).

Many factors shape a person’s attitude to and behavior concerning money. Several studies have reported a relationship between money attitudes and levels of financial problems (Hayhoe & Wilhelm, 1998; Lea et al., 1995) and financial satisfaction

(Tang, 1995; Wilhelm, Varese, & Friedrich, 1993) among adults. Over the past three decades, various measures of attitudes to money have been developed (Furnham et al, 2015). There are studies which have found differences in money attitudes between the genders, cultures, education levels, political and religious values. Usually, men tend to associate money with achievement, power, and freedom more than women, who are more inclined to see money as a source of anxiety, as well as associate money with retention and budgeting. According to Lay and Furnham (2018), four clear factors can be identified based on previous studies in the area: Achievement and Success; Savings Issues; Power and Status; Security and Safety. They added one concept, Financial Literacy Worries that refers to being relatively ignorant about financial events and processes which can have a significant impact on one's future.

2 Research and methodology

To assess the financial attitudes in a sample of women and men, we used the Money Attitudes Questionnaire published by Lay and Furnham (2018). The questionnaire was translated into Hungarian based on the authors' publication. Based on the findings of previous research, we suggested two hypotheses:

- H1: Women in the sample would score higher than men in the dimension of Savings Concerns.
- H2: Men in the sample would score higher than women in the dimension Achievement and Success.

Convenience sampling was applied and the questionnaire including the five dimensions mentioned above has been filled in by 212 people. Participants were asked to answer demographic questions concerning their gender, age, and monthly net income, and to provide the level how much they agree with statements covering typical opinions and concerns about personal finance. (Table 1) We used an 8-point Likert scale ranging from 1 that meant the respondent strongly disagrees, to 8 that meant the respondent strongly agrees with the statement.

Table 1
Dimensions of the Money Attitudes Questionnaire and statements related to the dimensions

Dimension	Statement
Achievement and Success	Money is a really good indicator of a person’s life achievements and success.
	One of the best measures of success in life is how much money you have earned.
	Earning a lot of money is one of the best achievements in life.
	Being rich is a sign of a great achievement. Money really talks: it talks about your status in life.
	You need money to buy the good things in life.
Savings Concerns	I never seem to have enough money. I have a real fear of running out of money.
	The amount of money that I have saved is never quite enough.
	I constantly worry about how few savings I have. I seem to worry more than most people about money.
	I am really concerned about whether I have enough money saved.
Mindful and Responsible	I am pretty good at budgeting.
	I am really proud of my ability to save money.
	I am much more of a saver than a spender. It is very important for me to save money for a rainy day.
	I keep a close track of my money affairs.
	I pay bills immediately to avoid interest and penalties.
Power and Status	I enjoy buying expensive products to impress others.
	I am quite happy to let people know how much money I have.
	I show off to people with the brand name products I have bought.
	I am happy to use money to persuade people to help me.
	I am proud of my financial “victories” and tell people about them
Financial Literacy Worries	I feel foolish and embarrassed talking about many money issues.
	I wished that I understood financial affairs better than I do.
	I feel anxious and defensive when talking about my personal finances.
	I really don’t understand financial talk and jargon.
	Even thinking about my money makes me anxious.

Source: own editing based on Lay and Furnham (2018)

The statements for first factor of *Achievement and Success* suggest the idea that money is an evident and comparable sign of achievement of a person, and money is a measure of success. The second group of statements was *Savings Concerns* expressing various thoughts about money being a source of stress, focusing mainly on not having enough of it. The third dimension of *Mindful and Responsible* relates to the fact that people used to think of saved money as a form of protection against the ups and downs of life. Dimension of *Power and Status* involved five statements concerning the notion that money is a major source of social status and people admire those who have enough money. The last dimension was *Financial Literacy Worries*, which implies that a main source of anxiety for individuals is the limited knowledge of financial issues.

2.1 Socio-Demographic Attributes of the Sample

In the sample 43 percent of respondents were men and 57 percent were women, which means that the gender distribution can be considered relatively proportional. We have enough respondents from each gender group to conduct the analysis. (Figure 1)

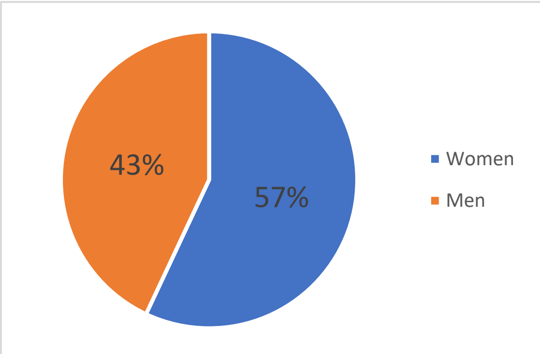

Figure 1
Gender distribution of the sample

The average age in the sample was 36.11 years, with a standard deviation of 10.09. The average age of the women in the sample was 36.58 years, with a standard deviation of 10.18 years. Female respondents belonging to the X generation, born between 1965 and 1979, represented a total of 43 people and 36 percent of the respondents. Another 45 people or 37 percent were born between 1980 and 1994. Finally, there were a total of 33 Generation Z women in the sample, who were born between 1995 and 2004. (Figure 2) The average age of male respondents was 35.49 years; with a standard deviation of 10.05 years. Among them 30 persons or 33 percent of the male respondents were members of the X generation. 36 persons or 39 percent of the respondents were members of the Y generation, and 26 persons or 28 percent of the male respondents, belonged to the Z generation. (Figure 3)

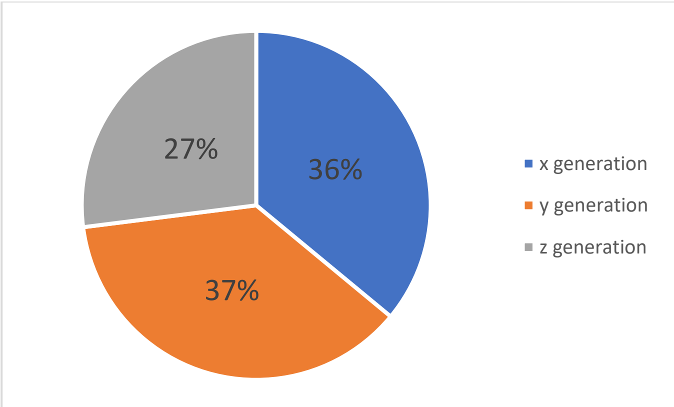

Figure 2
Female respondents by generation

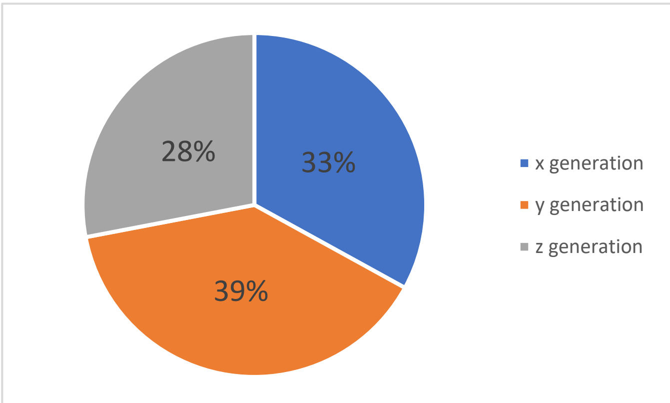

Figure 3
Male respondents by generation

3 Results

Our first hypothesis suggesting that women achieve a higher average in the dimension Savings Concerns can be considered true based on the Figure 4. There was a correlation between scoring higher in the dimensions Achievement and Success and Power and Status. The coefficient of correlation in this case was 0.7. There was no correlation between the dimensions Achievement and Success and Savings Concerns: the correlation coefficient in this case was 0.03. Therefore, we can state that those who judged money as an indicator of success were less likely to worry about their savings. The second hypothesis was that men would score higher in the dimension of Achievement and Success. This hypothesis also was confirmed, because the average value in this dimension was higher for men than for women.

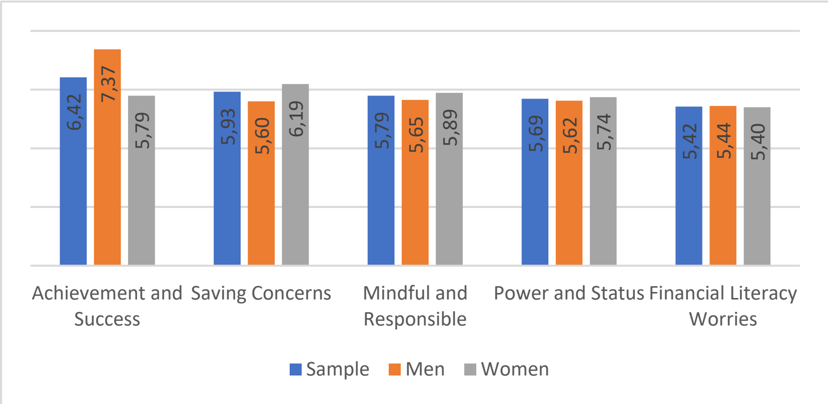

Figure 4

The average of the respondents' values in each dimension (N=212)

3.1 Net earnings

According to the 2020 data of the Hungarian Central Statistical Office, the average salary in Hungary was HUF 268,405. Within this, the average salary of women was HUF 246,053, and that of men was HUF 292,553. The average net salary of the sample was 362,073, higher than the national average, which may be due to age and qualifications. Within this, the women in the sample earned HUF 355,602 on average, while the men earned HUF 370,487.

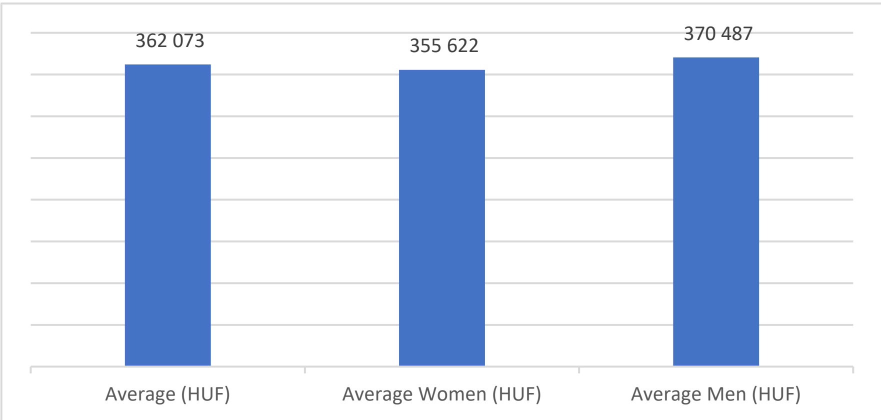

Figure 5

Net average earnings in the sample

We analyzed the correlation between responses and the respondents' net earnings. (Figure 6) Those individuals in the sample whose average earnings were higher scored higher in the dimensions Achievement and Success, and Power and Status. Men with higher average earnings scored higher in the dimension Power and Status than women. There is a weak relationship between earnings and Savings Concerns, although the more men earned, the less worried they were about their savings, while the more women earned, the more worried they were, although the correlation coefficient of the whole sample was almost 0. The Mindful and Responsible dimension for women shows some correlation with earnings, while it is much weaker in case of men.

Figure 6
Correlation between each dimension and the respondents' average net earnings

Conclusion

The current study aimed to explore the financial attitudes of women and men using a money attitudes questionnaire including the following dimensions: Achievement and Success, Saving Concerns, Mindful and Responsible, Power and Status, and Financial Literacy Concerns. The sampling method was convenience sampling, and the number of respondents was 212. Therefore, the results of the study can only be applied to the sample, which is one of the limitations of the findings.

The first hypothesis was that women would achieve a higher average in the dimension Savings Concerns, which can be considered true. The average of men's responses was 5.6; while the average of women's answers was 6.19; therefore, on average, women gave a value that was about 10 percent higher. The second hypothesis was that men would achieve a higher value in the dimension of Achievement and Success. This hypothesis also was confirmed, because the average value in this dimension was 7.37 for men, and 5.79 for women. Therefore, on average, men's score was about 20 percent higher than that of women.

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Explore the Impact of Cold Chain Logistics Distribution Service Quality on Customer Satisfaction of Fresh Food E-commerce Platform—A Case of Alibaba Hema Fresh

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Abstract: With the enhancement of people's living standards and consumption level, the demand for a variety of food products increases, and the demand for frozen food increases rapidly. Numerous fresh retail e-commerce platforms have emerged, and the online shopping mode of multi-frequency and small batches becomes more popular among people. Therefore, to ensure the quality of fresh products, the requirements for cold chain distribution logistics are constantly increasing. However, there are still a series of problems in China's cold chain logistics distribution system, and the quality of logistics service needs to be improved to meet the needs of the public and improve their satisfaction. This paper takes Hema Fresh as an example which provides a new retail format and uses the questionnaire to explore the relationship between customer satisfaction towards Hema distribution logistics services quality which helps to know the logistics factors that have the greatest impact on customer satisfaction. The results show that timeliness is the most concerning problem for consumers at present. Thus, this paper puts forward targeted strategies to improve the problem of cold change logistics of food retailers so it can provide better service for customers, customers can receive fresh food faster and better, and their overall happiness in life can be improved. At the same time, it also optimizes the cold chain distribution service of e-commerce and reduces the waste of fresh products. It also provides valuable insights into the cold chain logistics distribution industry in China.

Keywords: Cold chain logistics; E-commerce; Fresh food; Logistics service quality; Hema Fresh

1 Introduction

1.1 Background of the Study

With the rapid development of the fresh food e-commerce industry, the national government is also issuing relevant support policies and opinions. In 2014, guiding opinions issued by the CPC Central Committee and The State Council proposed “strengthening the construction of e-commerce platform for agricultural products” (The Central People's Government of the People's Republic of China, 2014), which further promotes the overall development of fresh food e-commerce. Subsequently, several large companies have established large retail e-commerce platforms to provide users with online procurement of fresh food and agricultural products, and other services, bringing great convenience to people's life. One of the most representative retailers is Hema Fresh, a subsidiary of Alibaba.

Despite the support of the government, it is not easy to get a foothold in this new fresh food e-commerce industry. One of the key factors to success in this industry is cold chain logistics distribution service. The impact of cold chain logistics delivery service quality on customer satisfaction and loyalty as well as potential customers is a crucial issue to be explored for those e-commerce companies to gain an edge.

With the increase in domestic consumption level and the rapid development of fresh food e-commerce, customers gradually make higher and higher requirements for the quality of logistics distribution services (Limbourg et al., 2016). For logistics distribution service quality contains a variety of factors, such as timeliness, order accuracy (Kamble et al., 2021). There are many factors to measure the quality of logistics. Some factors have a large impact on customer satisfaction, while others have a small impact, so the identification and evaluation of the importance degree of all factors is an important step to optimize the cold chain logistics distribution service.

It is necessary to know that due to the particularity of fresh products, the development of fresh food e-commerce is greatly restricted by many factors such as difficult storage, easy loss, and high logistics costs (Wenji. 2021). So, how to keep fresh food fresh is the biggest problem fresh food e-commerce companies face in the process of transportation, and China’s cold chain logistics lags far behind that of developed countries (Cai, 2019). Statistics reveal that despite the requirement for refrigeration, only 15% of fresh agricultural products are transported in China under refrigerated conditions, in addition, in the logistics stages such as picking, transportation and storage, the loss rate reaches 25% to 30% (Cai, 2019). Therefore, cold chain logistics distribution service seriously restricts the customer experience and sustainable development of fresh food e-commerce enterprises.

At present, scholars at home and abroad have built different theoretical models to help manage the cold chain logistics to improve efficiency and customer satisfaction, but there is relatively little theoretical knowledge about the management of cold chain in fresh food e-commerce, and there is also a lack of analysis of actual cases in China.

This research will explore the different influence degrees of different factors, take Hema Fresh as an example, use the theoretical knowledge to analyze and evaluate it, and put forward the optimization strategy for the fresh food e-commerce distribution system.

1.2 Purpose of the Study

The online fresh food platform is a new field and develops fast these years (Hong et al., 2019). But there are still some deficiencies because of the particularity of fresh food such as difficult storage and easy loss, cold chain logistics cannot deliver them completely undamaged (Wenji. 2021), while customers put forward higher and higher requirements for cold chain logistics (Limbourg et al., 2016). So, it is important to know what cold chain logistics service quality factors affect those customers most.

Although there have been relevant discussions in domestic (Dai et al., 2020) and foreign (Huma et al., 2019) research, few of them take fresh food e-commerce platforms such as Hema as the research object.

This research aims to analyze which distribution service quality factors are most important and how to improve cold chain logistics delivery services to better meet the needs of customers from the perspective of local enterprises in China.

1.3 Research Objectives

1.3.1 To Analyze the Impact of Cold Chain Logistics Distribution Service Quality on Customer Satisfaction

There are many factors that affect customer satisfaction in logistics distribution, such as timeliness, synchronization of information in logistics tracking, completeness of logistics, condition of goods. Different factors have different degrees of influence on customer satisfaction. Identifying and evaluating the importance of all factors is a significant link to optimizing logistics distribution services.

1.3.2 The Attraction of Delivery Range to the Potential Customers

As Hema's current delivery range is within three kilometers of its stores, off-line delivery services will not be available in areas beyond that range (Jin et al., 2021). Although this strategy can improve efficiency and ensure the consumption quality of some customers, Hema will lose a large part of potential customers due to the insufficient intensity of stores. This study will explore the impact of expanding the delivery range on existing customers and potential customers, whether it will attract more potential customers, and whether it will reduce the loyalty of existing customers.

1.4 Significance of the Study

1.4.1 For Academic Knowledge

Reviewing the existing academic knowledge about the impact of logistics service quality on customer satisfaction, it is not difficult to find that there are few articles focusing on the distribution link in the cold chain logistics (Zhang et al., 2020). This research can fill the current academic gap. In addition, it is difficult to analyze the results with these two things because customer satisfaction is a concept that is difficult to be measured, and everyone's satisfaction is affected by many different factors with different degrees of influence. This research is devoted to quantifying customers' satisfaction with the cold chain logistics distribution service quality, so it will be convenient for analysis, and that subjective problem can be more easily presented in an objective form and the relationship between them can be better understood.

1.4.2 For the Customers

For Hema online users, better logistics service quality like shorter delivery time is helpful for customers to get fresh ingredients more quickly, obtain the best taste, and improve the quality of life and efficiency. Sitting at home or on the way home from work, they can place an order immediately and get what they need in a short time when they get home. At the same time, providing better service for online orders can reduce the sense of crowding in stores and provide a better user experience for offline users.

1.4.3 For the Company

It helps Hema company to provide higher quality service and distribution efficiency, and better understand what their customers need.

By improving the cold chain logistics service quality, the company can get more potential customers to become real customers, and increase sales.

With the above improvement targets, the company can improve its reputation and popularity to a greater extent, improve customer satisfaction and loyalty, increase sales volume, improve profit margin, improve the core competitiveness, and make it gain a foothold in the fiercely competitive market.

1.5 Theoretical Framework

1.5.1 Logistics Service Quality (LSQ)

LSQ is a model which includes various dimensions such as information quality, ordering procedures, order release quantities, timeliness, order accuracy, order quality, order condition, order discrepancy handling and personal contact quality (Kamble et al., 2011).

For different industries, the requirements for logistics are different. For example, this research focuses on the fresh food industry and it must have different needs from other ordinary industries. Due to the particularity of fresh products, easy loss, transportation difficulties and other characteristics, the requirements of logistics timeliness must be higher. This research will explore the proportion of Hema's customers' requirements on the above 9 indicators, and find out the more important influencing factors, to improve Hema's logistics and distribution system more targeted, so as to improve customer satisfaction.

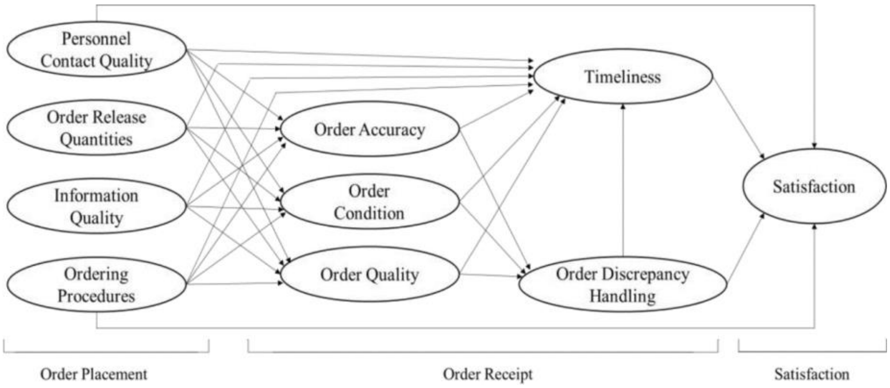

Figure 1

LSQ & customer saticfaction

1.6 Case Profile

The cold chain is a supply chain with perishable products that must be stored and transported under a specific range of temperature and humidity conditions (Bogataj et al., 2005).

China now is the country that produces the most perishable fruits and vegetables worldwide (Zhao et al., 2018). China cold chain infrastructure is incomplete (Zhao et al., 2018).

In China, many fresh food e-commerce platforms use cold chain logistics transportation. Hema mentioned in this article is one of them which started its business in January 2016 (Wang & Coe, 2021). The business, which is owned by Alibaba Group Holding LTD, pioneers an integrated online and offline retail strategy that enables users to order things online from retailers or restaurants in their area for quick delivery — in some circumstances, within as little as 30 minutes after placing the order (Hu et al., 2022). Hema had opened 341 stores, as of July 8, 2021 in China (Jin et al., 2021), and far outperform long-standing rivals such as Wal-Mart in terms of store sales (Wang & Coe, 2021). But Hema still has problems in some parts of the supply chain that needs to improve.

2 Literature Review

2.1 Fresh Food E-Commerce Platform in China

Fresh agricultural products e-commerce refers to using the Internet to sell fresh products like fruits and vegetables, seafood, aquatic products, cooked food, and meat products. The need for fresh food is rising as social economy and living standards grow. Fresh food e-commerce offers several benefits and has progressively grown to be a necessary component of everyone's convenient life. (Lingyu et al., 2019). For instance, consumers can get fresh food directly from the Internet without leaving their homes to visit the farmer's market or the grocery store.

The fresh food e-commerce market began to develop in 2012, and after 2014, the development of the fresh food e-commerce market also ushered in a new situation.

In the realm of e-commerce, fresh food e-commerce is described as the new "blue ocean." The volume of national fresh food e-commerce transactions reached 13 billion yuan in 2013 and 26 billion yuan in 2014, according to the monitoring data from China Electronic Commerce Research Center. Comparing 2014 to 2013, there was a 100% increase. A new high of 56 billion was attained in 2015. In 2018, it is estimated to generate 128.3 billion. Major Chinese e-commerce enterprises have frequently taken actions to raise investment, driven by the strong market. But fresh food e-commerce is still in a less than optimal state of growth. In China, there were more than 4,000 fresh e-commerce suppliers as of 2016, however just 1% of them were profitable, 4% were flat, 88% were in the red, and the remaining 8% suffered significant losses. (Bai & Guo, 2017).

The existing state of cold chain logistics development is primarily limiting the quick expansion of fresh food e-commerce. Only with the rapid development of fresh cold chain logistics can consumers really rest assured to buy fresh goods from the e-commerce platform, thereby promoting the rapid development of fresh food e-commerce.

Major e-commerce platforms such as JD.com, Alibaba, Amazon, and Suning Supermarket, as well as traditional corporate giants, have also seized the fresh food e-commerce market (Liu & Walsh, 2019).

Fresh food e-commerce is mainly divided into different modes such as vertical B2C, comprehensive B2C and e-commerce platforms. SF Express, No. 1 Orchard, Jingdong Fresh Channel and Tmall Mall are typical representatives (Zhang, 2016).

2.2 Cold Chain Logistics—Fresh Food E-Commerce Platform in China

The development of cold chain logistics was born under the demand of the fresh food e-commerce market. In order to prevent product deterioration during shipping, storage, and other chain links prior to product sales, a supply chain system known as "cold chain logistics" places products in a low temperature environment. (Wang, 2022). The logistics of the cold chain and the e-commerce of fresh foods are therefore closely related.

In recent years, although cold chain logistics in Chinese fresh food e-commerce market has achieved certain development, it is undeniable that there are also drawbacks and problems in this process. Among them, the unscientific distribution mode of cold chain logistics is one of the problems.

The randomization of fresh products in critical links including packing, transportation, storage, and distribution is caused by the lack of standardization of cold chain logistics in the e-commerce context. Lack of regulation and poor corporate governance, and the infrastructure are seriously insufficient, and the infrastructure such as refrigerated trucks and refrigerated containers is far from being able to keep up with the rapid growth of e-commerce. Cold chain logistics has relatively high requirements for talents. However, the majority of professionals in our nation did not obtain the proper cold chain logistics training prior to work, and many of them made the switch from ordinary logistics companies to cold chain logistics without any intermediate steps. They lack the corresponding professional knowledge and skills, resulting in a generally low service level in the cold chain logistics industry (Bai & Guo, 2017).

In addition, the lack of a cold chain logistics distribution center further causes problems such as unscientific transportation and distribution route planning, which greatly wastes transportation time, makes it difficult to improve work efficiency, and increases costs. More seriously, it may cause customers of dissatisfaction.

2.3 Theoretical Framework

2.3.1 Logistics Service Quality

Initially, Professor Smackie's 7RS theory advanced the idea of logistics service quality. Delivering the appropriate items to the appropriate consumer at the appropriate price, via the appropriate shipping method, at the appropriate time, and at the appropriate address is the theory's simple summary. The 7RS theory summarizes the key nodes in the logistics service process. With the diversification of logistics operation modes and the rise of customized services, the definition of logistics service quality is constantly enriched, and logistics service quality covers more and more elements (Bienstock et al., 2008).

Since the 1960s, the research direction of the development of logistics service quality has undergone different changes. From the 1960s to the 1980s, the research on logistics service quality started from the definition represented by the 7R theory, to the definition of logistics service quality as the marketing direction represented by La Londe and Zinzez, and then to the definition represented by Mentzes. Scholars define logistics as the two main directions of marketing and distribution, and they are more completely defined by Tenessee University in the United States. Scales have been studied since the late 1980s. The most representative ones are

SERVQUAL scale and LSQ scale, which are also two scales recognized by academic circles. By the 1990s, the emphasis of logistics service quality study has gradually changed to include the viewpoint of customer satisfaction. Through research, we found that for different customers and different marketing and distribution models, the logistics service quality model will be different (Mentzer et al., 2001).

2.3.2 Service Quality and Customer Satisfaction

Customer satisfaction and service quality are theoretically distinct but closely connected notions (Sureshchandar et al., 2002).

Current research has emphasized the above premises from various perspectives, taking into account various elements of service quality and customer satisfaction and designing various models in order to shed more light on the distinctiveness of the service quality and customer satisfaction structure, as well as the relationship between them. According to existing researches, overall service quality has a considerable beneficial impact on overall customer satisfaction (Afthanorhan et al., 2019). As a result, they are truly independent, and their bond is strong.

2.3.3 Fresh Food E-Commerce Platforms' Logistics Distribution & Customer Satisfaction

Customers view logistics service as a crucial criterion for evaluating the dependability of fresh food e-commerce, and there is a strong link between the performance of e-commerce in direct sales of fresh goods and the quality of logistics service. (Hong et al., 2019).

People are concerned about the quality of services and products in the fresh food e-commerce area in the context of the new era, so the platform must adhere to customer-centricity, whether before or after the sale, to enhance user stickiness, thereby increasing buyers repurchase rate and increase corporate profits. One of the aspects influencing a consumer's decision to repurchase or consume something is customer satisfaction, which will directly affect customers' loyalty to the platform. When customer satisfaction reaches a certain high value, customer loyalty will also become very high.

Liu Xinyi and Gao Zhiping believe that the quality of fresh agricultural products, brand image, e-commerce platform, and logistics and distribution are positively affecting customer satisfaction (Liu & Kao, 2022). Fresh e-commerce provides customers with a safe, convenient, and diversified purchasing platform, which not only solves the problem of customers' daily purchasing needs, but also saves a lot of purchasing time and physical exertion for customers.

According to Ye and Chen's investigation and research, due to the particularity of fresh products, customers place great importance on the arrival time of fresh products and the quality of the products when they receive them after placing an order. If the delivery service is not in place, it will cause the loss of goods, leading to bad customer experience and affecting customers' willingness to repeat purchases and customer loyalty (Ye & Chen, 2020).

From this, enhancing customer satisfaction and loyalty, ensuring the quality of fresh products, and improving the distribution services of e-commerce platforms are the most essential points.

2.3.4 Hema Fresh Cold Chain Logistics

In the field of online fresh food sales, Hema is one of the top retailers.

Hema employs a model of store-warehouse integration, and both offline stores and orders placed through online platforms count toward sales. At the same time, Hema debuted a brand-new retail concept that mixes fresh groceries and catering together. The majority of traditional fresh food e-commerce businesses, such Tmall Fresh and JD Fresh, use the Internet to deliver fresh goods to customers via e-commerce warehouses and other conventional rapid delivery methods. Following the user's order, transportation typically takes 1-2 days. It is hard to ensure the quality of those fresh food in this mode and shipping is slow (Liu & Kao, 2022). Hema's unique retail model, which is superior to conventional fresh e-commerce in that it fully utilizes the role of physical storefronts, enhances the customer experience, and increases the availability of fresh goods.

Jin et al. (2021) proposed in Problems and Development Strategies of Freshippo's Fresh Product Supply Chains that Hema's logistics model is an innovative B2C logistics. The author studies and analyzes Hema's cold chain operation structure and advantages and disadvantages through visits, such as insufficient logistics supervision. The distribution of inventory space is unreasonable, and it is concentrated in the first-tier cities and other problems, and proposes an improvement plan for it, to draw lessons from it.

Due to the natural characteristics of perishable and high-water content of fresh agricultural products, there are extremely high requirements for fresh-keeping storage and logistics distribution. Different fresh agricultural products require different temperature ranges for refrigeration and preservation during transportation to ensure product quality (Liu, 2016).

However, Chinese cold chain logistics technology was developed relatively late compared with other countries, and its base is fragile. So far, a complete and autonomous cold chain logistics infrastructure has not yet been established in China, so it is impossible to ensure that most of the fresh agricultural products will be carried out under cold chain conditions as it is being transported. The similar problem is also being faced by Hema's cold chain logistics technology because Hema has not been around for a very long period; although Hema has alleviated it by building its own warehouse, it is difficult to monitor the entire logistics chain, and it is unavoidable to adversely affect the quality of fresh agricultural products due to the improper operation of transport personnel (Jin et al., 2021).

According to the available literature, there are a fair number of research on China's cold chain logistics, and both the benefits and drawbacks of China's fresh food e-commerce are also analyzed in place. There are also corresponding literatures to explain the current situation and advantages and disadvantages of Hema. But there is little targeted analysis, such as which of Hema's delivery services affects customer satisfaction and how, and how platforms like Hema can improve. For the shortcomings of the current research, this paper will do further research and analysis.

3 Research Method

3.1 Research Methodology

Based on relevant research on the cold chain industry (Ashok et al., 2017; Shashi et al., 2020), this paper uses the survey research approach to investigate the satisfaction of Hema Fresh users of different ages and incomes towards Hema logistics service quality. Since China's cold chain logistics is still in the development stage, there are still many deficiencies in the logistics system (Zhao et al., 2018). Although Hema Fresh already has a certain status in the fresh food retail industry, there are still cases of dissatisfied customers, and some logistical problems still need to be resolved (Feng & Zhu, 2019). This paper will take Hema as an example. As a relatively typical Chinese retail e-commerce company, Hema is highly representative. Analyzing such successful enterprise will be helpful for the cold chain system to improve for reference.

3.2 Data Collection and Analysis

This study adopts the survey research approach, and all the data come from the results of the questionnaire survey.

3.2.1 Design of the Questionnaire

Through the second chapter, the evaluation model of cold chain logistics service quality for fresh products on e-commerce platform is preliminarily determined. In this chapter, the data will be collected by questionnaires, and then exploratory analysis will be carried out on the data.

The formal questionnaire is divided into three parts: the first part is the collection of personal information including gender, age, city of residence, income, and other items. The second part is some general questions about Hema Fresh. The third part is related to the consumers' evaluation of the fresh product cold chain logistics service quality of Hema e-commerce platform. Nine dimensions and forty-five indicators in terms of personnel communication quality, information quality, product accuracy rate, timeliness, etc. are contained in the third part. Among them, in terms of satisfaction with the fresh food delivery platform, the questionnaire uses a 7-point Likert scale (1~7 is an evaluation dimension ranging from very dissatisfied to very satisfied to measure the respondents' perception of the fresh products of

Hema e-commerce platform). The respondent are customers from all social classes and age groups. The content of the final questionnaire is detailed in Appendix B.

3.2.2 Distribution and collection of questionnaires

Online questionnaires are made from the official website of WJX.cn and are distributed randomly through social network platforms such as email, QQ, WeChat groups, and Microblog. A total of 124 valid questionnaires are collected eventually after screening and evaluating conscientiously. The main targets are residents in first- and second-tier cities who have used Hema.

3.2.3 Statistical Analysis of Questionnaire Sample Data

Part 1: Demographic Questions:

Part 1 illustrates demographic information in detail. Including 60 males and 64 females, the male-female ratio is relatively balanced, making it more in line with the actual situation of shopping. Among the people surveyed, there are 47 people aged 19-28, accounting for the largest proportion of 37.9%; followed by a total of 30 people aged 39-48. The age of the respondents ranges from19 to 58 years old, which is also consistent with that of the main consumer group of fresh products on the e-commerce platform. Moreover, the user-distribution (more than half of them live in first-tier cities, accounting for 50.81%, followed by those in second-tier cities, accounting for 33.06%, and the rest are residents in third tier and other cities) is very consistent with the distribution of cities Hema users live in because the distribution of Hema stores is mainly concentrated in first- and second-tier cities.

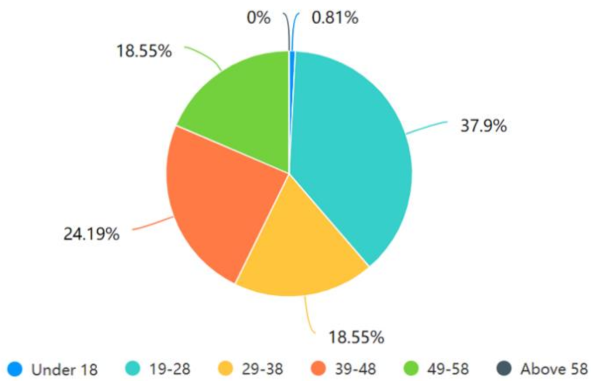

Figure 2

Pie chart of age distribution

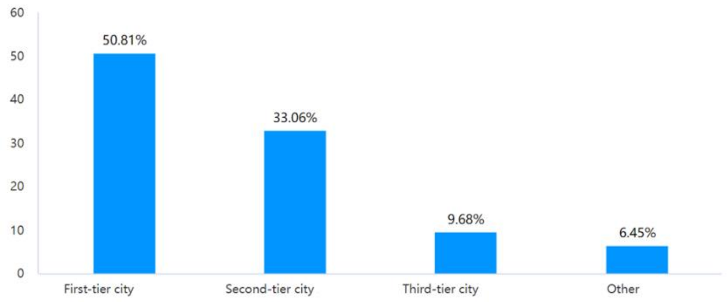

Figure 3

Bar chart of residential city level

Part 2: General Questions about Hema Fresh:

Among the respondents, 39.52% of them shop at Hema once or twice a month, sometimes even once a week; and 44.35% of them buy Hema products occasionally. 55 users live within three kilometers from the nearby Hema retail stores, while the rest of the users reside three kilometers or even further away.

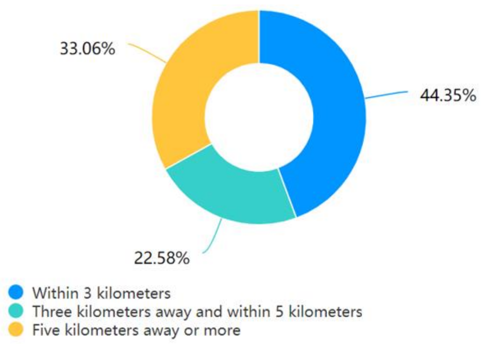

Figure 4

Donut chart of consumer distance from Hema

According to the survey results, fresh food is the most purchased product on Hema, followed by snacks and refrigerated or quick frozen products. These most purchased products have certain requirements for transportation conditions, such as refrigerated transportation.

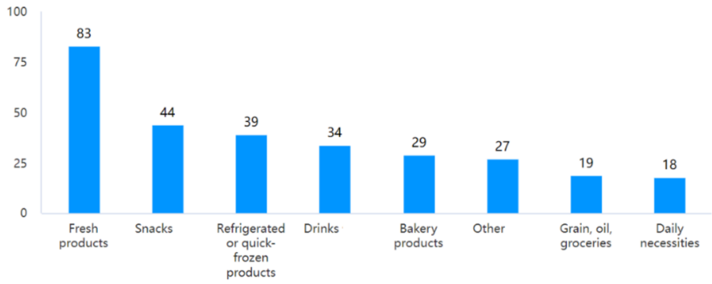

Figure 5

Bar chart of purchased product types

More users, up to as high as 84 people, make their purchase decisions on account of the fresh ingredients provided by Hema. There is a huge decrease in the number of people who choose other reasons, and a few people choose Hema because it is close to home and office.

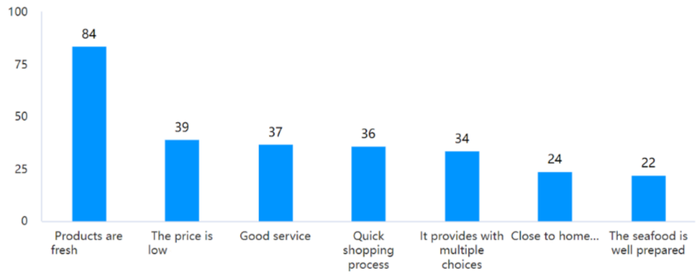

Figure 6

Bar chart of Hema's attracting factors

Promised by Hema that the delivery takes no longer than 30 minutes, 41.94% of consumers claimed that occasionally it costs them more than half an hour to receive the products.

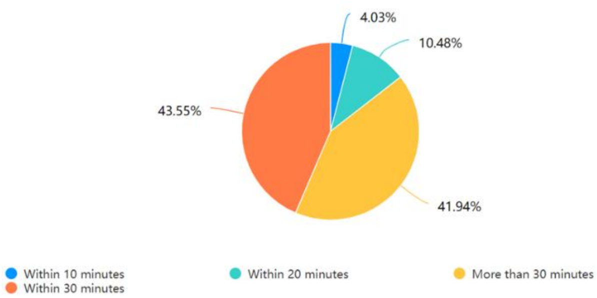

Figure 7

Pie chart of delivery time

Part 3: Logistics Service Quality (LSQ) and Customer Satisfaction

① Personnel Contact Quality

By Personnel Contact Quality, it means whether the logistics personnel can meet the needs of customers and provide good services (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. How professional, friendly, and timely are the customer service staff of Hema?
2. How satisfied are you with the efficiency and results of communication with the service staff of Hema?
3. Can Hema customer service staff timely give feedback and deal with customers' needs, opinions, and problems?
4. How satisfied are you with Hema courier service quality and attitude?
5. Can Hema courier deal with problems that you have?

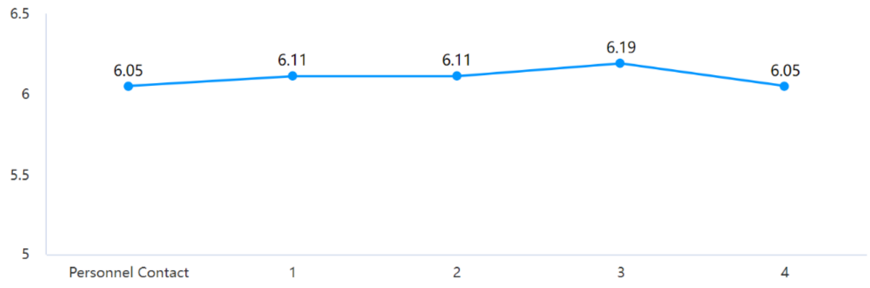

Figure 8

Satisfaction towards Personnel Contact Quality

The overall satisfaction rate for this item was 75.6%, with an average score of 6.10.

② Order Release Quantities

This refers to the logistics company releasing (reducing) the order quantity of some orders according to the actual situation (Mentzer et al., 2001), and whether it can complete the order quantity required by customers on time will affect customer satisfaction. Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. Normally, when placing an order, can Hema meet your required quantity and deliver it?
2. What is your attitude towards Hema in case of a stock shortage?
3. Orders are usually delivered together by Hema, not in batches

4. Hema can restock in a short time if there is a shortage problem

5. During the pandemic, Hema was able to meet the massive demand and supply of customers.

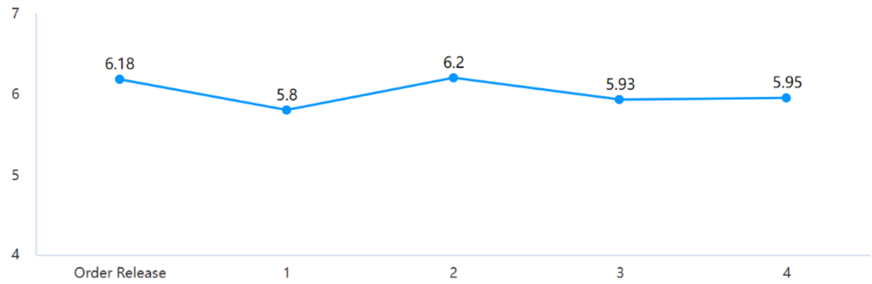

Figure 9

Satisfaction towards Order Release Quantities

The overall satisfaction rate for this item was 71.2%, with an average score of 6.01.

③ Information Quality

This refers to how much information about products is provided by logistics companies from the customer's point of view (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. How satisfied are you with the quality of information currently provided by Hema?

2. How do you feel about tracking Service information provided by Hema about the accuracy and real-time data?

3. Do you think the information provided by Hema about the product is not comprehensive enough to influence your decision?

4. The message of the shopping interface of Hema is updated timely (whether there is a situation that is out of stock but not displayed)

5. The Hema logistics information is comprehensive enough to meet your needs

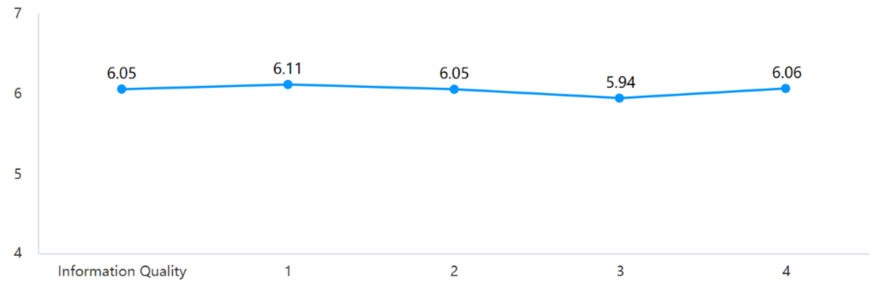

Figure 10

Satisfaction towards Information Quality

The overall satisfaction rate for this item was 75.0%, with an average score of 6.04.

④ Ordering Procedures

This refers to the efficiency and success rate of logistics companies in accepting customers' orders and processing the ordering process (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. Ease of procedure in the ordering process using Hema
2. Efficiency and effectiveness of Hema's order processing and success rate
3. Is the process of Hema complicated if you want to cancel or change an order or make a complaint?
4. The order in Hema is processed in a timely manner, and there will be no case that the order cannot match the Courier
5. Multiple payment options are available with Hema.

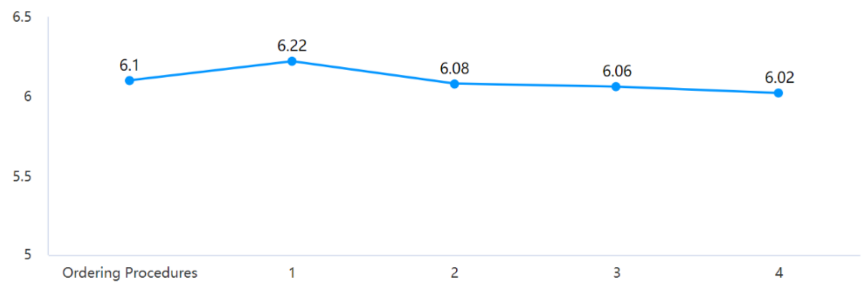

Figure 11

Satisfaction towards Personnel Ordering Procedures

The overall satisfaction rate for this item was 77.4%, with an average score of 6.10.

⑤ Order Accuracy

This refers to the degree to which the actual delivered product matches the product described in the order (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. The number of goods served by Hema matches orders exactly.
2. The model of goods served by Hema matches orders exactly.
3. Can the goods be served within the place as you required?
4. Can the goods be served within the time as Hema promised?
5. Fresh products that need to be processed in Hema can be processed as required.

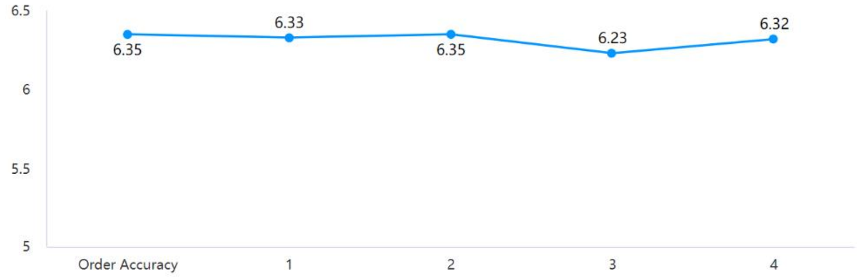

Figure 12

Satisfaction towards Order Accuracy

The overall satisfaction rate for this item was 84.8%, with an average score of 6.32.

⑥ Order Condition

This refers to the extent to which the item is damaged during the delivery process (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. The packing of Hema is beautiful and helps to protect the goods
2. The product order in Hema is intact without damage?
3. Hema doesn't provide excessive packing?
4. Hema provides different packaging for different orders.
5. Hema packaging is always in good condition.

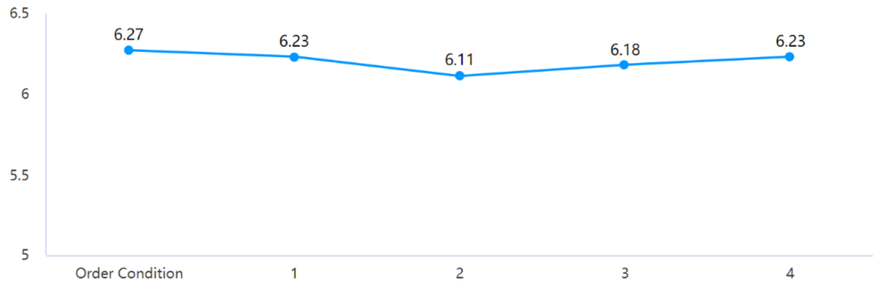

Figure 13

Satisfaction towards Order Condition

The overall satisfaction rate for this item was 78.6%, with an average score of 6.20.

⑦ Order Quality

This refers to the quality of use of the goods, including the extent to which the functionality of the product is in line with the needs of consumers (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. Overall quality of products from Hema is good.
2. The goods of Hema are in accordance with the pictures, product introductions and prices.
3. Fresh food is fresh from Hema.
4. The product ingredients are safe and harmless when you order from Hema.
5. Hema always makes sure the product they provide are not expired or nearly expired.

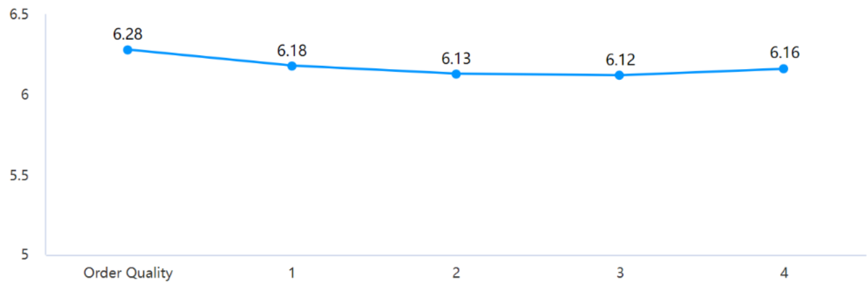

Figure 14

Satisfaction towards Order Quality

The overall satisfaction rate for this item was 78.4%, with an average score of 6.17.

⑧ Timeliness

This refers to whether the goods arrived at the designated place on time (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. Does the order arrive at the designated place within 30 minutes as promised every time by Hema?
2. Do you think the delivery time of Hema should be reduced, less than 30 minutes?
3. While receiving goods within 30min, you hope Hema can expand the distribution range (really desired-7, undesired-1).
4. Compared with other fresh retail e-commerce platforms, satisfaction with the delivery speed of Hema.
5. Satisfaction with delivery timeliness of Hema during the pandemic

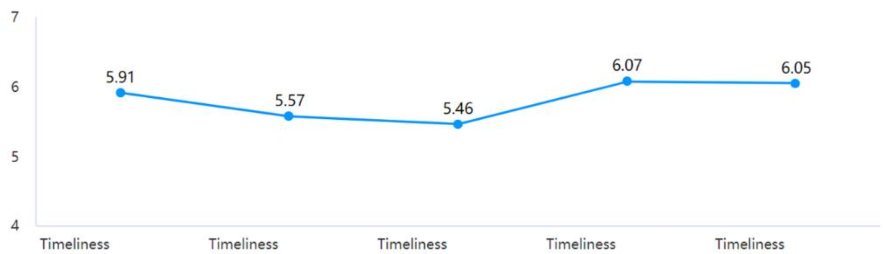

Figure 15

Satisfaction towards Timeliness

The overall satisfaction rate of the item was 70.0%, with an average score of 5.81.

⑨ Order Discrepancy Handling

This refers to the processing after an error in the order execution (Mentzer et al., 2001). Here are the five corresponding questions in the questionnaire and the results of the satisfaction survey:

1. How is the speed and quality of service in handling problems with goods received from Hema.
2. How is the Hema service of returning and exchanging goods, if it is simple, convenient, and responsible?
3. Hema's problem-handling system is perfect.
4. Hema logistics staff can contact you face to face and offer help.

5. Hema avoids order discrepancy of handling.

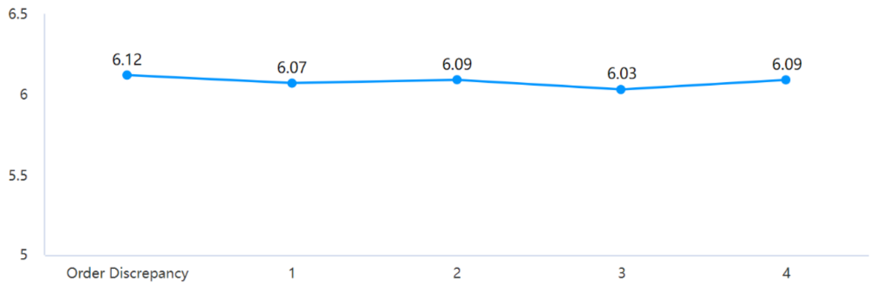

Figure 16

Satisfaction towards Order Discrepancy Handling

The overall satisfaction rate of the item was 73.2%, with an average score of 6.08.

3.3 The Model to Analyze the Case Study

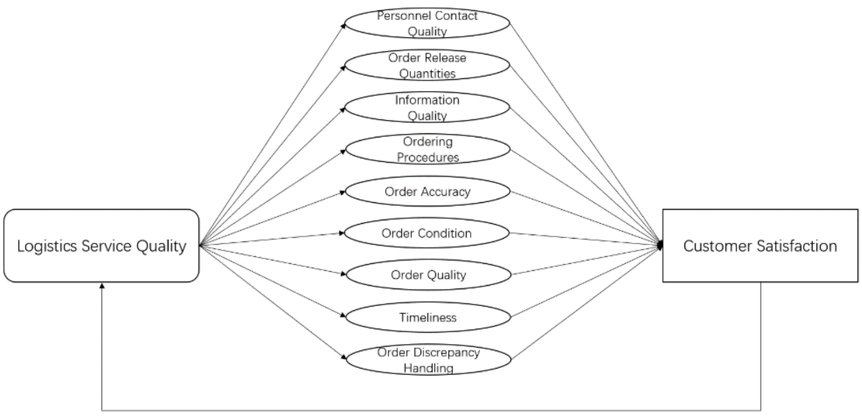

Figure 17

Model of LSQ with customer satisfaction

Each factor in the LSQ model evaluates logistics service quality from the customer's point of view, and each has a direct or indirect impact on customer satisfaction (Huma et al., 2019). Therefore, this study integrates the LSQ model with customer satisfaction to create this conceptual model. Since the position of each indicator in the quality of logistics services will be different according to the difference in market segmentation. This study will explore which indicators will have the greatest impact on fresh food-led retail e-commerce such as Hema based on customer satisfaction surveys, so as to focus on improving the logistics service system according to the level of satisfaction, further improve customer satisfaction, promote sustainable development, improve corporate reputation and interests, and the overall logistics service level of the industry.

4 Results

4.1 Challenges

4.1.1 Freshness of the Products

Questionnaire results show that most customers pay more attention to the freshness of Hema food.

However, due to the factors of the product itself and the limitations of external conditions, most fresh products need fresh-keeping measures during long-distance transportation. However, because of the incomplete cold chain infrastructure, it will cause relatively high transportation loss and limit the circulation radius of transportation to a certain extent (Adekomaya et al., 2016). Since there is currently no comprehensive cold chain transportation system, the majority of fresh food e-commerce businesses in China adopt traditional transportation method (Meng et al., 2022).

Therefore, a long-term difficulty for all fresh food e-commerce companies, including Hema, is how to keep food fresh.

4.1.2 Timeliness

The items on the questionnaire with the lowest scores were delivery effectiveness and timeliness. 40% of participants indicated that they were unable to receive the goods within the guaranteed 30 minutes from Hema. Customers anticipate Hema can deliver on time, or even in less time.

Due to the impact of the epidemic and other problems, Hema's "30-minute delivery service" cannot be guaranteed. Like the shortage of personnel, coupled with the large number of online orders, greatly affected the delivery efficiency (Li et al., 2022).

4.1.3 Size of Distribution Scope

Because Hema is mainly concentrated in the first-tier cities and does not focus more on the development in the second- and third-tier cities, this is an important factor that causes Hema to lose a large number of potential users.

In addition, in the survey on whether to expand the delivery scope, it is found that customers expect Hema to expand within the current delivery time, and think that the current size of delivery range is relatively small.

4.1.4 Stockout

The lowest-scoring issue in Order Release Quantities items is stockout. Out-of-stock phenomenon can affect customers negatively. For example, during the outbreak of the Covid-19 period, the country advocates the policy of less gatherings (Chen et al., 2021). Some areas even require home isolation and homeworking which makes it inconvenient for people to go out. But fresh food are daily necessities, so people's demand for home delivery services has greatly increased.

This has led to insufficient inventory and untimely supply. The large increase in online orders has also greatly increased the requirements for the supply of goods, which has led to the tight inventory of Hema, and the suppliers are unable to supply on time, so that the types of goods are not complete and the supply is unstable (Ma & Guo, 2020).

4.2 Solutions and Strategies

4.2.1 How to Keep Fresh

- Strengthen loss control during transportation and set up multiple key nodes.

There are many important nodes in the whole process of transportation of fresh products from the place of production, processing, distribution, retail to the final consumer, including transportation methods, packaging, distribution, display, marketing, etc (Ren et al., 2022). people should strictly check the key links to reduce the possibility of product quality damage.

- Classify the storage conditions of the product, use different management methods for different categories.

The conditions to store fresh products are different, and can be classified. Uniformly process, transport, and store products with the same level of conditional requirements, like the same refrigeration temperature, integrate and optimize resources, reduce the difficulty of cold chain transportation, and reduce the overall loss rate.

- Shorten the supply chain distance and reduce loss

A complete supply chain should integrate suppliers, fresh food e-commerce itself and consumers. The higher the degree of integration, the more cost-saving and the higher the efficiency of logistics (Bae, 2011). On the supply side, Hema should choose the nearest agricultural product base or brand supplier, and establish close contact with them to make sure there is no problem with the source of supply. On the demand side, Hema should try their best to make sure they are "closer to users" to facilitate consumers.

4.2.2 How to Improve the Efficiency and Reduce Time

Hema can use robots or UAV (unmanned aerial vehicles) for delivery, which not only improves efficiency, but also saves a lot of labor costs. And this kind of non-contact service is also applicable to the special situation of the epidemic, which can reduce the opportunity of viral transmission and reduce the chance of mutual contact.

In addition, the process of accepting orders and selecting products in stores can also be simplified. At present, online orders are selected by shop assistants in offline stores. Manual selection is time-consuming, and it also creates a sense of crowding for offline customers. Establish a separate intelligent sorting warehouse, use RFID identification technology, intelligent robots accurately pick, pack, and deliver according to order requirements. This will make a huge contribution to saving time.

4.2.3 How to Expand the Size of Delivery Scope

According to the dense distribution of people in the city, increase the store density or expand the delivery range where appropriate.

Make accurate market segmentation, and establish offline stores and warehouses of different sizes for different consumer needs and consumer groups. Segment the market and customers, such as commercial circles and residential circles, establish different store sizes in different geographical locations according to different needs, maximize the scope of target customers, and improve customer satisfaction.

4.2.4 How to Avoid Stockout

Adjust accordingly. For example, during the epidemic period, the average price of per customer transaction of Hema has dropped from 80-90 yuan to 40 yuan (Ma & Guo, 2020). During this period, Hema should reduce high-priced products and increase the vegetables and meat those common products. Make timely adjustment.

At the same time, the shortened supply chain mentioned above is also a solution for timely replenishment supply. The closer Hema is to the supplier, the faster Hema can get the products that are stockout, avoiding the dissatisfaction caused by the out-of-stock situation to some users. Fully investigate customer needs, supply in time, and achieve a balance between supply and demand, and thereby to improve customer satisfaction.

5 Discussion

5.1 discussion

The survey results indicates that among the nine logistics service quality items of Hema, the two dimensions that have the greatest impact on customer satisfaction include timeliness and Order Release Quantities. The current results of these two items are that they make customers relatively dissatisfied, which has a negative impact on their satisfaction and needs to be improved in time. Among these dimensions, the specific impact factors include delivery time and efficiency, food freshness, delivery range, and stockout. Focusing on improving these factors will help improve customer satisfaction, thereby increasing their stickiness of using the platform, and helping Hema and other similar fresh food e-commerce platforms to obtain long-term customers and promote future development.

As a theoretical framework, LSQ can clearly and comprehensively cover the evaluation dimension of an enterprise's logistics, and comprehensively allow customers, e-commerce companies, and even the entire industry to focus on problems in a more targeted point of view, improve problems, and help multiple parties to maximize the value of benefits.

5.2 Implications

5.2.1 Theoretical Implications

This paper makes a theoretical contribution to fill the research gap in the current logistics distribution system in the field of fresh food e-commerce. This paper uses the LSQ-customer satisfaction framework to understand which factors have the greatest impact on customer satisfaction in fresh food e-commerce logistics distribution services, and explains how they affect them, providing theoretical basis and data support for actual problems. This study is more in line with the current actual situation, and more intuitively reflects customers' requirements and tendencies for delivery services. This article provides scholars, e-commerce managers, cold chain logistics managers, customers, and other parties with better knowledge theory, so that they can more clearly understand the current shortage of logistics, their own needs, and the direction of their efforts.

Secondly, the current literature mainly focuses on analyzing the current challenges and opportunities faced by the whole fresh food e-commerce, the loss problem in cold chain transportation, how to choose the location of e-commerce offline stores and warehouse, and the problems faced by the entire e-commerce field (Song et al. al., 2017; Zhang et al., 2021; Liu & Kao, 2022), and almost all of them are aiming to improve a problem existing in the current logistics system. But there are few literatures that comprehensively evaluate the logistics system through the LSQ model and analyze problems through a specific platform. This study provides another dimension of insights for the fresh food e-commerce field, for scholars to exchange of ideas and discuss.

5.2.2 Managerial Implications

For enterprises, if they want to gain a firm foothold in the fierce competition in the e-commerce field and want to be irreplaceable in the market, improving cold chain logistics is one of the key. The improvement of logistics can not only improve customer satisfaction and enhance the attractiveness of the brand, but also reduce food loss and insist on sustainable development to enhance the brand's reputation, and at the same time increase the profit and influence of the enterprise.

Through this research, managers can find and solve problems in a more targeted angle, making enterprises run more efficiently. For example, combine different technologies, including UAV, robots, RFID, etc., to shorten logistics time; reduce product loss rate and replenishment time by shortening supply chain distance; classify different products according to different storage and transportation conditions, which can save input resources to a greater extent and maximize resource utilization. These measures are of important reference value for e-commerce managers. It helps companies to adjust in time according to the current consumer tendency to encourage them to have a higher degree of affection for the platform.

5.3 Limitations and Future Research

This study is authentic and reliable, but there are still some limitations. For example, some of the users participating in the questionnaire survey are not current long-term users of Hema. Some of them have only used Hema occasionally, and they don’t have a deep understanding of it. So, part of the questionnaire results need to be verified. Therefore, the questionnaire should set some stricter constraints, such as “your understanding of the Hema logistics distribution system” to ensure that the collected data is more effective.

In addition, since cold chain transportation will increase a certain amount of carbon emissions (Zhang et al., 2021), this paper may increase a certain amount of carbon emissions while reducing the food loss rate, which has a negative impact on the sustainable development of the environment. Further investigation is required into how to guarantee effective and practical logistics while the methods are also environment friendly. There is a critical need for future study to strike a balance between the two.

Furthermore, this article only proposes corresponding solutions based on the research results, and fails to fully understand the challenges that Hema and other fresh food e-commerce companies will face if they adopt these strategies, and whether they can be overcome. Fail to adequately investigate the specific implementation difficulties of the solutions. More comprehensive consideration should be done to make it have more reference value.

Conclusions

After learning that the most important factor for Hema Fresh are timeliness and order release quantities, other fresh food e-commerce platforms can take these two factors into account. And adopt and apply the above solutions and strategies, according to their own situation to optimal their distribution systems.

It is better if this research can make a great contribution to the cold chain logistics in e-commerce field, help companies to gain a foothold in the fiercely competitive market, and make the life of customer easier and better.

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Connecting universities and enterprises toward innovation and entrepreneurship (UET case)

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Abstract: Nowadays societal and economic needs requires that universities are active members in supporting the enterprices and offering real-life experience to the graduate by preparing them for the labour market. The purpose of the paper is to introduce and assess the status quo of higher educational institutions in their devotion to become innovative, foster entrepreneurship and generate value for the society and economy. The methodological approach is a qualitative research method, addressing not only the European University of Tirana - UET (case study), but also the national ecosystems in Albania. Following the methodological approach of the Erasmus + CBHE KnowHub Project (Reconnecting universities and enterprises to unleash regional innovation and entrepreneurial activity), data collection for this paper is done using the Online Servey (HEInnovate self-assessment survey, OECD) conducted in 2020 and 2022 at UET as well as 2 Focus Group (HEInnovate Assessment (Re) Introductory and Verification Workshop). The paper concludes that in a two-year period, UET has used tools and mechanisms which contribute to enhancing the entrepreneurship culture within university.

Keywords: innovation; entrepreneurship; value; economy; society

1 Introduction

The complexity and turbulence of global economies and societies affect a wide variety of organizations, HEI included. Universities are increasingly moving towards more entrepreneurial configurations to seek development, more innovation, and more social and economic commitment [12]

This paper aims to use HEInnovate (https://www.heinnovate.eu/en/about) as a self-assessment tool for HEI that wish to exploit their entrepreneurial and innovative potential. This tool guides us through a process of identification, prioritisation, and action, grouped in eight key areas.

This study intends to demonstrate the importance of creating an entrepreneurial and innovative culture within a university, as a tool to boost the overall performance of the latter. These data are collected through the Erasmus + CBHE KnowHub Project (Reconnecting universities and enterprises to unleash regional innovation and entrepreneurial activity https://knowhub.eu/) within the European University of Tirana, used as a case study for this paper.

The aim of the paper is to introduce the status quo of Europian University of Tirana and assess through a longitudinal study its devotion to become innovative, foster entrepreneurship and generate value for the society and economy, using data collected in 2020, corresponding to the beginning of KnowHub project and again in 2022, the end of the project. During the lifespan of the project, there are conducted a series of trainings for the academic staff, study visit of students, meetings with high management staff on strategic issues, results of which has been the UET HUB Strategy following the CANVAS model and the establishement of the HUB of the University.

Having said this, the research strives to provide deeper insight into the following aspects:

- to assess UET in its devotion to become innovative and foster entrepreneurship in the beginning of KnowHub project:

- to estimate the result and impact of Knowhub Project after the lifespan of the project with the sucessful completion of the Startegy and UET Hub.

- to analyse which are the factors that need to be improved within the University regarding “Entrepreneurship Development in Teaching and Learning” dimentions.

The research question of the paper: How much prepared is European University of Tirana for future challenges which open the path to an innovative and entrepreneur HEI?

The methodological approach of the paper is qualitative, addressing not only the European University of Tirana - UET (case study), but also the national ecosystems in Albania. Following the methodological approach of the Erasmus + CBHE KnowHub Project, data collection for this paper is done using the online survey (HEInnovate self-assessment survey, OECD) [4] conducted in 2020 and 2022 at UET and 2 Focus Group (HEInnovate Assessment (Re) Introductory and Verification Workshop). The questionnaire addressed all staff categories, starting from high management staff, lecturers, administration, and students. Stakeholders were also part of the target group, focusing on the pool that had previous contact with the university.

This paper concluded that internationalization as a dimension has largely impacted the approach to entrepreneurship in teaching and learning at the European University of Tirana, due to the involvement in many EU and regional projects, Erasmus exchange mobilities of academic and administrative staff as well as students. Also, the study emphasized the need to draft a Strategy on Entrepreneurship for the university, focusing more on the production of prototypes, innovation, financial support, strategic partners as well as mechanisms which measure the impact for the above-mentioned dimensions. The university should reflect more and strategically tackle the dimensions of "Entrepreneurship Development in Teaching and Learning".

2 Literature Review

As a result of political and economic turbulences in the contemporary free and globalized market society, Western Balkan Countries (WBC) face the lack of successful examples and qualified experience in establishing sustainable university – industry cooperation.

All scholars agree that one of the best ways to face the societal and economic challenges is the academia – industry cooperation through an entrepreneurial university and innovative research. The mission and role of universities have changed over the years, the knowledge-based economy has created challenges for the higher education sector on a global scale. The challenges are to create value through developing entrepreneurial and innovative potential of universities, to adopt institutional and structural changes and become entrepreneurial university [3].

Nevertheless, the problem is that sometimes the stakeholders have different needs and interests, speak different languages and might not be aligned to what the academic can produce, thus there is not a common understanding in what kind of value has to be created. In cases when a cooperation take place, […] venture capitalists and academic researchers might have divergent interests: the academic researchers might want to further develop their scholarly investigation; the venture capitalists might see the potential of the project in terms of pure economic revenues and might want to patent some of this technology and market it […] [12]. Start-ups and the SMEs need both infrastructural and know-how support, but often they do not recognise the universities as the right partner for this.

In the literature, one can identify three main reasons to justify the lack of cooperation or lack of common vision within a cooperation: (1) no awareness on the universities' capacities; (2) bureaucratic burden due to the absence of a one-stop-shop (focal point) and of defined instruments and tools that can be provided; as well as (3) lack of infrastructure in universities.

If these challenges are addressed, joint collaborative endeavors [can take part], where these different stakeholders bring together their assets, competencies and specificities [11] and provide innovative opportunities to the society at large.

Innovation is now the single most important engine of long-term competitiveness, growth and employment [1]. Universities contribute to the R&D capability of an economy in a variety of ways including: the production of appropriately skilled human capital, the transfer of technology from academia to industry, the creation of frame-breaking basic knowledge and the generation of spin-out companies that locate in the surrounding territories [10]. As defined by Etzkowitz et al. (2000), an entrepreneurial university is any university that undertakes entrepreneurial activities "...with the objective of improving regional or national economic performance as well as the university's financial advantage and that of its faculty" (ibid) [2]. The role of academics is to act as "entrepreneurial thinkers […] which seek new ways to engage with the community to create value" [7]. The concept of the entrepreneurial university carries multiple meanings including notions of enterprise, innovation, organisational leadership, commercialisation, and governance, employability, new venture creation [5].

On the other hand, the enterprises, especially the small and medium enterprises (SMEs) seek this cooperation to gain access to innovative solutions, new ideas and valuable technology, but also to influence curricula in order to gain qualified graduates in the areas in which they are needed (microelectronics, green technologies, ICT, precise machine building etc.).

In the framework of this research paper, authors have scrutinized a series of reports which show the status quo of the National Knowledge Transfer, Innovation and Entrepreneurship Ecosystems, etc for Albania and the region. Desk research of the secondary sources (strategic or policy documents on a local and national level, other relevant assessment exercises, such as: European Innovation Scoreboard, Community Innovation Survey, Mapping for Smart Specialisation, etc., relevant country/regional reports prepared by OECD, World Bank, EU, JRC etc.) are used for this research. Among a plurality of approaches, which distinguish the entrepreneurial characteristics of universities, HEInnovate entrepreneurial university evaluation tool provides a guiding framework of key pillars of individual and organisational capacities required of a university to be entrepreneurial [6]. The HEInnovate framework provides different possibilities for the analysis of the aspects of entrepreneurial characteristics of higher education institutions, but so far, the mentioned framework has not received much empirical attention. [8].

3 Methodology

The methodology of this paper is based on the KnowHub project approach, which aimed to evaluate the entrepreneurial and innovative approach of universities involved in this project. In other words, KnowHub aims at introducing and assessing the status quo of the Europian University of Tirana in its devotion to become innovative, foster entrepreneurship and generate value for the society and economy. Following this, the research paper strives to provide deeper insight into the following aspects:

- to assess UET in its devotion to become innovative and foster entrepreneurship in the beginning of KnowHub project:

- to estimate the result and impact of Knowhub Project after the lifespan of the project with the successful completion of the Strategy and UET Hub.

- to analyse which are the factors that need to be improved within the University regarding "Entrepreneurship Development in Teaching and Learning" dimensions.

The research question of the paper: How much prepared is European University of Tirana for future challenges which open the path to an innovative and entrepreneur HEI?

This paper includes a case study example. In general, case studies are the preferred strategy when 'how' or 'why' questions are being posed [14]. Moreover, it is possible to adopt a qualitative methodology of case study to identify meaningful insights through a limited number of examples [9]. The methodology used for the purpose of this paper is based upon the (1) *Quantitative self-assessment at university level;* (2) *Qualitative self-assessment at the university level*; (3) *Qualitative assessment of the wider environment (regional and national ecosystem).*

In this line, authors organized two Focus Groups (HEInnovate Assessment (Re) Introductory and Verification Workshop) and collected data from the online survey HEInnovate (https://www.heinnovate.eu/en/self-assessment/aWtRSXg4bFFZOWF6cVQzN1VadUpuQT09/get-started) [4]. HEInnovate is an initiative of the European Commission's DG Education and Culture in partnership with the OECD. HEInnovate is a free self-assessment tool for all types of higher education institution. It allows us to assess the HE Institutions using several statements related to its entrepreneurial activities, including leadership, staffing and links with business. It diagnoses areas of strengths and weaknesses, opens discussion and debate on the entrepreneurial / innovative nature of HE Institution and it allows us to compare evolution over time. (https://www.heinnovate.eu/en)

The HEInnovate online self-assessment tool is based on the following 8 pillars:

(1) Leadership and governance;

(2) Organisational capacity:

(3) Funding, people and incentives;

(4) Entrepreneurial teaching and learning;

(5) Preparing and supporting entrepreneurs;

(6) Digital transformation and capability;

(7) Knowledge exchange and collaboration;

(8) The internationalised institution; Measuring impact

In March 2020 the link of the online survey was distributed to staff, students, and stakeholders with an official email (including all instructions) to make the self-assessment of the status quo. More than 60 participants took part in this survey (Dean, Administrative staff, Students, Researchers, Professors/Teachers and at least 15 External stakeholders: businesses, SMEs, large corporations, start-up and spin-off companies, other type of companies). After the data collection, the authors organized the Introductory workshop with 25 participants from the same categories of the online survey. Moreover, international partners took part in the workshop to moderate and monitor the discussion and conclusion drawn from participants.

During the HEInnovate Introductory workshop, members discussed the following:

- The aggregated results from the HEInnovate survey;

- Provided certain evidence for the achieved results, such as strategic documents from the university, relevant administrative procedures, institutional setup within the university (technology transfer offices, patent or intellectual property offices/centres/departments);

- Proposed some actions, measures or polices that might be of interest for improving the entrepreneurial status of the university and enhancing the university-business cooperation;

- Identified the existing capacities that should be utilized in the Commercialisation Hub;

In June 2022, the same survey was distributed to the same target group. Overall, 53 participants completed the HEInnovate online self-assessment survey, from all categories: Administrative leader, Dean/Head, External stakeholder, Master students, Undergraduate students, Professional and support staff, Professor/Teacher, Researcher, Technology transfer office/Function, Others. During July 2022 the authors organized another verification workshop with 10 participants from the above-mentioned categories (including students and stakeholders) as well as representatives from international partner universities such as FH Johanneum, Ncdiel, etc.

4 Findings

Using the aggregated data from the HEInnovate online platform, the collected dataset was visually presented with bar charts for each of the 8 researched HEInnovate dimensions.

In figure no.1 the graph shows the average scores for each HEInnovate dimension for the European University of Tirana for year 2020 (light blue) and year 2022 (dark blue). The progress from 2020 to 2022 is obvious for all 8 dimensions.

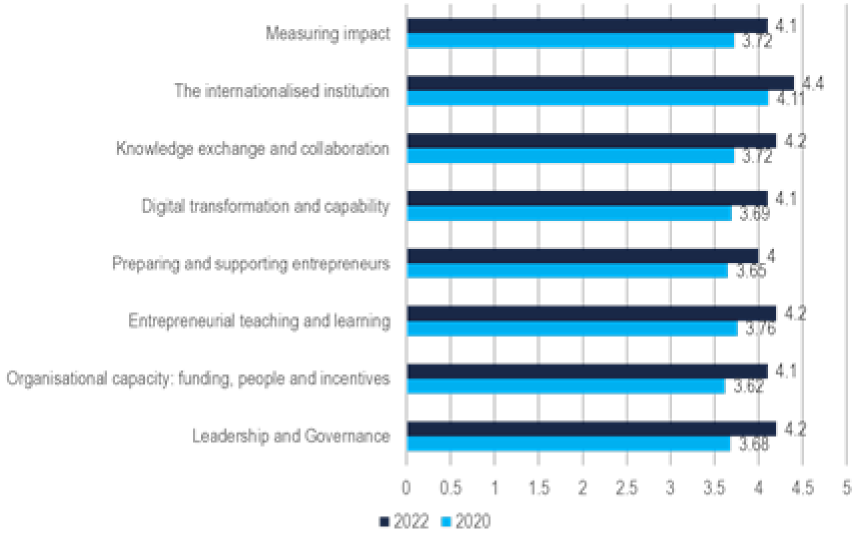

Figure 1.

Average scores for each HEInnovate dimension (UET) 2020 & 2022

Dimensions that have highest average scores in 2022 are: the *internationalized institution; knowledge exchange and collaboration; entrepreneurial teaching and learning; leadership and governance*. This category is followed by a set of less progressed dimensions, such as: *measuring impact; digital transformation and capability; organizational capacity, founding, people and incentives*. The weakest dimension for 2022 is: *Preparing and supporting entrepreneurs*.

During the focus group organized in 2022, authors tried to analyse the context and reasons the reasons that influenced the improvement of the results. Accordingly, progress was evident mostly due to the following reasons:

- Impact of a large number of projects at UET with focus on entrepreneurship, cooperation university-labour market and research;
- High intensity of activities during 2022, because of COVID situation. Many activities, planned for 2020 and 2021, were postponed taking part in 2022, thus the impact at the time of the survey was very touchable;
- Students who have completed the HEInnovate online survey, have been mainly students engaged in mobilities and activities, therefore they have more information on internationalization and entrepreneurship;
- Intensification of cooperation with external stakeholders, with whom UET has cooperated within the KnowHub project activities;

- Impact of EU projects in supporting mainly the infrastructural investments and human recourses development at UET;
- Incorporation of KnowHub project concepts into various courses, developed by academic staff who are involved as experts in KnowHub project;
- Establishing the Projects Office outside the University as a spin-off in another location. This came as an initiative of the KnowHub project. Projects and networking became easier and provided a new approach for HEIs in Albania.

In the following session the paper will present the indicators and the average scores of each of the dimensions for both 2020 and 2022, generated through the HEInnovate online platform, as well as results from both focus groups.

4.1 Leadership and Governance: HEInnovate 2020 & 2022

The indicators that construct the "Leadership and Governance" dimensions are: *The HEI is a driving force for entrepreneurship and innovation in regional, social and community development; The HEI encourages and supports faculties and units to act entrepreneurially; There is a model in place for coordinating and integrating entrepreneurial activities across the HEI; There is commitment at a high level to implementing the entrepreneurial agenda*; *Entrepreneurship is a major part of the HEI's strategy*.

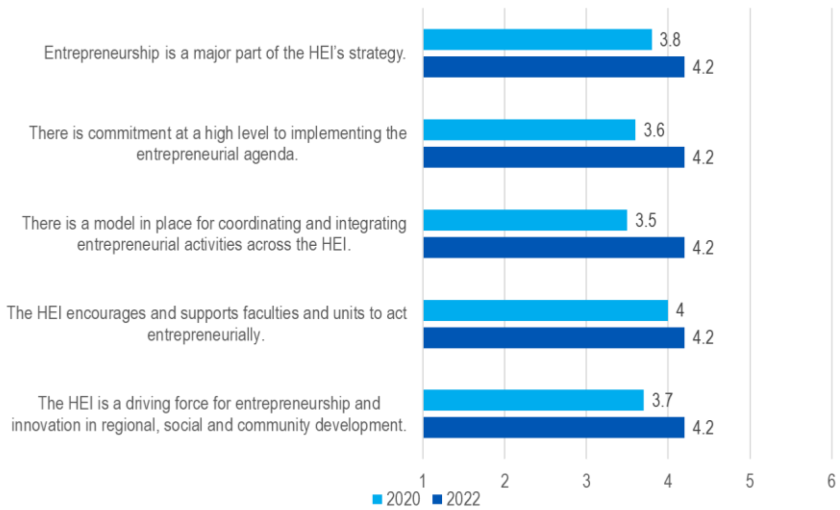

Figure 2.

Leadership and Governance: HEInnovate 2020 & 2022

Graph 2 shows the average scores of all indicators that “Leadership and Governance” dimension has, for both year 2020 (light blue) and year 2022 (dark blue). For year 2022, one can see that all 5 indicators have the same average score, while the highest progress (2020-2022) stands for the indicator “*There is a model in place for coordinating and integrating entrepreneurial activities across the HEI*”. This is mainly connected to the proactive approach of the institution toward projects and the spin off role – Office for Projects and Internationalization.

4.2 Organisational capacity: funding, people and incentives: HE Innovate 2020&2022

Indicators that construct the “Organisational capacity: funding, people and incentives” dimension, are: *Incentives and rewards are given to staff who actively support the entrepreneurial agenda; The HEI invests in staff development to support its entrepreneurial agenda; The HEI is open to engaging and recruiting individuals with entrepreneurial attitudes, behaviour and experience; The HEI has the capacity and culture to build new relationships and synergies across the institution; Entrepreneurial objectives are supported by a wide range of sustainable funding and investment sources.*

Graph 3 shows the average scores of each indicator, for both year 2020 (light blue) and 2022 (dark blue).

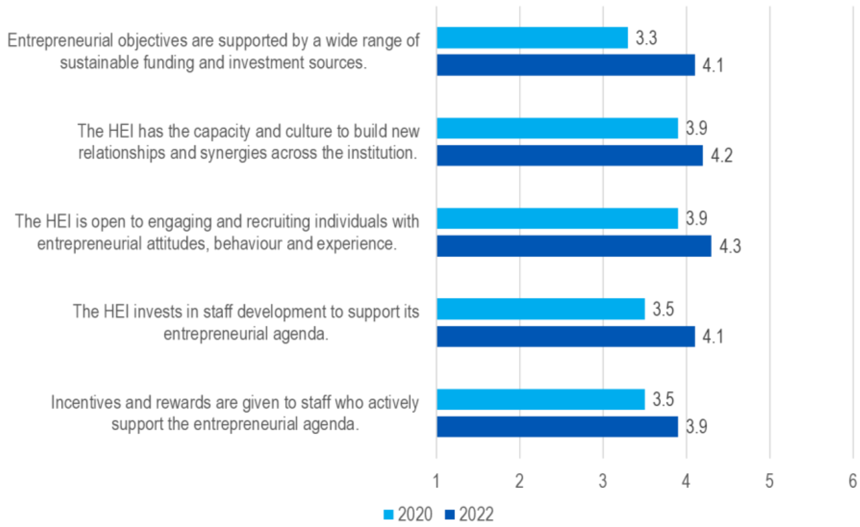

Figure 3.

Organisational capacity: funding, people and incentives: HE Innovate 2020&2022

The Graph show that the average score for all indicators have been higher for year 2022, with a significant progress for the indicator "*Entrepreneurial objectives are supported by a wide range of sustainable funding and investiment sources*" scoring from 3.3 to 4.1 and "*HEI invests staff development to support is entrepreneurial agenda*", from 3.5 to 4.1. This progress is mainly related to the implementation of a series of projects and activities in the last two years, related to innovation, entrepreneurship, cooperation to industry, etc.

4.3 Entrepreneurial teaching and learning: HEInnovate 2020&2022

Indicators that construct the "Entrepreneurial teaching and learning" dimension, are: *Results of entrepreneurship research are integrated into the entrepreneurial education offer*; *The HEI co-designs and delivers the curriculum with external stakeholders*; *The HEI validates entrepreneurial learning outcomes which drives the design and execution of the entrepreneurial curriculum*; *The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills*; *The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills*.

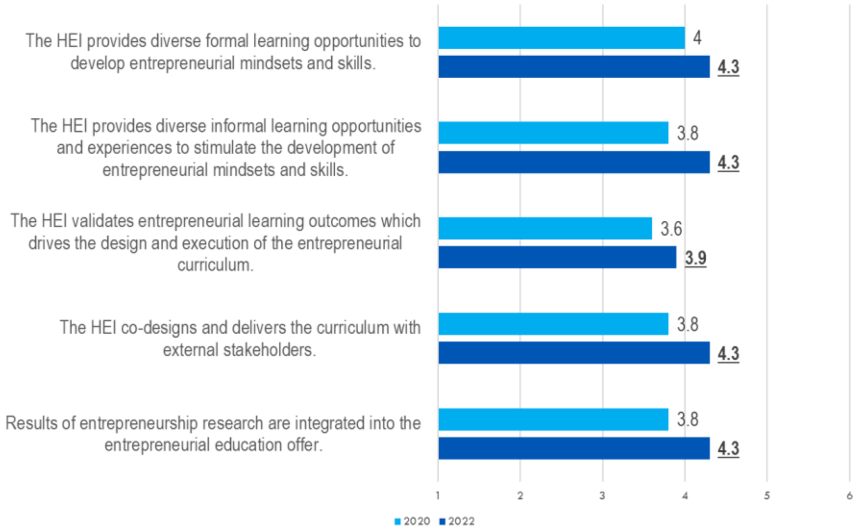

Figure 4.

Entrepreneurial teaching and learning: HEInnovate 2020&2022

Graph 4 shows the average scores for all indicators of "Entrepreneurial teaching and learning" dimension, for year 2020 (light blue) and year 2022 (dark blue). The highest progress is done in the following indicators (average score from 3.8 to 4.3)

- *HEI provide diverse informal learning opportunities to stimulate the development of entrepreneurial mindsets and skills* – this is due to the institutional culture and implemented activities which have promoted new and innovative approaches in different aspects of the institution.
- *HEI co-designs and delivers the curriculum with external stakeholders* – this is connected to existing units and practices within the university which try to enhance the cooperation with industry, such as labour market boards established in each department, open lectures to industry experts, labour fair, etc. UET tries to design curricula that are accepted by the labour market, having as an example the joint master with Credins Bank in Albania in Digital finance.
- *Results of entrepreneurship research are integrated into the entrepreneurial education offer* – the progress of this indicator is mainly related to the implementation of several projects in the field of innovation, entrepreneurship, collaboration to industry, etc.

It is worth to mention that the indicator "*The HEI validates entrepreneurial learning outcomes which drives the design and execution of the entrepreneurial curriculum"* remains below the average score of 4, mainly due to the lack of a systematic approach (strategy, etc.) of managerial processes within the university.

4.4 Preparing and supporting entrepreneurs: HEInnovate 2020&2022

Indicators that construct the "Preparing and supporting entrepreneurs" dimension, are: *The HEI offers or facilitates access to business incubation*; *The HEI facilitates access to financing for its entrepreneurs*; *Mentoring and other forms of personal development are offered by experienced individuals from academia or industry*; *Training is offered to assist students, graduates and staff in starting, running and growing a business*; *The HEI supports its students, graduates and staff to move from idea generation to business creation*; *The HEI increases awareness of the value of entrepreneurship and stimulates the entrepreneurial intentions of students,* *graduates and staff to start-up a business or venture.*

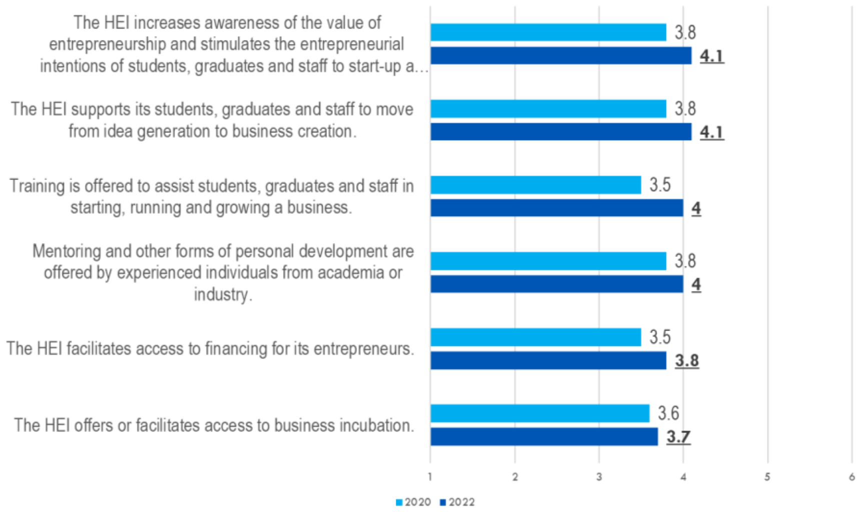

Figure 5.

Preparing and supporting entrepreneurs: HEInnovate 2020&2022

The graph shows that indicator "*Preparing and supporting entrepreneurs*" has the lowest average score among all indicators, for both years 2020 and 2022.

The major progress stands for indicator "*Training is offered to assist students, graduates and staf in starting running and growing a business*" scoring from 3.5 to 4. This result is connected to the fact that many students that have participated in the online survey, have been taking part in international activities organized in the framework of EU projects.

On the other hand indicators "*HEI facilitates access to financing for its entrepreneurs*" and "*HEI offers or faclititeties access to business incubation*" not only remain with an average score under 4 but also have a slow progress compared to other indicators.

4.5 Digital transformation and capability: HEInnovate 2020&2022

Indicators that construct "Digital transformation and capability" dimension, are: *The HEI makes full use of its digital capacity to promote sustainable and inclusive innovation and entrepreneurship*; *The HEI actively uses open educational resources, open science and open data practices to improve the performance of the institution and increase its impact on its ecosystem*; *The HEI actively supports the use of digital technologies to enhance quality and equity in teaching, learning and assessment*; *The HEI invests in, manages and continuously improves a fit-for-*

purpose digital infrastructure; *The HEI fosters a digital culture and implements and monitors a digital strategy supporting innovation and entrepreneurship.*

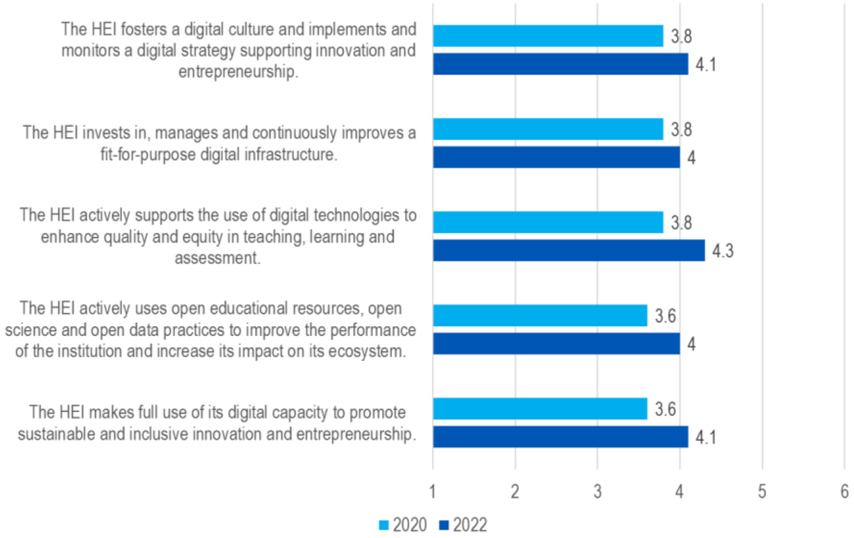

Figure 6.

Digital transformation and capability: HEInnovate 2020&2022

Graph 6 shows that from all indicators that construct "*Digital transformation and capability"* dimension, the highest progress stands for indicator "*HEI actively supports the use of digital technologies to enhance quality and equity in teaching learning"* (from 3.8 to 4.3) and "*HEI makes full use its digital capacity to promote sustainable and inclusive innovation and entrepreneurship"* (from 3.6 to 4.1). The highest indicator for 2022 is the "*HEI actively supports the use of digital technologies to enhance quality and equity in teaching learning and assessment*". This is a result of the continuous work conducted by the IT department, working on developing new management systems of technology information, LMS, and other digital processes that help both staff and students.

4.6 Knowledge exchange and collaboration: HEInnovate 2020&2022

Indicators that construct "Knowledge exchange and collaboration" dimension, are: *The HEI integrates research, education and industry (wider community) activities to exploit new knowledge*; *The HEI provides opportunities for staff and students to take part in innovative activities with business/the external environment*; *The HEI has strong links with incubators, science parks and other external initiatives; The HEI demonstrates active involvement in partnerships and relationships with a wide range of stakeholders*; *The HEI is committed to collaboration and knowledge* *exchange with industry, the public sector and society.*

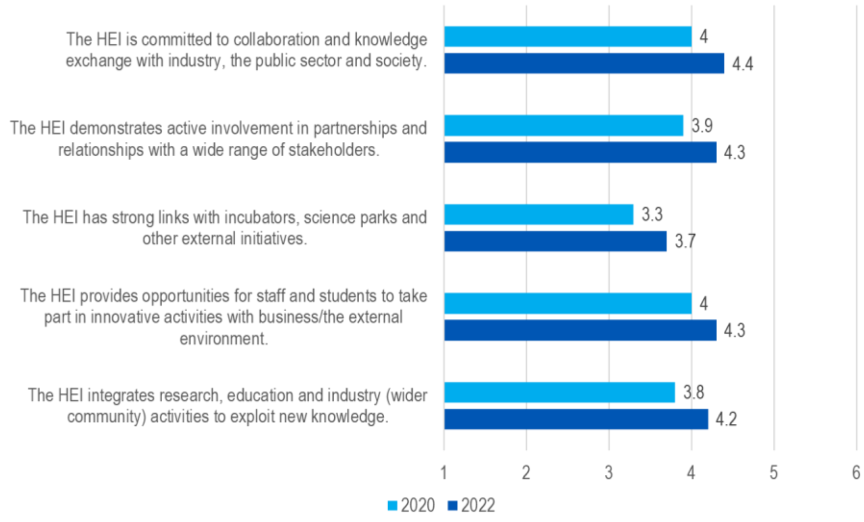

Figure 7.

Knowledge exchange and collaboration: HEInnovate 2020&2022

Graph 7 shows that for "Knowledge exchange and collaboration" dimension, the highest indicator for year 2022 is '*HEI is committed to collaboration and knowledge exchange with industry, the public sector and society*" with an average score of 4.4. On the other hand, the lowest indicator for year 2022 is " *HEI has strong links with incubators, science parks and the external initiatives*", with an average score of 3.7. The progress from 2020 to 2022 seems to be stable for all indicators.

Indicator "*HEI has strong links with incubators, science parks and the external initiatives"* that has the lowest average score in both years. It is related to the way the ecosystem in Albania works in terms of entrepreneurship initiatives toward students and academia: lack of initiatives and opportunities offered to students to get involved and academic staff to produce practical research.

4.7 The internationalised institution: HEInnovate 2020&2022

Indicators that construct "The internationalised institution" dimension, are: *The international dimension is reflected in the HEI's approach to research*; *The HEI encourages and supports faculties and units to act entrepreneurially; The HEI seeks and attracts international and entrepreneurial staff; International perspectives are reflected in the HEI's approach to teaching; Internationalisation is an integral part of the HEI's entrepreneurial agenda.*

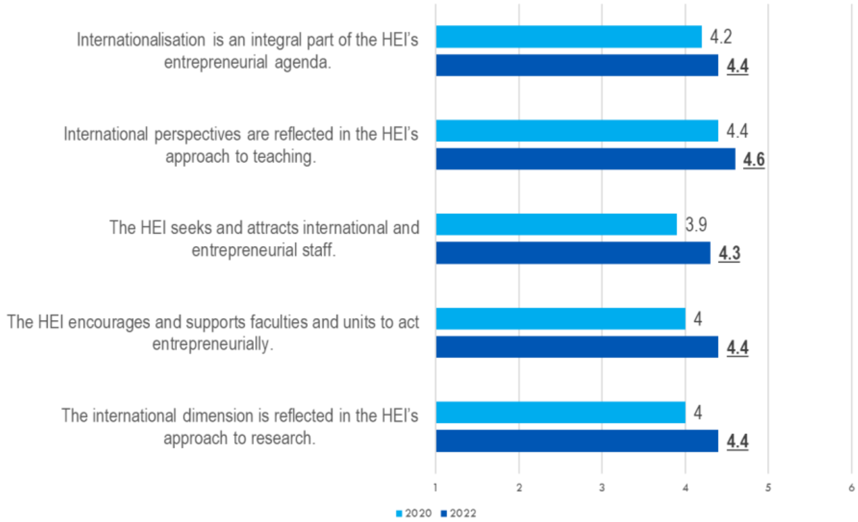

Figure 8.

The internationalised institution: HEInnovate 2020&2022

Graph 8 shows that indicators that construct "The internationalized institution" dimensions have the highest average score for both year 2020 and 2022, compared to all other dimensions. This result is deeply related to the vision of the institution and its efforts to attract European funds and practices. The indicator with the highest average score is "*International perspectives are reflected in the HEI's approach to teaching",* at level 4.6. Experts on focus group think that this is a result of post-COVID isolation. During 2020 and 2021 staff and students were almost not able to travel and organize many on site activities, mobilities and activities were concentrated in 2022, providing as such a huge impact in the mentality of staff and students.

4.8 Measuring impact: HEInnovate 2020&2022

Indicators that construct "Measuring impact" dimension, are: *The HEI regularly assesses the institution's international activities in relation to its entrepreneurial agenda; The HEI regularly assesses knowledge exchange and collaboration; The HEI regularly assesses the impact of start-up support; The HEI regularly assesses entrepreneurial teaching and learning across the institution*; *The HEI regularly assesses how its personnel and resources support its entrepreneurial agenda; The HEI regularly assesses the impact of its entrepreneurial agenda.*

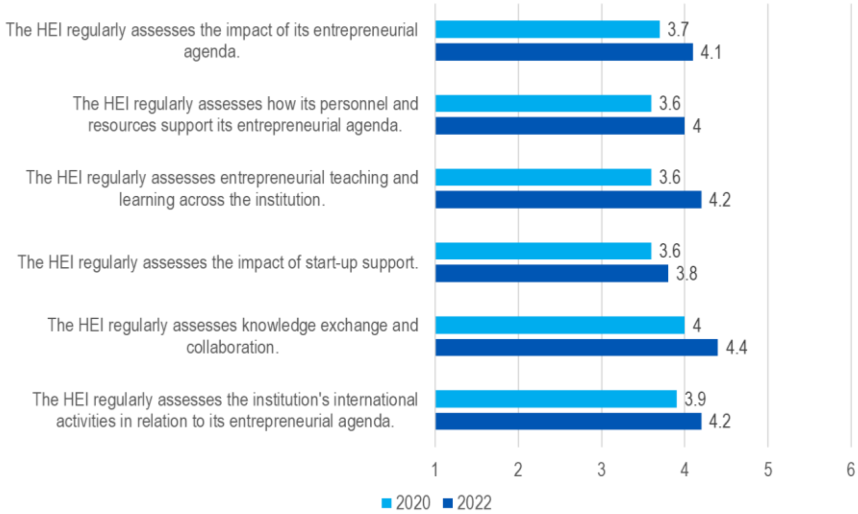

Figure 9.

Measuring impact: HEInnovate 2020&2022

Graph no. 9 shows that for “Measuring impact” dimension, the indicator with the highest impact for year 2022 is “*HEI regularly assesses knowledge exchange and collaboration*” with an average score 4.4 while the indicator with the lowest average score is “*The HEI regularly assesses the impact of start-up support”* with an average score of 3.8.

The biggest progress stands for indicator “*HEI regularly assesses entrepreneurial teaching and learning across the institution*” with an increase of the average score from 3.6 to 4.2. This is due to the existing set of procedures that UET has in place for a long time now, trying to periodically evaluate the teaching and learning progress.

5 Conclusions and Recommendations

This research paper is a result of the implementation of Erasmums + KnowHub project activities, where the authors had a team leader role in designing and also organizing a series of research tasks. The methodology used for this research is based on HEInnovate self-assessment survey, a free self-assessment tool for all types of higher education institution.

The main method used for this research is the self-assessment online survey, which was used to conduct a longitudinal study, considering year 2020 and 2022. This approach provides the opportunity for UET to measure the progress of its approach toward entrepreneurship and innovation and the capacity building of the university in 8 pre-defined dimensions.

The paper stipulates the strong and weak dimension of the University in terms of entrepreneurship and innovation, trying to orient its focus in addressing the identified issues and promoting its strong dimensions. In other words, this means that the institution should strengthen internal processes in line with 8 dimensions.

Main areas where the Europena University of Tirana should be more focused are: Preparing and Supporting Entrepreneurs; 'Organizational Capacity: Funding, People and Incentives; Digital Transformation and Capability; Measuring Impact.

All the activities of the entrepreneurial agenda are strongly related with the internalization strategy, and the University is highly involved in international projects/mobilities, etc. Majority of projects are related to entrepreneurial activities of the University.

The university has a strategy and agenda focusing on the efforts to create chances for employment, internships and creating relationships between businesses and university, but it should improve and apply an Entrepreneurial Strategy producing prototypes or patents and Supporting Entrepreneurs and produce research oriented toward industry needs.

The entrepreneurial objectives must be supported by a wide range of sustainable funding and investment sources; UET should reward excellent performance in teaching, research and entrepreneurship;

UET performs periodically the activities of its entrepreneurial agenda and tries to measure their impact. In the framework of this agenda also tries to assess its personnel and resources. There are many questions related with the assessment of the impact of start up support, so this dimension is considered over evaluated.

The business connections are often formal and there is no correlation between the business demand and the university offering. It is important to involve the external experts/stakeholders in academic activities; to involve the students in research and applicative projects of the academic staff in cooperation with external stakeholders

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The Influence of Consumer Preferences on FMCG Supply Chain Decision-making from an Omnichannel Perspective

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Abstract: At present, the FMCG market accounts for more than half of global business, and consumers can obtain purchasing information anytime and anywhere from omnichannel. However, a critical obstacle that remains unsolved is how to combine FMCG purchases under the omnichannel with a more agile supply chain. In this paper, the focus is on the influence of consumer preferences on the FMCG supply chain from the omnichannel perspective, aiming to provide FMCG enterprises with a unique perspective from the consumer port and enhance their competitiveness in this industry. Therefore, based on the data collected from 250 respondents, consumers' preferences and behaviors were investigated, and the factors that impact consumer preferences were tested and validated through SPSS, to find out the essential factors that influence enterprise supply chain decisions. In addition, the strategic adjustment and optimization measures of the FMCG supply chain based on consumer preferences will be formulated. The survey demonstrates that most people are satisfied with social networks' purchase channels. Meanwhile, a personalized purchase with added value at the pre-sale and after-sales end is more desired. However, it is worth noting for FMCG supply chain decision-makers take measures to reduce the purchase risk caused by social networks.

Keyword: FMCG Supply chain; Social Networks; Consumer preference; Optimization

1 Introduction

1.1 Background of the Study

One of the most significant characteristics of the supply chain is the rational allocation of resources; that is, enough quantities of goods can be produced and placed in the right target market during an adequate time period (Končar et al., 2020). For most companies, a company's supply chain capabilities are closely related to its core corporate competitiveness (Janvier-James, 2012). Especially for the Fast Moving Consumer Good (FMCG) industry, which plays a very significant role in the global economy and is closely related to people's supplements and consumption in daily life. According to globalEDGE (2022), the FMCG industry enjoys a strong development momentum, accounting for two-thirds of the world's economic and trade volume.

FMCG are also commonly known as Consumer Package Goods (CPG), which refers to products that consumers regularly consume (Gupta, 2018). Considering the characteristics of fast production turnover, short life cycles, low profits, large quantities, and fungible resources of FMCG as people's daily necessities, there are increasingly growing requirements for the FMCG industry to have a comprehensive logistic infrastructure system and a responsive supply chain. Moreover, an efficient and flexible supply chain enables those products to reach end customers faster and more economically (Stevenson & Spring, 2007).

Meanwhile, the increasing demand of consumers and the rapid development of the Internet have become more and more demanding on the contemporary supply chain. With the rapid development of economic globalization and information technology, consumers' consumption patterns and habits have changed significantly (Yu et al., 2020). Consumers' expectation for products and their delivery is constantly rising, for instance, the desire to obtain more cost-effective products in relatively convenient purchase channels with quicker delivery period. In addition, consumers' demand also tends to become more personalized. What's more, the FMCG market faces multiple challenges with the rapid popularization and application of the Internet. Especially from an omnichannel perspective, which is considered a complex network consisting of many entities and some interactions between them (Mirzabeikia & Saghirib, 2020). It has been proved by practice that from the initial physical stores to the multi-channel combined with offline stores, and then to the omnichannel environment, consumers are provided with more information and purchase choice space. Although omnichannel retail has achieved significant advantages in all aspects, it has increased operational complexity for managers and supply chain systems (Chen & Zhou, 2021).

Therefore, in such an era of continuous popularization of Internet platforms and changes in people's shopping habits and demands, the supply chain of FMCG is facing great changes. To better adapt to change, endeavors ought to pay extraordinary consideration to the optimization of the supply chain framework (Hubner et al. 2016). Especially, progressed point-of-sale, the Web of Things, user-generated substance on social media, and computerized advances such as cloud computing empower companies to gather expansive sums of information (Boone et al., 2019), through which we are able to progress the understanding of client behavior, make strides request determining, and superior perform supply chain administration.

In spite of the fact that numerous researchers have made a few ponders on the impact of buyer inclinations on supply chain decision-making and proposed a few models and optimization methodologies, there is still a lack of academic literature on the link between supply chain perspective and consumer choice behavior (Bask et al., 2013).

Therefore, this paper aims to study the influence of consumer preferences on the FMCG supply chain from the omnichannel perspective, and provide some special perspectives for enterprises in the FMCG industry that occupy a huge market share and have strong competition, gain unique competitiveness by taking advantage of the supply chain at the consumer side so as to further safeguard and promote the development process of the FMCG industry.

1.2 Purpose of the Study

In this paper, a large amount of data will be collected and analyzed in an omnichannel context to improve the understanding of consumer behavior, so as to find out the factors that influence enterprise supply chain decisions. In addition, the optimization of the FMCG supply chain will also be explored. To fulfill the purpose of the study, the following research objectives should be facilitated:

a) Explore consumer preferences and behaviors from the omnichannel perspective, so as to analyze the factors affecting FMCG industry supply chain decisions.
b) Formulate strategic adjustment and optimization measures of the FMCG supply chain based on consumer preferences and behaviors

1.3 Significance of the Study

This paper can provide beneficial enlightenment for the FMCG market supply chain (including but not limited to FMCG) to make supply chain decisions from the perspective of consumer preference, and optimization solutions will also be proposed, so as to increase the competitiveness of enterprises. Secondly, for consumers, an enterprise's knowledge of consumer preferences and behaviors can offer assistance for them to provide higher-quality and higher-level supply chain services to meet the expanding requests of shoppers. Finally, by quantifying the relationship between customer preferences and supply chain decisions to present factors and results in a more distinct way, this paper can moreover make up for the in current academic research on the influence of consumer preferences on FMCG supply chain decisions from the omni-channel perspective.

1.4 Theoretical Framework

1.4.1 Theory of Reasoned Action(TRA) and Theory of Planned Behavior (TPB)(Rausch & Kopplin, 2021).

The Theory of Reasoned Action(TRA) and Theory of Planned Behavior aims to explore the predecessors of such behavioral intentions eagerly by proposing intention-to-behavior connections (Rausch & Kopplin, 2021). TRA is simulated by altitude and subjective norms then forms behavioral intention, and finally produces specific behaviors. To begin with, due to the social weight of critical others, a favorable attitude toward a behavior might not able to be interpreted into activity (Webb & Sheeran, 2006). But, the subjective norm can measure the social influence on behavior (Shah & Mohamed, 2011). Assumably, the two factors of attitude and subjective norm can influence the behavior by means of advancing the formation of a mind or deliberate. Though it's challenging to clarify some unconscious behavior under TRA, the TPB solves the problem, which is the extension of TRA, and takes perceived behavioral control(e.g., compared to X, someone would regard doing Yis easier) into consideration. With the increased attention on TBP, there is a consensus that some constructs (e.g. efficiency, emotional reaction, environmental constraints) play an essential role in anticipating and changing the behavior of consumers. The use of this model can be beneficial to identify and explain the factors that affect some behaviors, and it is also a good tool to analyze the factors that affect consumer preferences (Simons-Morton & Lodyga, 2021).

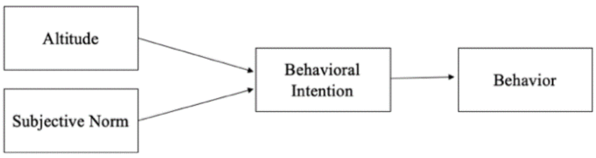


Figure 1 Theory of Reasoned Action (TRA)

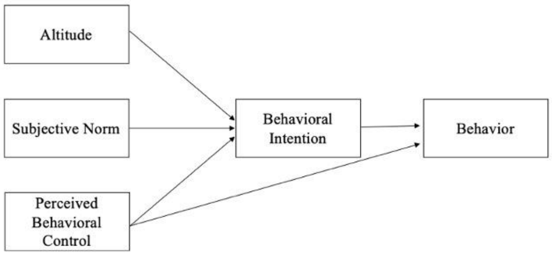


Figure 2 Theory of Planned Behavior (TPB)

1.4.2 Consumer Behavior in Omni-Channel Supply Chain Model (CBOCSC) (Yan et al., 2019)

The Consumer Behavior in Omni-Channel Supply Chain Model (CBOCSC) can help to determine the importance of various factors affecting consumer behavior in the omni-channel supply chain, and these factors can also be conducive to the decision-making of the FMCG industry Supply Chain. In Yan's research (Yan et al., 2019), The CBOCSC model proposed the subjective behavior pattern of using the social network and the degree of subjective social demands of diverse resources have a positive impact on consumer channels. Meanwhile, consumers' perceived degree of shopping convenience, value-added services, information quality, perceived risk of the social network, and percieved personalization all have significant positive effects. In this study, the above factors will be combined with FMCG product characteristics to conduct a questionnaire survey to determine the relationship and significance of each factor.

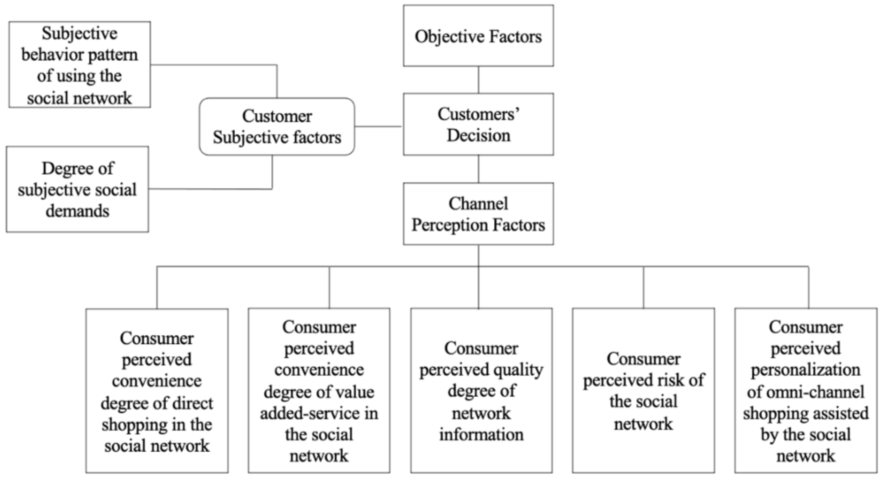


Figure 3 Technology Acceptance Model (TAM)

1.5 Conceptual Framework

Based on the review of the literature, the conceptual model is presented in Figure 4.

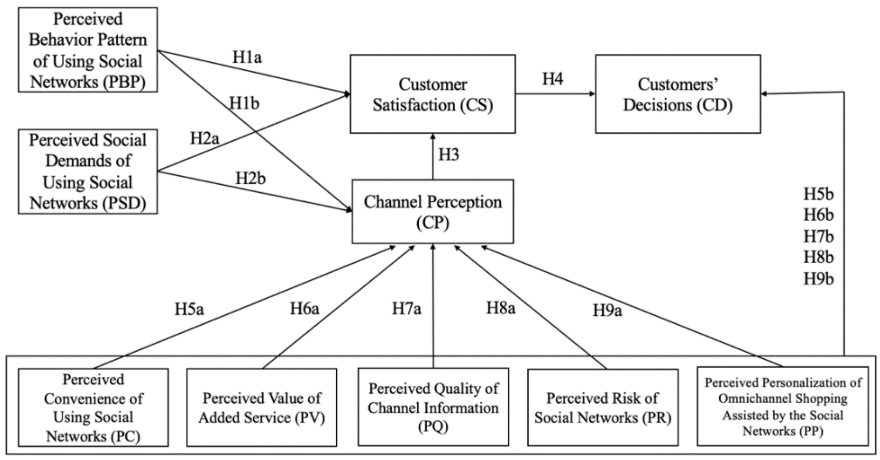


Figure 4

1.6 Hypothesis Development

H1a: Perceived behavior pattern of using social media (PBP) is positively associated with customer satisfaction (CS).

H1b: Perceived behavior pattern of using social media (PBP) is positively associated with channel perception (CP).

H2a: Perceived social demands of using social networks (PSD) are positively associated with customer satisfaction (CS).

H2b: Perceived social demands of using social networks (PSD) are positively associated with channel perception (CP).

H3: Channel perception (CP) is positively associated with customer satisfaction (CS).

H4: Customer satisfaction (CS) is positively associated with customer decisions (CD).

H5a: Perceived convenience of using social networks (PC) is positively associated with channel perception (CP).

H5b: Perceived convenience of using social networks (PC) is positively associated with customer decisions (CD).

H6a: Perceived value of added service (PV) is positively associated with channel perception (CP).

H6b: Perceived value of added service (PV) is positively associated with customer decisions (CD).

H7a: Perceived quality of channel information (PQ) is positively associated with channel perception (CP).

H7b: Perceived quality of channel information (PQ)is positively associated with customer decisions (CD).

H8a: Perceived risk of social networks (PR) is positively associated with channel perception (CP).

H8b: Perceived risk of social networks (PR) is positively associated with customer decisions (CD).

H9a: Perceived personalization of omnichannel shopping assisted by the social network (PP) is positively associated with channel perception (CP).

H9b: Perceived personalization of omnichannel shopping assisted by the social network (PP) is positively associated with customer decisions (CD).

2 Literature Review

2.1 FMCG Supply Chain Decision-making from Omnichannel

The emergence of the multichannel, the interaction of both physical and online retailing, provides a solid foundation for the development of a retailing omnichannel (Frasquet et al., 2017). Nevertheless, despite the fact that multiple channels coexist, neither customers nor retailers are able to direct how they are integrated (Beck & Rygl, 2015). In contrast, omnichannel offers consumers a consistent and seamless overview across various channels, along with taking brand esteem into the consideration, independent of the channel selection, so as to amplify consumers' purchase experience (Mirzabeiki & Saghiri, 2020). In addition, by offering a complete alignment of various channels and touchpoints, omnichannel really provides a high level of integration by allowing customers to easily switch between channels within the same transaction process (Hamouda, 2019). And just in the last decades, the majority of consumers have already started their shopping across many channels thanks to the Internet's explosive expansion (Zhang et al., 2010).

Moreover, omnichannel is a good development opportunity for enterprises that want to gain competitiveness through the supply chain. If the enterprise makes good use of it, it can not only help close the relationship between the target group and the company but also promote its business development (Sousa et al., 2021). According to the research, the omnichannel, particularly social networks, enables faster and more consistent communication and information transfer between the enterprise and its suppliers and customers, and then it can also achieve the same effect on the consumer side (Tungande et al., 2020).

However, due to the agile nature of their products, the FMCG retail industry has one of the most difficult and complex supply chains, such as fast turnover rate, short life cycles, low profits, large quantities, and fungible resources, is essential to meet customer's demand through flexibility (Tungande et al., 2020). Meanwhile, the key to prevailing is no more either clicks or bricks, not just one or the other, even further containing every possible chance of getting to the final customer (Djofack et al., 2021). In addition, FMCG is featured as end-consumer-centric, customer behavior has modifid due to the evolution of technologies such as the Internet and their expectations have become more complex (Thaichon et al., 2022). Therefore, contemporary enterprises, especially those in the FMCG industry, need to adapt and maximize the use of omnichannel, embed it into the supply chain, which could collect a wide range of information from different sources, and predict future trends, to help enterprises make wiser decisions (Salam & Khan, 2018).

2.2 Theoretical Framework and Hypothesis Development

2.2.1 Theory of Reasoned Action(TRA) and Theory of Planned Behavior (TPB)

The Theory of Reasoned Action (TRA) is a theory that explains why someone chooses to act in a particular way and is seen to be the best indicator of whether their behavior will be realistic (LaCaille, 2020). According to the research, altitudes and subjective norms demonstrate a positive relationship with a person's behavioral intention and actual action (Procter et al., 2019). Later, the appearance of perceived behavior control is taken into account by the Theory of Planned Behavior (TPB). Besides this, TPB is considered more accurate and informative than TRA (Ahmed & Ward, 2016). As a common rule, the more founded the person's decision to engage in the conduct in question should be, the more favorable the frame of mind and subjective standard, and the more notable the seen control (Bosnjak et al., 2020).

2.2.2 Consumer Behavior in Omni-Channel Supply Chain Model (CBOCSC)

Consumer behavior in the context of an omnichannel supply chain primarily refers to how consumers integrate data from various complicated channels, stores, and commodities into their decision-making processes (Yan et al., 2019). Combined with the characteristics of the FMCG industry, the Consumer Behavior in Omni-Channel Supply Chain Model (CBOCSC) can contribute to assessing the significance of various elements influencing consumer behavior under the omnichannel supply chain, the CBOCSS in this paper takes the factors of the perceived behavior pattern and perceived social demands, convenience, the value of added service, quality of channel information, perceived risks, perceived personalization of social networks into consideration, then further ascertain the significance of each aspect.

2.2.3 Perceived behavior pattern of using social networks

Broadly speaking, social networks (also known as social media, or SNSs) are websites and programs that let users create and share content with networks (Pittman & Reich, 2016). Meanwhile, many e-commerce sites today make heavy use of social networks to facilitate user contributions, social connections, and the online buying and selling of goods (Kwahk & Kim, 2016), which will foster consumers' use of social networks. According to TPA, a consumer's perceived behavior pattern or attitude toward using those social networks is related to the degree to of a person judges actions as being favorable or negative (Peña-García et al., 2020). If consumers' perception of the purchase channel is favorable, it is then anticipated that the consumer's intention and satisfaction to purchase through social networks will rise (Yeung & Morris, 2001). Thus, the first hypothesis is to investigate whether customers' attitudes regarding social networks have a substantial impact on their satisfaction and channel perception, as presented in the following:

H1a: Perceived behavior pattern of using social networks is positively associated with customer satisfaction.

H1b: Perceived behavior pattern of using social networks is positively associated with channel perception.

2.2.4 Perceived social demands

Vygotsky's theory contends that social interaction is essential to development (Akpan & Kennedy, 2020). Moreover, based on Maslow's pyramid-shape hierarchy of human demand, there is one level related to a person's social needs, close bonds, and relativeness (Ghatak & Singh, 2019) and interpersonal connection is a fundamental desire. At the same time, social networks modernized and facilitated channels for people to interact and socialize even when they make purchases, and to some extent, they can help users relieve loneliness and provide a platform for interpersonal communication (Pittman & Reich, 2016). For instance, more than 70% of people who use social media talk about and support advertising businesses (Currás-Pérez et al., 2013). According to earlier studies, social interaction linkages may have a considerable impact on the decision-making mechanisms of consumers (Ng, 2013), at the same time, social ties have been linked to favorable customer visitation intentions (Kwahk & Kim, 2016). Thus, the second hypothesis is to investigate whether customers' subjective demands regarding social networks have a substantial impact on their satisfaction and channel perception, as presented in the following:

H2a: Perceived social demands are positively associated with customer satisfaction.

H2b: Perceived social demands are positively associated with channel perception.

2.2.5 Channel perception

Consumer characteristics and social demographies, combined with their purchase experience all have an impact on consumer channel perception (Xu & Jackson, 2019). Besides, enterprises now show their concern about customers' intended channels of purchase in an omnichannel retail environment in addition to the products they are willing to purchase (Mela & Neslin, 2008), which is essential for their business. In general, customers' fundamental preferences for channels and the extent to which inertia influences their selections vary (Neslin & Shankar, 2009). Moreover, the ultimate purchase choice is recognized to be influenced by the consumer's purchase intention (Peña-García et al., 2020b), furthermore, the correlation between purchasing intent and perceived value is typically positive (Chiu et al., 2012). Thus, the third hypothesis is to investigate whether customers' channel perception has a substantial impact on their satisfaction, as presented in the following:

H3: Channel perception is positively associated with customer satisfaction.

2.2.6 Customer Satisfaction

Customer satisfaction is the sense of happiness or dissatisfaction that occurs from comparing the effectiveness of items with their intended effectiveness (Putro & Nurmahdi, 2020). Variables such as quality, convenience, and risk all can give consumers satisfaction on a level corresponding to the satisfaction of their consumption needs (Nawangsari et al., 2020). What's more, a positive attitude acts in the formation of a customer-satisfaction, which also reinforce consumers' purchase decision and repurchase intention in the future (Tandon et al., 2017). Thus, the fourth hypothesis is to investigate whether customers' satisfaction has a substantial impact on their decision:

H4: Customer satisfaction is positively associated with customer decisions.

2.2.7 Perceived convenience of using social networks

The convenience of the channel can bring savings to consumers from the dimensions of time, money, and experience, so as to promote the generation of consumers' enthusiasm for one or more particular channels (Xu & Jackson, 2019). In research from Berry et al., consumer perception of service convenience decreases when time expenses connected with a service increase (2002). There are various dimensions that can be used to measure social network convenience, such as the ease of access, search, possession, transaction, etc (Jiang et al., 2013).

The higher convenience makes it simpler for customers to use a certain channel to seek and eventually buy a product, which improves their perception of this channel(Ma, 2017). Thus, the fifth hypothesis is to investigate whether customers' perceived convenience of social networks has an impact on their channel perception and customer decisions, as presented in the following:

H5a: Perceived convenience of using social networks is positively associated with channel perception.

H5b: Perceived convenience of using social networks is positively associated with customer decisions.

2.2.8 Perceived value of added service

Many theories related to CRM now emphasize the significance of buyer-seller connections beyond just making sales and are built upon customer happiness and trust-building (Agnihotri et al., 2017). Successful differentiation are tracked more efficiently across the pre-sales, sales, and after-sales process thanks to social networks (Roblek et al., 2013). Such a value-added service is an addition to a current purchase that raises the value of every connection with a client, present or potential (Andzulis et al., 2012). Thus, the sixth hypothesis is to investigate whether customers' perceived value of social networks in pre-sale and after-sale processes has an impact on their channel perception and customer decisions, as presented in the following:

H6a: Perceived value of added service is positively associated with channel perception.

H6b: Perceived value of added service is positively associated with customer decisions.

2.2.9 Perceived quality of channel information

People today must cope with the abundance of information they have access to without knowing the information quality (Fu et al., 2020). Thus, the dilemma that the majority of people then encounter is determining which information is more reliable (Hilligoss & Rieh, 2008). Nevertheless, Purchase intentions are influenced by perceived channel information (Pearson et al., 2012), and the greater the quality of the information used to make decisions, the better those decisions will turn out, according to decision theory (Gallemore & Labro, 2015). In addition, the effectiveness of omnichannel integration is projected to matter more than multichannel. As mentioned before, "omnichannel" refers to channel integration to the fullest possible degree (Hamouda, 2019). Thus, the seventh hypothesis is to investigate whether customers' perceived risk of social networks has an impact on their channel perception and customer decisions, as presented in the following:

H7a: Perceived quality of channel information is positively associated with channel perception.

H7b: Perceived quality of channel information is positively associated with customer decisions.

2.2.10 Perceived risk of social networks

Perceived risk of social networks here specifically refers to the information privacy of consumers. Under the distinctive features of the e-commerce environment, such as incomplete information and the absence of face-to-face connection, consumers tend to perceive increased risk when they conduct an omnichannel purchase (Bhatnagar et al., 2000). Furthermore, online payment increases the consumer's perceived risk of disclosing personal information (Kim, 2020). Customers typically reveal as little information as possible to avoid undesirable effects, and they prefer circumstances where they feel they have a lot of control over their personal data (Wetzlinger et al., 2017). Scientists have established that while shopping on the internet, higher levels of perceived risk may have a detrimental impact on consumers' intent to purchase through social networks. (Kim, 2020). Thus, the eighth hypothesis is to investigate whether customers' perceived risk of social networks has an impact on their channel perception and customer decisions, as presented in the following:

H8a: Perceived risk of social networks is negatively associated with channel perception.

H8b: Perceived risk of social networks is negatively associated with customer decisions.

2.2.11 Perceived personalization of omnichannel shopping assisted by the social networks

Individuals rely on technological tools and applications more and more for interaction and collaboration in the Age of the internet; an individual's perception of overload may rise due to various technologies and apps (P. Yin et al., 2018). Consumers frequently find themselves unable to do a thorough analysis of all of their options before making a buying decision (Song et al., 2021), while personalization, which is capable of recognizing a variety of consumer wishes, preferences, and cultural traits as well as elements intended to reinforce consumers' purchasing intentions (Gana & Koce, 2016), can deliver customized messages based on users' specific tastes (Li, 2016). As a result, building decision support models that benefit users accurately, conveniently, and quickly identify appropriate products is more favorable (Schuckert et al., 2015). Especially at present, retailers can offer tailored services due to digital technologies (Wetzlinger et al., 2017). The recommendation system is one of the most typical ones; by swiftly choosing products that suit users, such systems can significantly minimize the amount of time people spend perusing vast volumes of information (Yin et al., 2020). What's more, based on the consumers' data analysis, individuals have a greater tendency to buy those recommended products (Liao et al., 2021). Thus, the ninth hypothesis is to investigate whether customers' perceived personalization of omnichannel shopping assisted by social networks has an impact on their channel perception and customer decisions, as presented in the following:

H9a: Perceived personalization of omnichannel shopping assisted by social networks is positively associated with channel perception.

H9b: Perceived personalization of omnichannel shopping assisted by social networks is positively associated with customer decisions.

3 Research Method

3.1 Data Collection and Sample Characteristics

In order to investigate the influence of consumer preferences on FMCG supply chain Decision-making from an omnichannel perspective, an online survey was created. Participants are Chinese web users under the age of 48 with a range of monthly earnings, occupations, and ages. At the same time, the participant demographics are shown in percentage form in Table 1. There were 251 participants, including 38 males and 213 females. Moreover, their ages tend to cluster between 18-22. 91.2% of them are university degrees.

Table 1. Demographics of respondents

Demographics	Frequency %
Gender	
Male	15.1
Female	84.9
Age	
≤17	0.4
18-22	88.8
23-27	7.2
28-32	1.6
33-37	0.8
38-42	0.0
42-47	1.2
≥48	0
Occupation	
Students	91.2
Unemployed	2.4
Part-time	1.6
Full-time	4.8
Monthly Income	
Less than 1,500 RMB	20.7
1,500-3,000 RMB	44.6
3,001-4,500 RMB	23.9
4,501-6,000 RMB	6.4
6,001-7,500 RMB	2
More than 7,500	2.4
Have you ever had shopping through social networks	
Yes	99.2
No	0.8
Frequency of buying products or services through the social networks	
Never	1.2
Sometimes	28.3
Usually	46.6
Always	23.9
How satisfied are your social networks shopping experiences	
Very satisfied	12.7
Satisfied	80.9
Dissatisfied	6
Very dissatisfied	0.4

3.2 Measures and Reliability Tests

The measurement approach used in this research makes reference to earlier research. The constructs include Perceived behavior pattern of using social networks (PBP), Perceived social demands of using social networks (PSD), Perceived convenience of using social networks (PC), Perceived value of added service (PV), Perceived quality of channel information (PQ), Perceived risk of social networks (PR), Perceived personalization of omnichannel shopping assisted by the social networks (PP), Channel Perception (CP), Customer satisfaction (CS), Customer decision (CD), originated with Yan et al. (2019). All the characteristics were evaluated using a seven-point Likert scale, ranging from 1 (Strongly disagree) to 7 (Strongly agree). A pilot test was conducted with 30 people to collect responses in order to pretest the reliability of the measurements. All measurement items were preserved for the official reliability tests because the results of the pilot test showed no reliability difficulties with them.

In many areas like social, behavioral, and educational sciences, reliability is frequently assessed using Cronbach's Alpha coefficient (Ravinder & Saraswathi, 2020). This coefficient, which ranges from 0 to 1, is used to assess the reliability of variables on various scales. Cronbach's alpha has a score between zero and one, with larger scores indicating that the items are more reliable at measuring something, and with a minimum desired effect size of 0.7, Cronbach's alpha reaches an adequate reliability coefficient (Bujang et al., 2018). Within two weeks, all of the valid questionnaires for this study were gathered. The Cronbach's alpha value for each variable is shown in Table 2. All of the values were more than or equal to 0.7, indicating that all of the variables' reliability is acceptable.

Table 2. Cronbach’s Alpha (α) of Each Variable

Table 2. Cronbach’s Alpha (α) of Each Variable

Variables	No. of Items	α
Perceived behavior pattern of using social networks (PBP)	5	0.799
Perceived social demands of using social networks (PSD)	5	0.810
Perceived convenience of using social networks (PC)	5	0.880
Perceived value of added service (PV)	5	0.870
Perceived quality of channel information (PQ)	5	0.898
Perceived risk of social networks (PR)	5	0.809
Perceived personalization of omnichannel shopping assisted by the social networks (PP)	5	0.852
Channel Perception (CP)	5	0.866
Customer satisfaction (CS)	5	0.879
Customer decision (CD)	5	0.900

3.3 Correlation Test

The r coefficient, often known as the correlation coefficient, measures the correlations between different variables. The correlation r number, which ranges from -1 to +1, can be either positive or negative to indicate a positive or negative correlation relationship. If the r value is changed from -1 to 0, especially in particular situations, the relationships between two variables are negative. In contrast, it shows that the two variables are positively associated if the r value is between 0 and +1. The correlation between two variables is stronger the closer the r value is to |1|.

Table 3. Correlation analysis between the variables

Variable	PBP	PSD	PC	PV	PQ	PR	PP	CP	CS	CD
PBP	1									
PSD	0.488**	1								
PC	0.586**	0.374**	1							
PV	0.582**	0.425**	0.656**	1						
PQ	0.534**	0.336**	0.723**	0.745**	1					
PR	0.209**	0.363**	0.035	0.148**	0.008	1				
PP	0.430**	0.466**	0.364**	0.462**	0.371**	0.374**	1			
CP	0.524**	0.500**	0.413**	0.459**	0.352**	0.411**	0.605**	1		
CS	0.561**	0.525**	0.405**	0.522**	0.420**	0.435**	0.619**	0.801**	1	
CD	0.603**	0.397**	0.440**	0.563**	0.501**	0.315**	0.526**	0.650**	0.758**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 displays the findings of an investigation of correlations between various factors.

The absolute magnitude of the observed correlation coefficient (two variables), which varied from 0.90 to 1.00, will receive a strong correlation according to Schober's (2018) remark of the standard method for interpreting a correlation coefficient. A significant correlation exists between the two variables if the r value is between 0.7 and 0.89. Two variables have a moderate correlation when their r values are between 0.4 and 0.69. When the value of |r| falls between 0.1-0.39 or 0.00-0.10, it indicates a weak or insignificant connection, respectively. All of the factors for the data gathered below exhibit at least a moderate association with one another.

4 Results

4.1 Evaluation of Measurement Results

The statistical method of determining the relationship between independent and dependent variables is known as regression analysis. In the research of Hayes and

Rockwood, mediation is a regression-based analysis (2017).In this study, model 4 and model 6 are used, including the linear regression of the independent variable X and dependent variable Y, regression analysis of the independent variable X, the mediating variable M1 and M2, and the dependent variable Y.

On the basis of the hypothesis model and the established conceptual framework, perceived behavior patterns of using social media (PBP), perceived social demands of using social networks (PSD), channel perception (CP), perceived convenience of using social networks (PC), the perceived value of added service (PV), perceived quality (PQ), perceived risk (PR), perceived personalization of omnichannel shopping assisted by the social networks (PP) are set as the independent variables and customer decisions (CD), both customer satisfaction (CS) and channel perception (CP) will influence customer's purchase decision under the omnichannel environment.

4.2 Hypothesis Analysis

Table 4 displayed the outcomes of the structural model analysis. From the analysis, we can conclude that the perceived behavior pattern of using social media is positively associated with customer satisfaction. H1a is accepted since $\beta = 0.561$, $p < 0.01$. For H1b, $\beta = 0.524$, $p < 0.01$, hence H1b is supported, and the perceived behavior pattern of using social media will largely influence channel perception. In H2a, since $\beta = 0.524$, $p < 0.01$, H2a is accepted, and perceived social demands of using social networks are positively related to customer satisfaction. While for H2b, which is accepted and perceived social demands of using social networks are positively associated with channel perception, because $\beta = 0.500$, $p < 0.01$. Channel perception ($\beta = 0.801$, $p < 0.01$) had a powerful influence on customer satisfaction, thus accepting H3. In addition, customer satisfaction ($\beta = 0.758$, $p < 0.01$) is positively associated with customer decision, so accepting H4. H5a is accepted since $\beta = 0.413$, $p < 0.01$, thus perceived convenience of using social networks is positively related to channel perception. While for H5b, which is accepted, and perceived convenience of using social networks is positively associated with customer decision, because $\beta = 0.440$, $p < 0.01$. The perceived value of added service ($\beta = 0.459$, $p < 0.01$) is positively associated with channel perception, thus supporting H6a. For H6b, since $\beta = 0.563$, $p < 0.01$, H6b is accepted, and the perceived value of added service is positively associated with customer decision. Perceived quality of channel information ($\beta = 0.352$, $p< 0.01$) is positively related to channel perception, then supporting H7a. For H7b, $\beta = 0.501$, $p< 0.01$, so H7b is accepted, and the perceived quality of channel information is positively associated with customer decision. Perceived risk of social networks ($\beta = 0.411$, $p< 0.01$) is positively associated with channel perception, thus accepting H8a. For H8b, $\beta = 0.315$, $p< 0.01$, so H8b is accepted, and the perceived risk of social networks if positively associated with the customer decision. Perceived personalization of omnichannel shopping assisted by social networks ($\beta = 0.605$, $p< 0.01$) is positively associated with channel perception, so H9a is supported. Since β = 0.526, $p < 0.01$, H9b is accepted, and perceived personalization of omnichannel shopping assisted by the social network is positively associated with customer decision.

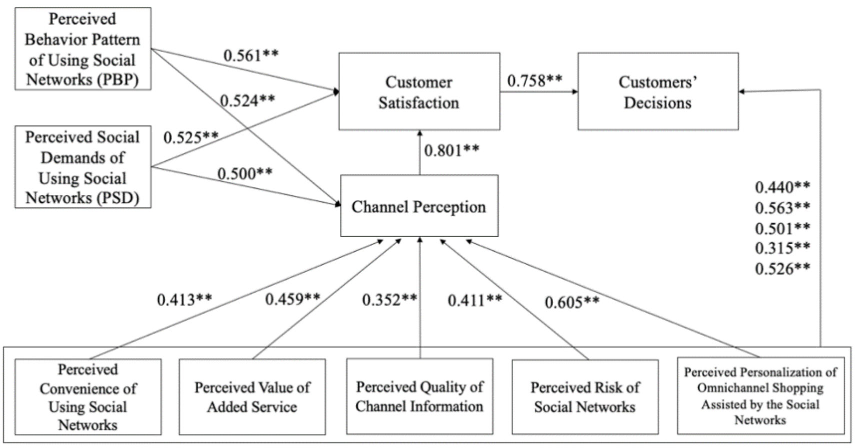
Table 4. Hypothesis Analysis

Hypotheses	Path	Coefficient	*t* value	*p*-value
H1a	PBP→CS	0.561	10.698	0.000**
H1b	PBP→CP	0.524	9.708	0.000**
H2a	PSD→CS	0.525	9.738	0.000**
H2b	PSD→CP	0.500	9.109	0.000**
H3	CP→CS	0.801	21.000	0.000**
H4	CS→CD	0.758	18.324	0.000**
H5a	PC→CP	0.413	7.163	0.000**
H5b	PC→CD	0.440	7.730	0.000**
H6a	PV→CP	0.459	8.159	0.000**
H6b	PV→CD	0.563	10.754	0.000**
H7a	PQ→CP	0.352	5.932	0.000**
H7b	PQ→CD	0.501	9.131	0.000**
H8a	PR→CP	0.411	7.114	0.000**
H8b	PR→CD	0.315	5.228	0.000**
H9a	PP→CP	0.605	11.996	0.000**
H9b	PP→CD	0.526	9.754	0.000**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 5 Hypothesized model with results



**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Non-significant routes are illustrated in dotted lines above.

4.3 Mediation Analysis

Table 5 indicates the result of the mediation analysis of CP and CS, taking them as the mediation items within variables of PBP, PSD, PC, PV, PQ, PR, PP, and CD. We use SPSS 26 and Hayes Process Macro to calculate the total and indirect effects. The total effect via CP and CS was significant since $p < 0.01$, and the indirect effect via CP and CS was significant as well because $p < 0.01$ demonstrating that CP and CS played a mediation part within PBP, PSD, PC, PV, PQ, PR, PP, and customer decision of using the social networks channel to conduct research.

Table 5. Mediation analysis

Path	Effect	Coefficient	SE	*t* value	*p*-value	LLCI	ULCI
PBP → CS → CD	Total	0.6992	0.0586	11.9316	0.0000**	0.5838	0.8146
PBP → CP → CS → CD	Total	0.6992	0.0586	11.9316	0.0000**	0.5838	0.8146
PSD → CS → CD	Total	0.3806	0.0558	6.8174	0.0000**	0.2707	0.4906
PSD→ CP → CS → CD	Total	0.3806	0.0558	6.8174	0.0000**	0.2707	0.4906
PC→ CP → CS → CD	Total	0.5080	0.0657	7.7300	0.0000**	0.3786	0.6374
PV→ CP → CS → CD	Total	0.6158	0.0573	10.7544	0.0000**	0.5031	0.7286
PQ → CP → CS → CD	Total	0.5833	0.0639	9.1315	0.0000**	0.4575	0.7092
PR → CP → CS → CD	Total	0.2708	0.0518	5.2283	0.0000**	0.1688	0.3728
PP → CP → CS → CD	Total	0.5070	0.0520	9.7538	0.0000**	0.4046	0.6094
Indirect effect	**Effect**	**Coefficient**	**Boot SE**	**Boot LLCI**		**Boot ULCL**	
PBP → CS → CD	Indirect	0.3981	0.0565	0.2930		0.5157	
PBP → CP → CS → CD	Indirect	0.2383	0.0484	0.1480		0.3351	
PSD → CS → CD	Indirect	0.3824	0.0475	0.2910		0.4761	
PSD→ CP → CS → CD	Indirect	0.2295	0.0423	0.1498		0.3154	
PC→ CP → CS → CD	Indirect	0.2298	0.0483	0.1406		0.3311	
PV→ CP → CS → CD	Indirect	0.2016	0.0408	0.1261		0.2862	
PQ → CP → CS → CD	Indirect	0.1762	0.0382	0.1051		0.2524	
PR → CP → CS → CD	Indirect	0.1773	0.0349	0.1137		0.2493	
PP → CP → CS → CD	Indirect	0.2486	0.0457	0.1607		0.3401	

Table 6 demonstrates the hypothesis testing results on the basis of data analysis.

Table 6. Summary of Hypothesis

Hypothesis	Results
H1-a: Perceived behavior pattern of using social media (PBP) is positively associated with customer satisfaction (CS)	Supported
H1-b: Perceived behavior pattern of using social media (PBP) is positively associated with channel perception (CP)	Supported
H2-a: Perceived social demands of using social networks (PSD) are positively associated with customer satisfaction (CS)	Supported
H2-b: Perceived social demands of using social networks (PSD) are positively associated with channel perception (CP)	Supported
H3: Channel perception (CP) is positively associated with customer satisfaction (CS)	Supported
H4: Customer satisfaction (CS) is positively associated with customer decisions (CD)	Supported
H5-a: Perceived convenience of using social networks (PC) is positively associated with channel perception (CP)	Supported
H5-b: Perceived convenience of using social networks (PC) is positively associated with customer decisions (CD)	Supported
H6-a: Perceived value of added service (PV) is positively associated with channel perception (CP)	Supported
H6-b: Perceived value of added service (PV) is positively associated with customer decisions (CD)	Supported
H7-a: Perceived quality of channel information (PQ) is positively associated with channel perception (CP)	Supported
H7-b: Perceived quality of channel information (PQ)is positively associated with customer decisions (CD)	Supported
H8-a: Perceived risk of social networks (PR) is positively associated with channel perception (CP)	Supported
H8-b: Perceived risk of social networks (PR) is positively associated with customer decisions (CD).	Supported
H9-a: Perceived personalization of omnichannel shopping assisted by the social network (PP) is positively associated with channel perception (CP).	Supported
H9-b: Perceived personalization of omnichannel shopping assisted by the social network (PP) is positively associated with customer decisions (CD).	Supported

Conclusions

The outcome of this study demonstrates that all the hypotheses were supported. This paper revealed that the seven variables (PBP, PSD, PC, PV, PQ, PR, PP) positively influenced the customer's decision (Yan et al., 2019), and both customer satisfaction and channel perception mediate between those variables and the customers' decision (Rausch & Kopplin, 2021), which are in agreement with earlier findings. Moreover, this study indicates that supply chain practitioners or managers in the FMCG industry can better understand consumers' choices and tendencies of purchase channels under the omnichannel background from the perspective of consumer preference, so as to help enterprises establish and optimize the customer-centered supply chain system.

This study discusses the relationship between omnichannel supply chains and consumer channel decisions based on consumers' subjective channel perceptions and social needs for social networks. Firstly, according to the survey results, the channels are influenced by consumers' personal preferences, and consumers' subjective perception of channels varies from person to person. Moreover, consumers have certain social needs on social networks, (Ghatak & Singh, 2019; Pittman & Reich, 2016; Ng, 2013; Kwahk & Kim, 2016), and the reviews on product usage or service sent by users on social networks can provide some reference to users who want to buy the same product, which is helpful and beneficial for other buying processes (Ventre & Kolbe, 2020).

Secondly, according to the study, consumers' perceived convenience of using social networks, the perceived value of added service, the perceived quality of channel information, the perceived risk of social networks, and the perceived personalization of omnichannel shopping assisted by the social networks have significant effects on customer decision in omnichannel supply chains (Ma, 2017; Agnihotri et al., 2017; Pearson et al., 2012; Bhatnagar et al., 2000; P. Yin et al., 2018). At the same time, consumers believe that shopping through social networks provides convenience and additional services during the pre-sales and post-sales process that add value to the overall buying experience (Roblek et al., 2013). Purchase through social networks allows for a certain amount of online socialization to take place in the shopping experience, which is in line with their expectations. However, it is worth noting that consumers believe that the current social network purchase channel has some risk issues and that consumers expect their personal rights, information and payments to be protected. In addition, the personalization of social networks and the provision of quality and comprehensive information can increase customer satisfaction with the channel.

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Identification, analyzing and solving of the nonconformities through selected quality management tools

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Abstract: Companies nowadays must adapt to quickly changing conditions on the market. It is common for a production company to have some inconsistencies in the production process and it depends on the quality system how will the company decrease their occurrence. Nowadays is quality department an important part of companies because it is responsible for consistent production, high quality of produced pieces and employees working in the department. This paper aims to identify the main nonconformities and complaints to propose solutions to their reduction and corrective measures. In the article, we want to focus on the identification of nonconformities and complaints and their analysis through selected quality management tools. The first part of the article contains the theoretical basis of an overview of the issue, which further characterizes the importance of management quality, its importance and use in the company. The second part contains the main goal together with partial goals and methodology, which served as the base for calculations necessary for the elaboration of own research.

Keywords: quality management system, nonconformity, complaint, quality management tools, Pareto chart

1 Literature review

Since the company was established in 1993, the situation on the market has changed. The company had to adapt to changing conditions and introduced new quality system in order to be competitive. When the company was established, documentation was mostly kept in a paper form which slowed down efficiency. In comparison to the current situation, nowadays the company uses an internal system with shared access. In 2004 the company started to implement ISO 9001 certification and in 2013 ISO 14001 certification. Implementing the certifications helped the company to operate more efficiently on the market and maintain competitiveness. Nowadays there are various quality management tools used to improve quality within the company.

For an organization to run and function successfully, it is essential to guide and manage it in a systematic and transparent way (Hrubec & Cservenáková, 2016). The prevailing processes of globalization and integration, along with the creation of new technology, are what define the current corporate environment (Svikruhova et al., 2021). Quality management, according to one of the concerns, is monitoring the manufacturing and product creation processes to guarantee that the final product fulfills the designer's or customer's expectations (Faghih et al., 2021). Quality management, according to one of the concerns, is monitoring the manufacturing and product creation processes to guarantee that the final product fulfills the designer's or customer's expectations (Faraji et al., 2022). Modern quality management of production is connected to quality control which is a set of activities such as continuously control of products, removing identified shortcomings, employee motivation and products improving (Pačaiová et al., 2015). A major discipline supporting the full life-cycle (consultation, commitment, verification, planning, validation for design, and delivery to consumers) needs to be completely understood in order to establish, run, and sustain Quality Assurance process skills (Zhang et al., 2020). The critical understanding and application of these methodologies in the correct discipline empower and achieves effective, adaptable, and Quality Assurance outcomes (Noda, 2021). To achieve more consistent quality, quality management employs quality assurance and control of processes as well as products (Summers, 2019). Quality management considers not just the quality of the product or service, but also the methods used to attain it (Walls et al., 2018). Quality assurance is a method of reducing errors and flaws in manufactured products and services, as well as avoiding issues when delivering solutions to clients (Abbas, 2020). This defect prevention in quality assurance differs slightly from defect detection and rejection in quality control, and has been dubbed a skiff left because it emphasizes quality earlier in the process (Bravi et al., 2019). Quality assurance refers to the administrative and procedural operations carried out in a quality system to ensure that a product's, service's, or activity's objectives and goals are met (Lee et al., 2019). Error prevention is achieved through systematic measurement, comparison to a standard, process monitoring, and a related feedback loop (Sader et al., 2021). Quality control, on the other hand, is concerned with the output of the process. Quality Assurance is more of a function of policy and administration (Ammar et al., 2021).

All of the ISO management standards are based on the premise that a quality management system is understood by everyone is the ideal prerequisite for the suitable level of quality in the company (Hinsch, 2019). According to Japanese managers, quality management is changing summary of factors which are constantly changing under the influence of its environment. Managers are supposed to be skilled in statistical methods and that is why quality management can be also called as a statistical quality management (Kapsdorferová & Švikruhová, 2018).

The organization must identify external and internal challenges that are relevant to its mission and strategic direction and have an impact on its capacity to achieve the environmental, quality, and energy management system's desired outcomes (Grover & SACHIN GROVER, 2021). There are numerous advantages to improving quality (El-Reedy, 2015). Control is a crucial managerial role that ensures the evaluation of processes in a regulated system in order to contribute to the system's or individual elements' dynamic balance (Mišún & Hudáková, 2017). Manufacturing excellence is considered as the key aspect to survive in today´s strongly competitive market environment. Goals of world-class companies are to provide products and services that really work according to requirements while generating minimal waste (Hansen et al., 2021). Processes quality and productivity improvement are getting more important and enable clear view on economical possibilities of an organization and using them leads to saving of costs in comparison to the competition of the organization (Margherita & Braccini, 2020). Economic aspects of complex quality management are essential for stable and long-term operation of a company on the market (Kumar et al., 2021). They are the main reason why is the company on the market. They serve to meet needs of owners, employees, managers, customers, suppliers, and company itself (Asif, 2020). Management should pay attention to cost analysis of quality and synthetic view of quality which is the overall economic efficiency (Prentice et al., 2020).

The article's main goal is to identify the principal causes of nonconformities and complaints to suggest appropriate corrective measures. Via analysis of these causes, we would like to find their key cause through chosen quality management tools. Results of the analysis will provide us with data on the number of nonconformities and complaints for the analyzed period, the number of costs for their correction and the key causes of their occurrence.

To fulfill the main goal, we set the following partial goals which consist of Creation of Pareto analysis based on the internal information from 8D report, identification of main causes of nonconformities and complaints in the company and suggestions for the quality department how to reduce the number of discrepancies and complaints.

Analyzed period was January 2021 till January 2022. We chose this time period due to the fact that data in 8D Report started from January 2021. By monitoring data from this time period, we can ensure uniformity and comparability of data.

For analysis of the most numerous types of nonconformity and complaint, we used Pareto analysis. Firstly, we analyzed the most numerous types of nonconformities and complaints for February.

For the purpose of comparison monthly costs on nonconformities and complaints, we summed up all nonconformities and complaint that occurred in certain month and created a bar graph. After we created the bar graph, we chose the most numerous types on complaints and summed up amount of costs on chosen complaints. We used the same procedure to calculate costs on nonconformities.

2 Own elaboration

For the analysis of the quality management system, we chose a Slovak company focused on the manufacture of engineering products and entrepreneurship operates without any foreign participation and foreign investors. The company has been using ISO 9001 certification since 2004 and ISO 14001 certification since 2013 as a quality management system. For solving problems connected to external complaints and internal nonconformities, company uses an 8D report as an effective tool of collecting data, their evaluation and further processing. The main objective of the company is to increase efficiency of processes by decreasing number of complaints and nonconformities.

2.1 Analysis of quality system tools used in the company

For purpose of this article, the quality department of the chosen company provided us with their 8D report where we found all data needed for the analysis. Based on data, we created Pareto diagram which shows us what is the biggest nonconformity which caused the highest amount of complaints in case of external customers. Goal of the company is to find as many nonconformities as possible internally, which will reduce external complaints. After identifying internal nonconformities, immediate actions are taken like for example interruption of production process of broken piece and either repairing it or excluding it from the whole process.

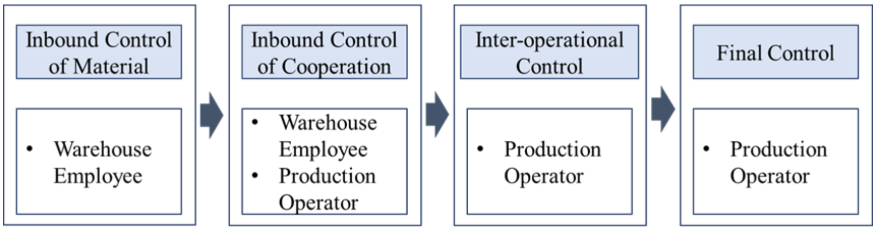

Figure 1: Levels of Control

Source: Own elaboration

In the process of production can occur a variety of nonconformities, which are found by employees, and they can be either repaired or removed from the production process. In case of external complaints, they are found by customers in their companies. After receiving a complaint report, the company can either accept or deny it. In case they deny a complaint, it will not be recorded in the monthly statistics. Each complaint and nonconformity have its own internal number which helps with better organization of the 8D report.

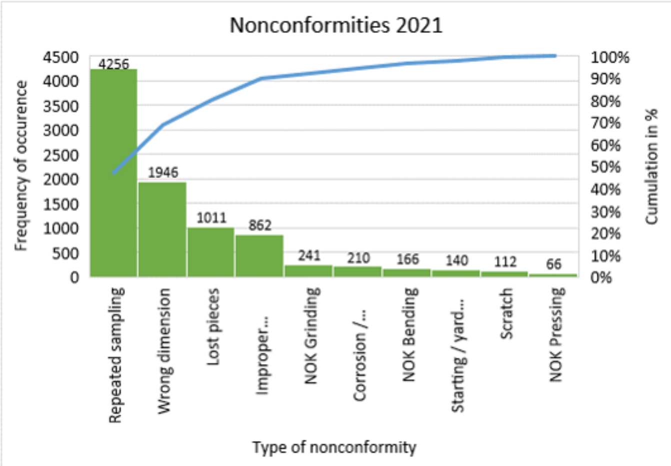

Figure 2: Pareto Analysis – Nonconformities 2021
Source: Own Elaboration based on company data

There are 10 types of nonconformities found by employees in the diagram above. Pareto diagram shows us that the most significant nonconformity with the biggest impact is repeated sampling. By solving a problem connected to repeated sampling, approximately 90% of defects would be solved.

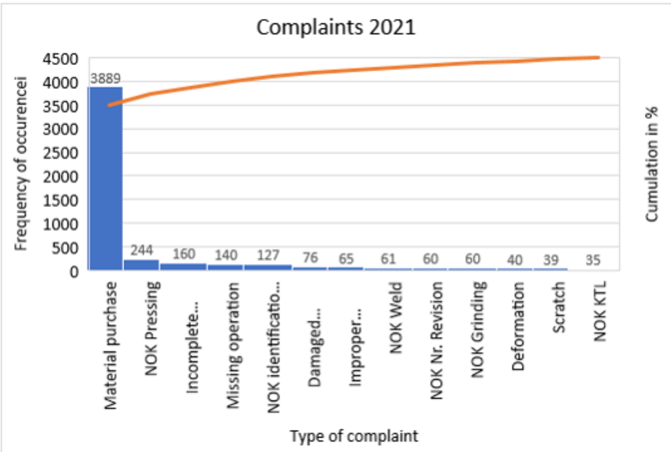

Figure 3: Pareto Analysis – Complaints 2021
Source: Own elaboration based on company data

The most significant impact has a problem with purchased material where 3 889 pieces were defected and complained. In graph we can see that over 80% of defects would be solved by solving a problem connected to material purchase. Other complaints do not occur in numbers as high as material purchase.

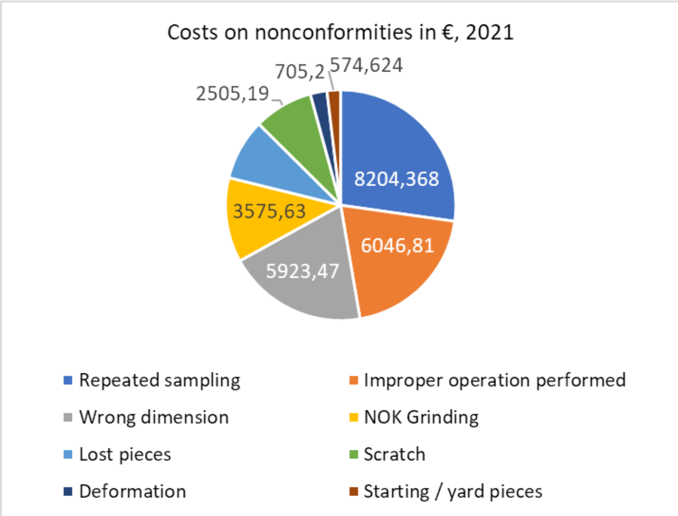

Figure 4: Costs on nonconformities
Source: Own elaboration

In Diagram 3, we can see which nonconformities are the costliest for the company. We chose nonconformities which have costs higher than 500 €. On the first place there is repeated sampling which is the costliest and most numerous nonconformities at the same time with the level of costs 8 204,37€.

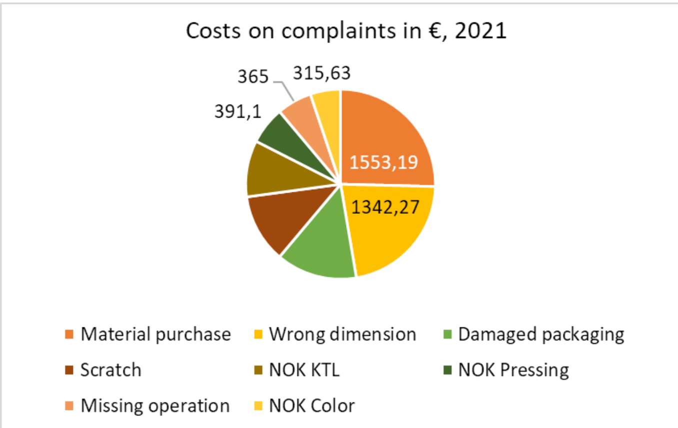

Figure 5: Costs on complaints
Source: Own elaboration

In Diagram 3, we can see which nonconformities are the costliest for the company. We chose nonconformities which have costs higher than 500 €. On the first place there is repeated sampling which is the costliest and most numerous nonconformities at the same time with the level of costs 8 204,37€.

Conclusion

By using the quality management tool – the Pareto analysis, we were able to identify the main causes of nonconformities and complaints. Based on the results of used quality management tools we suggested solutions to identified problems. When comparing amount of nonconformities and complaints, we noticed that the number of nonconformities is higher than the number of complaints. It is a company goal to identify as many defected pieces internally as possible in order to decrease the number of complaints from customers.

In Pareto analysis, we identified the most common type of nonconformity, which was repeated sampling and in the case of complaints, it was material purchase. As a result of Pareto analysis, we found out that the company can solve 90% of problems by solving the problem of repeated sampling in case of nonconformities and over 80% of problems by solving a problem with material purchase in case of complaints.

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Organic Farming and Markets During Covid-19

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Abstract: Over the past decades, the market for organic production and products has grown year on year. This has been true in Hungary, in Europe and elsewhere in the world. The market turnover of the goods produced in this way has also increased year after year, and is even forecast to do so. This was also the case for the areas involved in production. However, the most recent data available for 2020 and 2021 show a decline in organic produce sales markets. The 12.5% growth in 2019-2020 was followed by a 1.3% decline, which was quite unusual. The COVID-19 infection wave has put the issue of health, but the general economic downturn has affected even organic food sector that is supposed to be supporting health. Consumer fears, the economic downturn, the rise of online sales, price sensitivity, higher prices for organic products, and reduced spending have all contributed to this downturn.

Keywords: organic farming; organic food market; COVID-19; crisis

1 Introduction

Following the economic crisis of 2008, the world is back to business as usual, but 2019 has seen a major shift. The first cases of Covid-19 were detected in December in the city of Vuhan, and then the coronavirus started to spread intensively and on 31 December China informed the WHO about the pneumonia outbreak in Vuhan, Hubei province (Zheng et al., 2020; Liu et al., The pathogen was later identified (Bai et al., 2020), and the pathogen, originally named New Coronavirus 2019 (2019-nCoV), was later officially renamed Severe Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses (Lai et al., On 30 January 2020, the WHO declared the spread of SARS- CoV-2 virus, which causes COVID-19, as a public health emergency of international concern (Zheng et al., 2020; Bai et al., On 11 March 2020, the WHO declared the new coronavirus (COVID-19) a pandemic (Cucinotta and Vanelli, 2020; WHO, 2020) and reported that in just two weeks, the number of cases outside China had increased 13-fold and the number of countries had increased 3-fold (Cucinotta and Vanelli, 2020). COVID-19 is very different from other viruses in that it has the highest transmission rate to humans. It can be fatal for the elderly or for those with underlying problems related to a weak immune system.

From samples of Chinese patients, COVID-19 has been found to be caused by the SARS- CoV2 virus. The live virus was not only present in the respiratory tract but also on the patients' faces, leading them to conclude that the widespread spread of the live virus outside the respiratory and airways may be the cause of the spread of the live virus (Murthy et al., 2020). In another study, it was found that COVID-19 had a higher replication rate compared to SARS coronavirus (Liu et al, 2020). Some researchers have suggested that bats may be the primary source of SAR-CoV-2, as it is closely related to two bats from acute respiratory syndrome, bat-SL-CoVZC45 and bat-SL-CoVZXC21 (Lai et al., 2020; Sheeren et al., 2020). However, there are no confirmed studies on the intermediate source of COVID-19 transmission from bats to humans. At present, the intermediate source of COVID-19 transmission is not known, but it has been confirmed that COVID-19 has halted the world. economic, social and political processes.

Coronaviruses are a type of viruses. any member of the family of large, single-stranded RNA viruses (Coronaviridae), whose lipid envelopes are filled with spike-shaped proteins, infect birds and many mammals, including humans, and include the causative agents of MERS, SARS, and COVID-19 (Webster, 2022). Many different species exist, and some cause disease. The coronavirus identified in 2019, SARS-CoV-2, a respiratory disease called COVID-19, has caused a pandemic. Researchers currently believe that the coronavirus is spread by virus particles in airborne droplets when the infected person's face comes into contact with others. Infectious particles can persist in the air and accumulate indoors, especially where large numbers of people congregate and where there is poor ventilation (Hopkins Medicine, 2022).

Coronaviruses are a type of viruses. any member of the family of large, single-stranded RNA viruses (Coronaviridae), whose lipid envelopes are filled with spiky proteins in the shape of a club, infect birds and many mammals, including humans, and are the causative agents of MERS, SARS and COVID-19 (Webster, 2022). There are many different species, and some cause disease. The coronavirus identified in 2019, SARS-CoV-2, a respiratory disease called COVID-19, has caused a pandemic. Researchers now know that the coronavirus is spread by virus particles in airborne droplets when an infected person breathes, talks, laughs, sings, coughs or sneezes. Larger droplets can fall to the ground in a few seconds, but tiny infectious particles can remain in the air and accumulate indoors, especially where large numbers of people congregate and where ventilation is poor (Hopkins Medicine, 2022). SARS-CoV-2 may have originated in animals and mutated (mutated) to cause disease in humans. In the past, outbreaks of infectious diseases have been traced to viruses from birds, pigs, bats and other animals that mutated to become dangerous to humans. SARS-CoV-2 is a new member of the CoVs, a large group of highly diverse, enveloped, positive-sense, single-stranded RNA viruses. Research has reported that SARS-CoV-2 probably originated from bats, based on the similarity of its genetic sequence to that of other CoVs.The intermediate animal host of SARS-CoV-2 between the probable bat reservoir and humans is still unknown. Although this nCoV has genetic characteristics that are similar to the CoV family, it may have a different gene sequence that is highly divergent from previously sequenced CoVs (Gortázar and Fuente, 2020). This coronavirus infection is typically associated with mild symptoms. These may include cough, fever, muscle aches, shortness of breath and fatigue. In some cases, they cause more severe symptoms. They may include acute respiratory failure, pneumonia, even sepsis, and circulatory or multi-organ failure. Patients with a chronic underlying disease (hypertension, cardiovascular disease, diabetes, liver disease, respiratory disease, cancer) are more likely to develop a severe or life-threatening condition (WHO, 2022; Koronavirus.gov.hu, 2022). Figure 1. shows us the number of cases of COVID-19.

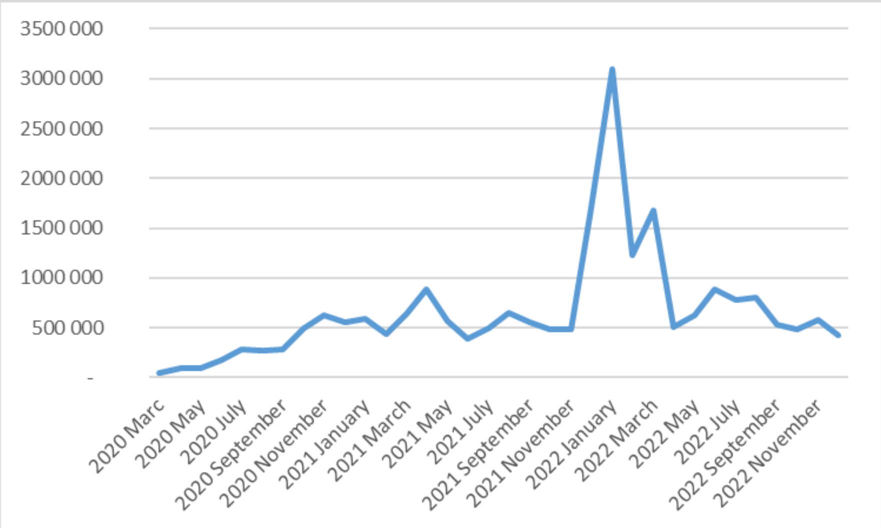

Figure 1. The number of COVID-19 cases 2020-2022

Source: worldometer (2022)

The cases initially caused a lot of fear among both the public and professionals because of the lack of knowledge. The most extreme period was not in the initial year 2020, but in December 2021, the period before Christmas. However, the number of deaths linked to coronavirus disease justified the concerns, as they spiked in early 2021 and then moderated by the summer of 2022.

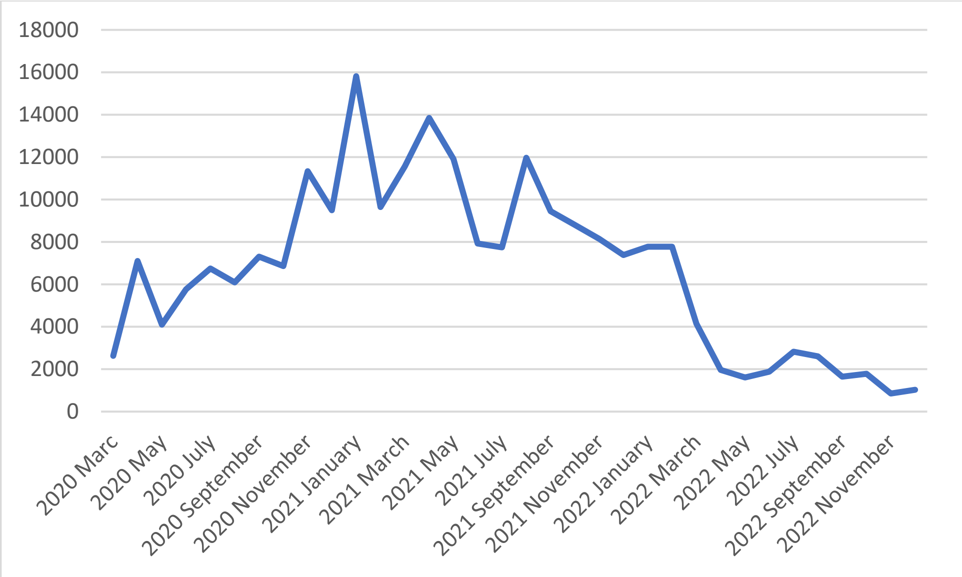

Figure 2. The number of death cases by COVID-19 2020-2022
Source: worldometer (2022)

Countries around the world have taken steps to improve basic facilities, particularly health care, which were called into question by the COVID-19 pandemic, including the developed countries of the world, which had claimed to have the best health care systems in the world. COVID-19 alerted the world to address real human problems rather than fighting each other merely to demonstrate dominance. The crises created by the pandemic brought attention to the health investment policies of states (Hussain et al., 2020).

Table 1: Key data on COVID-19 until 2022.

Country	Total case number	nem cases	Death cases	new deaths	Total revovered	new recovered	Active cases	Serious, critical	Total cas/1 million pop	deaths/1m pop	Total tests	Tests/1 m pop	number of habitants
World	649 799 405	16 393	6 646 043	301	626 994 443	139 129	16 158 919	37 074	83 363	852.6			
USA	100 796 300		1 106 640		98 257 582		1 432 078	3 541	301 059	3 305	1 141 588 533	3 409 709	334 805 269
India	44 674 459		530 628		44 138 235		5 596	698	3 176	377	906 950 463	644 768	1 406 631 776
France	38 027 968		159 093		36 968 080		900 795	869	579 831	2 426	271 490 188	4 139 547	65 584 518
Germany	36 557 861		158 198		35 869 800	7	529 863	1 406	435 817	1 886	122 332 384	1 458 359	83 883 596
Brazil	35 400 159		690 213		34 262 104		447 842	8 318	164 382	3 205	63 776 166	296 146	215 353 593
S. Korea	27 308 090	46 564	30 729	60	26 326 795	66 539	950 566	460	532 011	599	15 804 065	307 892	51 329 899
Japan	25 220 452	89 566	50 344	151	20 754 250	12 609	4 415 858	353	200 824	401	81 441 509	648 498	125 584 838
Italy	24 488 080		181 733		23 799 178		507 169	320	406 355	3 016	258 382 332	4 287 595	60 262 770
UK	24 024 746		197 253		23 750 288	2 809	77 205	146	350 737	288	522 526 476	7 628 357	68 497 907
Russia	21 617 601	6 598	392 231	55	21 018 980	4 589	20 639	23	148 263	269	273 400 000	1 875 095	145 805 947

Source: wordometer (2022)

Different countries were affected differently in terms of numbers of cases, deaths and cures, as shown in Table 1. About 1% of all cases ended in death. The situation was worse in Brazil and India, while fewer cases in the welfare states ended in death.

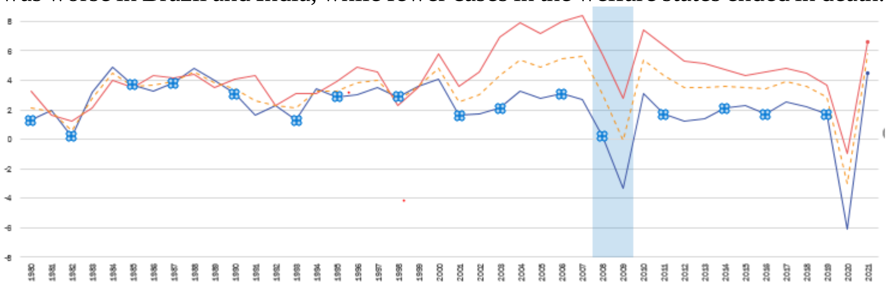

Figure 3. Economic performance in welfare and developing countries 1990-2021

Source: IMF (2022)

In Figure 3, the economic decline in the wealthy countries in blue was more significant than in the developing countries in red. There are several reasons for this. One is that developing countries have a larger share of the population engaged in agriculture, which means that these people are close to nature and work in a healthier environment. Another reason could be that in these countries it is not the covid virus but poverty and low living standards, malnutrition. Because of this, there was not as much fear and austerity as in the welfare states.

Baldwin (2020) argues that this crisis is not a normal recession because it was caused by a reaction to a health phenomenon. It was caused by a policy of containment to try to reduce the number of deaths. In countries where there have been no cuts, the health risk has been taken, but in return economic performance has not fallen. According to econ-core research, businesses were characterised by disrupted supply chains, labour supply, and a drop in sales revenues. For households, it was characterised by falling employment, wages and salaries, and a decline in purchases. However, the burden on the environment has fallen under austerity (Econcore, 2022).

According to the OECD study (2022), economic output fell by around 50-100% during 2020. Within the service sectors, travel-related activities, including tourism, and direct contact between consumers and service providers, such as hairdressers or house purchases, have clearly been adversely affected by restrictions on movement and social distance. Most retail outlets, restaurants and cinemas have also closed, although takeaways and online sales may prevent some businesses from going out of business altogether. Non-essential construction work has also been adversely affected, either by restrictive policies affecting labour availability or by a temporary decline in investment. The direct impact of closure measures is smaller in manufacturing sectors, some of which are less employment intensive. However, complete closures are taking place in the manufacture of transport equipment, often because of difficulties in obtaining the necessary inputs from suppliers in other countries.

GDP growth has been below the long-term trend, with low inflation in most developed countries in the pre-COVID-19 period, often below the 2% target (Macrotrends, 2022). It has also been characterised by low unemployment and high employment rates. In the post-financial crisis decade, nominal interest rates fell close to zero, with very low real interest rates. The debt-to-GDP ratio increased in the aftermath of the financial crisis (2008) and stabilised at the height of 2013 (Econcore, 2022)

As shown in Figure 4, trade flows also declined in most euro area countries and have struggled to recover. Interestingly, there was a big swing in France, which corrected the decline with equal intensity.

Figure 4: % change in trade turnover compared to the previous year. EU, Germany, France and Hungary 2017-2022 Source: Statistische Bundesamt (2022)

2 Data and methodology

Data for the study were provided by the statistics of the Hungarian Central Statistical Office (KSH) and Eurostat, as well as studies, materials and records of various Ecological Agriculture Research Institutes. Materials and articles relevant to the impact of COVID-19 were taken from the Statista database and from the scopus, web of science and google scholar databases. The econ core studies were also used as a source, as well as the worldometer materials. The correlations and underlying causes were drawn from these materials and statistics. I used a simple statistical methodology and looked for correlations between changes in consumption of general products and changes in ecological products. More complex statistical analyses were not possible due to the scarcity of recent data and difficulties of access.

3 Results

Over the past decade, spending on food has increased by 4% on average, as shown in Figure 5. Despite COVID-19 constraints, growth in 2019-2020 and 2020-21 has been higher than growth in 2014-2019. In contrast, average inflation rates in the world over this period ranged between 0.8% and 3.8%, meaning that food consumption increased in real terms.

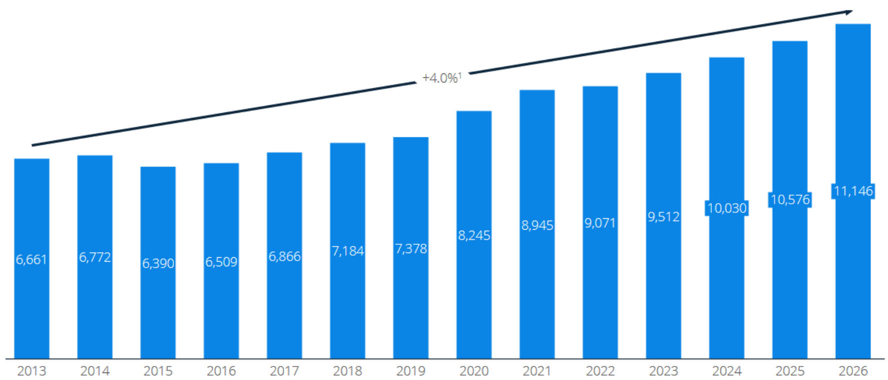

Figure 5 Annual global food sales in USD 1000 billion. 2013-2026 * Estimates 2022-2026 Source: Statista (2021)

For food products, the overall brand awareness of food is relatively low compared to other consumer product categories, i.e. consumers are more brand loyal, familiar and differentiated with non-food products. Among the product attributes that are important to consumers, health and sustainability are the most important. At the same time, a survey shows that Chinese consumers are also more aware of food safety.

Europe and China have the highest proportions of respondents who avoid artificial flavours and sweeteners, while British and North American consumers are less concerned about them. However, North American consumers claim to suffer more from food intolerances, highlighting the importance of free products. In the countries surveyed, those who try to eat less meat (flexitarians), do not eat meat (vegetarians) or do not consume any animal products (vegans) have become a significant target group. Among the mentions of sustainability, the preference for regional foods was the highest, with 44% on average, while 31% and 29% preferred organic and fair trade products respectively (Statista, 2021, Statista 2022c).

Organic agriculture, also known as organic farming, is growing year on year. The area under cultivation is also increasing (Willer et al., 2022), one reason being that organic farming has generally outperformed conventional systems in economic terms. This is largely due to lower production costs and higher market prices. However, organic farms face lower yields, especially in the fruit, vegetable and livestock sectors. At the same time, organic farming can bring significant local environmental benefits (Durham and Mizik, 2021). The data in Table 2 show that organic production is also price-sensitive and that, in addition to following a philosophy, profitability is also of paramount importance, and sometimes even more important than principles. Moreover, the environmental benefits of this production are clearly higher.

Table 2: Major carachteristics of organic and conventional farming

Characteristics	Conventional	Conventional Plus Biotechnology	Organic	IPM
Yield	Normal	Up to 15% higher	At least 10% lower	Comparable to Conventional
Pesticide Cost	Normal	Lower	Much lower	Much lower
Fertilizer Cost	Normal	Normal	Much lower	Normal
Labor Cost	Normal	Lower	Higher (+15%)	Higher
Product Variety	Specialization	Specialization	Diversification	Diversification
Product Price	Normal	Normal	High price premium	Normal
Gross Margin	Normal	Much higher	Generally higher	Higher
Pricing/Business Model	Volume	Volume	Margin	Margin
Environmental Benefits	Normal	Higher	Much higher (at the micro level)	Much higher

Source: Durham Mizik (2021)

While general food consumption grew by 3.2% year-on-year between 2013 and 2020, organic food sales grew by an average of 8.6%, a more significant increase, and thus relatively more than the change in conventional food consumption. The magnitude of the correlation between the two sets of data was 33.5%, i.e. a very slight medium correlation. This means that the change in organic food has a small effect on the change in total food consumption and vice versa. Sales of organic products accounted for 1.9% of total sales. Willer et al (2022) predict a decline in growth from 2022 onwards, i.e. COVID-19 restrictions could mean a decline in sales of organic products. Unfortunately, the latest statistics for organic products are not available, so we cannot be sure until 2020. According to Willer et al (2022), the United States had the highest sales of organic products in 2020. It amounted to €49.5 billion, followed by Germany with €14.9 billion, then France and China (12.7 and 10.2 respectively). In the US, organic accounted for 3.1% to 6% of total food consumption between 2008 and 2020. Organic food sales

Demand for organic food is driven primarily by personal health and environmental reasons, and in the US, organic food sales have increased every year since 2000. In 2021, organic sales in the United States reached approximately US$57.5 billion. Within the category, yogurt and meat products were the most commonly purchased categories. According to one survey, only 15 percent of Americans do not buy organic food. Per capita spending on organic packaged foods and beverages was just over $70 US per person in 2021, almost $20 more than in 2017. By 2025, the consumption value of organic beverages is projected to be around $2.8 billion. However, the demand for organic packaged food is growing and the projected consumption value for 2025 exceeds USD 25 billion (Statista, 2022a).

The European market for organic products is highest in Europe in Germany and France, with sales of €15 billion and €12.7 billion respectively. Denmark has the highest share of organic retail sales, followed by Austria and Switzerland. The average expenditure per capita in the EU is around €102. Some popular reasons for buying organic food among European consumers include supporting local businesses, health reasons and avoiding pesticides and other sprays. Although many consumers want to support organic food, they may not be willing to pay the higher prices. The majority of respondents would probably pay about five percent more for organic food than for conventional food. However, only about 14 percent indicated that they would be willing to pay more than ten percent more for them. According to a German survey The typical organic food consumer in Germany is female, aged between 30 and 69, according to research. They are typically in a couple and have a university degree. Spends at least €3,500 a year on food, so is wealthy. She likes and respects nature and does something for it. Sustainability and health are the main motives for his food choices and he prefers local food (Statista, 2022b).

According to Willer et al. (2021), a COVID epidemic is expected to change the global organic food industry. The pandemic has highlighted the vulnerability of international supply chains. The supply of raw materials was disrupted when countries started emergency measures. Some countries, for example, stopped exporting agricultural products because they had imposed a freeze. Freight rates and transport costs have risen and delivery times have increased. COVID-19 showed that the winners in the current crisis are those who have kept their supply chains close to home. Operators relying on organic food from other geographical regions have been the worst off. The development of local - if not regional - supply chains seems to be the way forward (Willer et al., 2021). A French study found that local organic dairy farmers experienced a moderate impact on supply chains due to the pandemic. Despite downsizing, supply chains continued to produce sufficient quantities of dairy products to meet consumer demand (Perin and Martin, 2021).

During the pandemic, continuity of supply in the agri-food sector - one of the most important sectors alongside health - was crucial to prevent a food crisis and reduce the negative impact on the global economy (Aday and Aday, 2020). Unlike traditional food supply chains, regional food supply chains were able to adapt their operations quickly. This rapid response has been facilitated by the adoption of best logistics practices, many of which have been based on the creation of new collaborative partnerships and the use of information and communication technologies (Marusak et al, 2021).

Recognising the weakness of supply chains, some national governments have focused on keeping food supply networks moving in times of crisis. The United Kingdom and the United Arab Emirates, for example, have ensured that there is no disruption to food imports during the crisis. Singapore, which imports 90 percent of its food supply, has invested in domestic production. Access to safe, sufficient and nutritious food is likely to be increasingly high on the political agenda. Asian and

African countries that have traditionally focused on export-oriented organic food industries are now developing domestic markets (Willer et al., 2021).

Governments should invest more in organic farming for food security. Countries should aim to reduce pesticide use and improve soil fertility. The EU's 'farm to fork' strategy aims to improve food security in Europe. The strategy aims to reduce the environmental impact of Europe's food system by reducing chemical pesticide use by 50 percent, hazardous pesticide use by 50 percent, fertiliser use by 20 percent and nutrient losses by 50 percent by 2030. Governments must facilitate the movement of workers and agri-food products. They should also provide financial support to small farmers and vulnerable people. Facilities must change working conditions and maintain worker health and safety by changing safety measures. Food protectionist policies should be avoided to prevent food prices from rising (Aday and Aday, 2020; Barman et al., 2021).

A shift towards transparency and traceability in agricultural supply chains is expected to gain momentum. Traceability plays a vital role in the quality and safety of food (Iftekhar and Cui, 2021). As the supply of organic ingredients/products shrinks, the risk of fraud and adulteration increases. Traceability tools will be used to maintain the integrity of organic products (Willer et al., 2021).

COVID-19 has had the biggest impact on consumers, changing their shopping and eating habits (Śmiglak-Krajewska and Wojciechowska-Solis, 2021). From initial panic buying and stockpiling to less frequent shopping and online shopping, COVID-19 is causing significant changes in consumer attitudes and behaviour. Online shopping has become significantly widespread (Ćirić, 2020). Sales of organic food have increased significantly during the crisis. At the same time, demand for plant-based foods, nutritional supplements and natural products is also increasing. Consumers are turning to health and wellness products as they pay more attention to disease prevention and maintenance. The challenge for the industry is to ensure that the marketing of organic products meets the needs of changing consumer behaviour. Sales of organic dairy products are already being adversely affected by the rise of plant-based products (Willer et al, 2021; Statista 2021b). For example, attitudes in UK households towards food consumption and catering at home have changed. The study reveals the increased frequency and variety of cooking during the closed season as a factor influencing household food waste. Catering service providers are expected to need to adapt their business environment and adopt protective and preventive measures, such as frequent cleaning and routine health checks, to encourage visitation (Filimonau et al., 2022).

4 Conclusions and discussions

COVID-19 has brought a long-forgotten epidemic to the populations of developed countries that has turned our lives upside down. The official reason given for the cuts was to reduce the risks of disease and death. The consequence was a sharp fall in economic performance and a crisis for the people of the welfare world. As food satisfies basic needs, consumption has not fallen. Only organic products, which are considered premium products, have seen a moderate decline in consumption, while the demand for safe food has increased. In several countries, supply has been disrupted and supply chains have been broken. Local food has become more prevalent. Governments had a major responsibility to manage the difficulties in the new circumstances. Consumer habits have also changed, with health becoming more important to consumers, and more attention being paid to the origin and other characteristics of products. Price remains important to consumers, but quality has become more important. Buying online is becoming increasingly important (Śmiglak-Krajewska and Wojciechowska-Solis, 2021). Distinguishing organic products and presenting their benefits through marketing tools may also be of particular importance. The high price of organic products is a deterrent for the average consumer, especially among the poorer classes. Distrust remains one of the reasons why people do not buy organic food (Rojik et al., 2021). This is because it satisfies several consumer needs.

As the most recent data on organic food and markets for 2021 and this year are not available, it will be possible to conduct more complex and accurate research on this market segment in the future as data become available.

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A Review of the Impact of Green Supply Chain Management Practices in Sub-Saharan African Organizations

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Abstract: With the increasing uncertainty and concern regarding the real impact that the mismanagement of the environment could have in the future, in recent years, numerous organizations have been looking for new ways to be more socially and environmentally responsible. As they understand the importance of protecting the environment, these organizations have begun to adopt more environmentally friendly strategies, such as green supply chain management (GSCM), to grow and remain to compete in the market. This systematic literature review investigates the impact of green supply chain management in sub-Saharan Africa. The literature review includes 40 published articles directed to sub-Saharan Africa from global and regional journals in the areas of supply chain management, operations management, sustainability, and corporate social responsibility. We found that green supply chain management positively affects the economic performance of Sub-Saharan African companies, including increased efficiency, cost savings, and stakeholder satisfaction. Additionally, green supply chain management also positively impacts environmental performance, including reduced emissions, waste, and increased resource efficiency. The findings of this review provide valuable insights for businesses, policymakers, and civil society organizations in Sub-Saharan Africa on the potential benefits of green supply chain management in the region. Finally, the study also illustrates the gap in research in the region.

Keywords: Green supply chain management, Systemized literature review, Sub-Saharan, sustainable supply chain, performance.

1 Introduction

The awareness of environmental-related issues has skyrocketed in recent years, leading to a shift in the way both producers and consumers think about the environmental impact of their products. Producers are now more conscious of the environmental impact of their products, while consumers are increasingly looking for more eco-friendly products (Van Hoek, 1999; Anbumozhi & Kanda, 2005). This has resulted in a greater demand for sustainable products and practices. With that in mind, organizations worldwide have started to play their part in adjusting to the current demands in order to remain competitive in the market. In addition, apart from the profit-oriented goals set by many organizations worldwide, they have also started to comprehend the undeniable importance of adopting more "green" practices and the need to work towards improving their environmental management efforts, especially within the supply chain.

The emergence and implementation of supply chain management saw companies worldwide experience an improvement in their various business operations (Ireland & Webb, 2007; Fawcett, et al., 2008; Ajmera & Cook, 2009; Näslund & Hulthen, 2012). Additionally, the ever-going revolutions and the constant need for innovation in different industries tend to result in new ways to operate in the market and consequently force companies to adjust or face being left behind. As a result, ever since the "supply chain revolution," the strategies of many companies operating in different industries have shifted to a more sustainable one that requires the implementation of practices aimed at safeguarding the environment.

In the present day, it is essential for companies to not only survive but to thrive in a sustainable manner while being mindful of the environment. According to the United Nations Brundtland Commission (1987, p. 16), sustainability is "a development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Green supply chain management (GSCM) is a key component to achieve this.

As a concept that draws on both supply chain management and environment management literature (Srivastava, 2007), green supply chain management can be seen as an approach that helps organizations manage the flow of goods, information, and services. It also focuses on minimizing the negative impacts throughout the entire supply chain. Thus, green supply chain management has become increasingly important in recent years due to growing public concern over climate change and increased pressure from governments and other stakeholders to reduce the negative environmental impact of business activities. In addition, as the "old supply chain management" becomes less effective and more vulnerable over time when dealing with environmental-related issues, there was the need to create a modernized strategy that could deal with the current and future environmental, social and economic problems in the chain. This has also led to increased interest in green supply chain management, not only by those involved in supply chain operations but also by many scholars worldwide.

Green supply chain management is a set of principles and practices that are designed to reduce the environmental impact of supply chain activities. These practices include reducing waste, optimizing efficiency, and optimizing resource utilization. By implementing these practices, companies can ensure that their operations are sustainable and environmentally friendly. This will enable them to remain competitive in the long term and ensure their continued success.

As the international market for goods and services becomes increasingly globalized, the need to develop efficient and sustainable supply chains has become increasingly important in sub-Saharan Africa. In response to this, the concept of green supply chain management has gained increasing prominence in the majority of sub-Saharan countries, not only from scholars but also from organizations. However, the adoption of green supply chain management in sub-Saharan Africa has been relatively slow.

Many companies in sub-Saharan Africa are beginning to recognize the economic benefits that green supply chain can bring, which could further serve as a lever for the rapid adoption of green supply chain management practices in the region. This research examines the impact of green supply chain management in Sub-Saharan Africa and the potential benefits of implementing green supply chain management initiatives in the region. Therefore, the following research questions were formulated to properly understand how green supply chain management (GSCM) has been implemented in the sub-Sahara region and how it impacts different organizations present in the region:

1.What is the impact of green supply chain management on Sub-Saharan African organizations according to the reviewed literature?

2.Can these organizations benefit from the implementation of GSCM?

Nevertheless, to answer the research questions presented in this paper and help fill the research gap, we have conducted a systematic literature review, starting with the collection and then analyzing the most relevant research papers on this theme.

2 Theoretical background

In this section, we briefly describe the relevance of GSCM, and then summarize some relevant studies on the sub-Saharan dimension of the topic.

2.1 Green Supply Chain Management

To fully understand green supply chain, it is necessary first to define supply chain and supply chain management.

According to numerous scholars, supply chain can be defined as a transparent and organized process in which those focused on providing end goods to customers transform raw materials into finished goods, which are then made available for their customers to purchase (Beamon, 1998; Janvier-James, 2012; Pienaar, 2009). In addition, supply chain can also be defined as "the integration of procedures from suppliers to consumers to provide products/services and information in order to add the values of the customers and the related roles” (Janvier-James, 2012, pp. 194-205). On the other hand, supply chain management (SCM) can be viewed as a complementary process to supply chain in that it helps conduct and "manage" the whole process to arrive at a satisfactory end.

Green supply chain management (GSCM), or "sustainable supply chain management" (Seuring & Müller, 2008; Hassini, et al., 2012; Vasileiou & Morris, 2006), is a relatively new concept in the supply chain area, considered to a certain degree by many scholars as part of the environmental innovation process of an organization or company (Pagell & Wu, 2009). It can be defined as a set of policies or strategies aimed at identifying and managing the overall environmental impact of different supply chain operations such as manufacturing, transportation, product design, and material sourcing in order to mitigate wasteful outcomes that might compromise the process or damage the environment (Srivastava, 2007; Rauer & Kaufmann, 2015; Epoh & Mafini, 2018; Hu & Hsu, 2010). Similarly, for Seuring and Müller (2008, p. 1700), sustainable supply chain is "the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements".

Different from how things were in the past, customers nowadays are more demanding and are constantly looking to be informed about the daily operation of the companies with which they interact. To ensure that these companies are managed in accordance with the different climate issues, both internal and external stockholders play a crucial role in pressuring and encouraging organizations worldwide to adopt environmentally friendly practices in their day-to-day operations to improve their performance towards the environment, a vital point in the emergence of green supply chain management in the 1990s (Kagan, et al., 2003; Handfield, et al., 1997; Green, et al., 1998).

According to Garza-Reyes (2015), implementing a strategy such as green manufacturing can be important to achieve sustainable results for the company. However, in another study by Chan et al. (2012), the authors emphasize the necessity of creating a pro-environmental corporate culture, taking into account stakeholders' needs and requirements, in order to enhance the integrated green supply chain management, as well as the positive effect that green practices such as green purchasing and GSCM activities have on corporate performance. In contrast, Gehin et al. (2008) state that implementing green supply management practices and strategies does not necessarily lead to sustainable results.

Initially, GSCM was driven by environmental degradation, dwindling raw material resources, and rising pollution levels. However, nowadays, organizations view green supply chain management (GSCM) as a viable way to both reduce the environmental impact of operations and enhance operational performance (Vanalle, et al., 2017; Srivastava, 2007; Handfield, et al., 1997; Kagan, et al., 2003). Moreover, the implementation of GSCM goes beyond environmental concerns, as it can lead to increased profits, cost savings, and business value (Kagan, et al., 2003; Srivastava, 2007; Chan, et al., 2012).

A study by Lee et al. (2012) found that environmental factors such as pollution, climate change, and the depletion of natural resources play a crucial factor in the race to green both organizations and the supply chain entirely. Moreover, Hu and Hsu (2010), in a study conducted on green supply chain management in Taiwan, argue that GSCM does not solely focus on practices that aim to protect the environment but also on the economic aspects of the organization.

According to Khan (2019), there are mainly six key factors that contribute to the successful implementation of green supply chain practices:

Ethical leadership/internal management,

- Customer Management,
- Competitiveness,
- Societal,
- Supplier management,
- Regulatory.

2.2 Green supply chain management in Sub-Saharan Africa

Sub-Saharan Africa (SSA) is a region of diverse countries, cultures, and economic opportunities. However, the region is also characterized by inadequate infrastructure, limited access to capital, and a lack of institutional capacity. While green supply chain management (GSCM) has the potential to bring significant benefits to sub-Saharan Africa, the region has been slow to adopt these practices due to a variety of challenges.

The literature on green supply chain management (GSCM) in Sub-Saharan Africa seems to be limited. However, several studies have examined green supply chain management's impact and potential benefits. For example, a study conducted by Muma et al. (2014) shows that adopting green supply chain management practices in Kenya has contributed positively to reducing both environmental pollution and the cost of environmental management. In addition, a study by Obeng and Osei-Bonsu (2017) examined the potential benefits of green supply chain management (GSCM) in a case study of a Ghana-based company. The study found that GSCM can reduce costs, improve efficiency, and increase customer satisfaction. The study also found that GSCM can improve environmental performance and help Sub-Saharan African companies meet sustainability goals. The study concluded that GSCM could be an effective tool for companies in Sub-Saharan Africa to increase their competitiveness in global markets.

Furthermore, in a study conducted by Epoh and Mafini (2018) on small and medium enterprises in South Africa, they found that incorporating green supply chain management practices, such as reverse logistics and compliance with laws and regulations, can enhance both environmental and supply chain performance. Moreover, Mburu (2014) also found that implementing green supply chain management practices improves the performance of specific companies, especially within the sugar industry. Similarly, Vermeulen and Ras (2006) researched the challenge of greening global product chains, and the challenges that companies face in meeting both ends of the spectrum. They examined the various challenges to greening global product chains, including the need for companies to balance environmental sustainability with economic returns. The study concluded that companies must be willing to invest in greening global production chains in order to remain competitive and that governments and other stakeholders should also play a role in developing and implementing greening strategies.

Furthermore, a study by Ogunlela (2018) examined the impact of green supply chain initiatives on the manufacturing industry in Nigeria. The study found that implementing green supply chain management practices can help organizations magnify their performance and improve their competitive advancement.

A study by Thuo and Susan (2017) examined the potential benefits of green supply chain management in Kenya-Universities. The study found that implementing green supply chain practices enhances Kenyan universities' performance and encourages adopting more green supply chain management practices as it can help universities in Kenya achieve sustainability. Another study in Kenya by Barasa et al. (2015) found that green supply chain management positively impacts steel manufacturing companies in Kenya and helps them improve their performance.

In a 2020 study by Bag et al. (2020), the authors investigated the role of GSCM in the automotive and manufacturing industry in South Africa. They found that implementing green supply chain management (GSCM) strategies and processes can have a significant impact on the environment, society, and finances, and the level of complexity of the product may alter the relationship between the GSCM strategy and process.

Finally, Ojo et al. (2015) investigated the implementation of green supply chain management in the construction industry in Nigeria. The authors found that green supply chain management practices are important in the construction industry because they improve environmental and economic performance.

Sub-Saharan Africa (SSA) is a region of diverse countries, cultures, and economic opportunities. However, the region is also characterized by inadequate infrastructure, limited access to capital, and a lack of institutional capacity. While green supply chain management (GSCM) has the potential to bring significant benefits to sub-Saharan Africa, the region has been slow to adopt these practices due to a variety of challenges.

Certain studies have been conducted to explore the various factors influencing the adoption of green supply chain management in sub-Saharan African countries. Mukiri (2017) identified a range of internal factors, and perceived benefits were found to be associated with green supply chain management adoption in the region. These factors included environmental awareness, stakeholders' influence, and lack of understanding.

A study conducted in Mozambique by Niemann et al. (2016) on the difficulties in implementing green supply chain management shows that government regulations, culture, and costs are among the factors delaying the implementation of green supply chain management in the country.

The government significantly influences the implementation of green practices in the region (Lund-Thomsen & Nadvi, 2010). For example, a study by Mukiri (2007) found that the adoption of green supply chain management (GSCM) practices in Kenya is still relatively low due to the government's unwillingness to create incentives such as policies that accelerate the process.

A study by Ras et al. (2007) in the agriculture sector in South Africa found that factors such as the lack of required knowledge and expertise, absence of policies that incentive the adoption of GSCM in the sector, high costs, and lack of trust in the industry between suppliers and consumers, are among the factors that delay the adoption of more green supply chain practices in the country. In addition, these issues affect not only the South African market but also the majority of sub-Saharan African countries.

The study by Morris and Dunne (2004) looked at the impact of driving environmental certification in the furniture and timber products value chain in South Africa. They found that there were economic and environmental benefits to driving environmental certification, including improved market access and credibility, improved supply chain management, and improved governance. However, they also found that there were challenges to driving environmental certification, such as the cost of certification, lack of capacity and awareness, and regulatory barriers. Additionally, they found that there were opportunities for further progress, such as improving collaboration between stakeholders and increasing public-private partnerships.

Despite the ongoing attempts to monitor and tackle the ecological concerns, such as deforestation, waste, contamination, and so on, that plague the Sub-Saharan African region, many countries in the region still have a considerable distance to cover (Darkoh, 2009) to be completely ready to handle these environmental issues. Therefore, for Sub-Saharan countries to properly implement green supply chain practices, minimizing some of the climate issues that may endanger the region in the future, the government, the public, and organizations must comprehend their part in eliminating these problems.

Despite having low pollution levels according to world standards, some Sub-Saharan African countries need to start tackling their level of C02 emissions (SARDC, 1994).

In recent years, the levels of CO_2 emission in Sub-Saharan Africa have been growing at a high rate, especially in the countries shown in Fig.1, with South Africa having the highest emissions, with around 390 million metric tons in 2016 (Worldometer, 2016). This position could be linked to the fact that South Africa has the most developed industry among the countries in the region. However, according to Shakantu et al. (2007) and Ojo et al. (2014), in order to promote changes, especially in the construction industry, the South African government has been acting as both client and moderator, intending to encourage practices that would help reduce waste, increase the use of resources more efficiently and consequently transform the working environment.

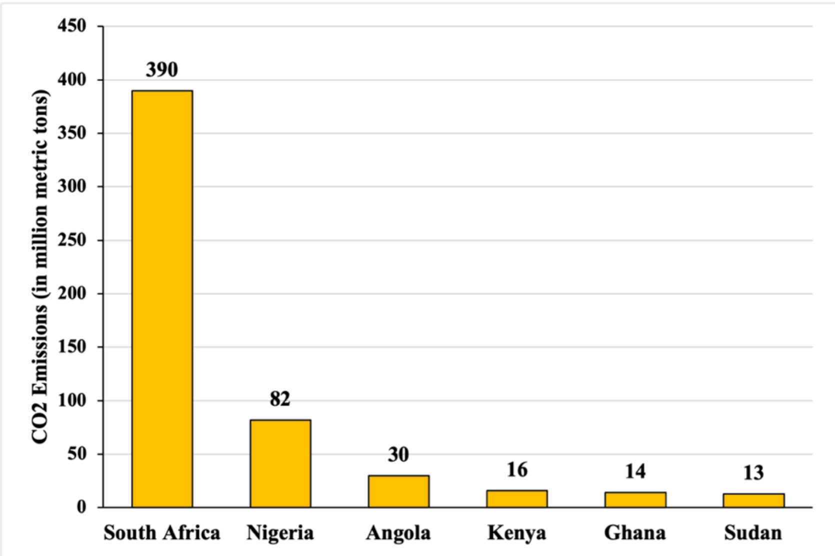

Figure 2

Sub-Saharan countries with highest level of CO_2 emmisions in 2016

Source: adapted from (Worldometer, 2016)

Although there have been some publications on the sub-Saharan perspective of GSCM, we felt that a more complete picture would be obtained if a systematic literature review method was used.

3 Research Method

In this chapter we show how we conducted the systematic literature review.

A well-conducted systematic literature review provides a comprehensive idea of the subject being researched. It is a transparent and explicit process that reviews, evaluates, and interprets the available literature based on different search criteria (Fink, 2019; Tranfield, et al., 2003).

Furthermore, we implemented a series of steps to achieve a satisfactory result:

1- First, we formulated the research questions that have to be answered.

2- We used the available databases to identify and collect the relevant literature to answer the research questions by applying specific search terms for a satisfactory result.

3- We concluded by reviewing and analyse the filtered literature using the desired condition (included/excluded) of relevance to our goal.

The selection of databases plays a vital role in the quality and quantity of results for a specified theme. For this study, the following databases were selected:

- Google Scholar (scholar.google.com)
- Elsevier (sciencedirect.com)
- Scopus (scopus.com)

Nonetheless, for any research, filtering mechanism and selection criteria are important when trying to identify and collect specific pieces of literature in a pool of articles that might not be relevant to our theme. For instance, when searching on google scholar for “Green Supply Chain in Sub-Saharan Africa,” we found a total of 650.000 results. This led us to apply some filtering criteria on the search engine so that we could only select the articles relevant to our research topic. For that, we set the advanced filter option available on google scholar to specify that the desired keywords should not be in the text (anywhere in the article) but rather in the title (in the title of the article). This process helped us avoid an undesired number of articles that would simply contain one word from our keywords but would not present any real value to our topic. For instance, the word “green” can trigger any result with publications that contain that specific word, despite not presenting any real value for our theme.

The search terms used included “green supply chain management”, “Sub-Saharan Africa”, “impact,” and other keywords that included the names of sub-Saharan countries.

Despite first being introduced in 1987 with the Brundtland’s report and having some publications during the 1990s, it was only after 2000 that green supply chain management was fully integrated (Seuring & Müller, 2008). For this reason, the inclusion criteria for this review were articles published in English between 2000 and 2022 and focused on green supply chain management in Sub-Saharan Africa.

4 Results

This study has examined the impact of green supply chain management in Sub-Saharan Africa and the potential benefits of implementing green supply chain management initiatives in the region. A total of 40 articles were identified that met the inclusion criteria for this review. These articles were analyzed to determine the key themes and findings related to the impact of green supply chain management in sub-Saharan Africa.

Upon applying the previously mentioned search criteria, followed by the use of more specific keywords, and carefully analyzing the titles and abstracts of the selected papers, a total of 40 articles were picked, as shown in Fig.2.

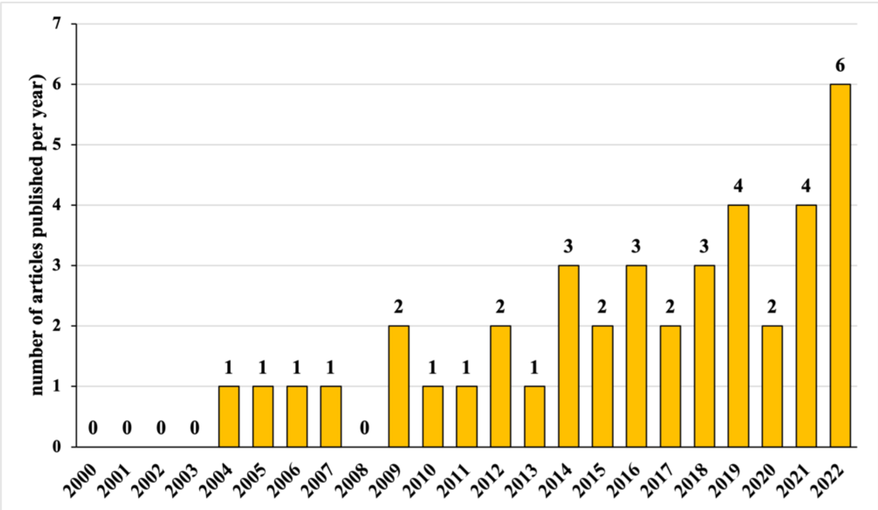

Figure 3
Distribution of publications per year across the period studied 2000-2022
Source: Own editing

Fig.2 shows the final number of selected works of literature per year, composed of 40 papers with the highest number of articles published in 2022, which illustrates a small but important increase in interest in the topic, as the figure emphasizes. Moreover, as shown in Fig.3, Kenya has the highest percentage value of publications among the sub-Saharan countries.

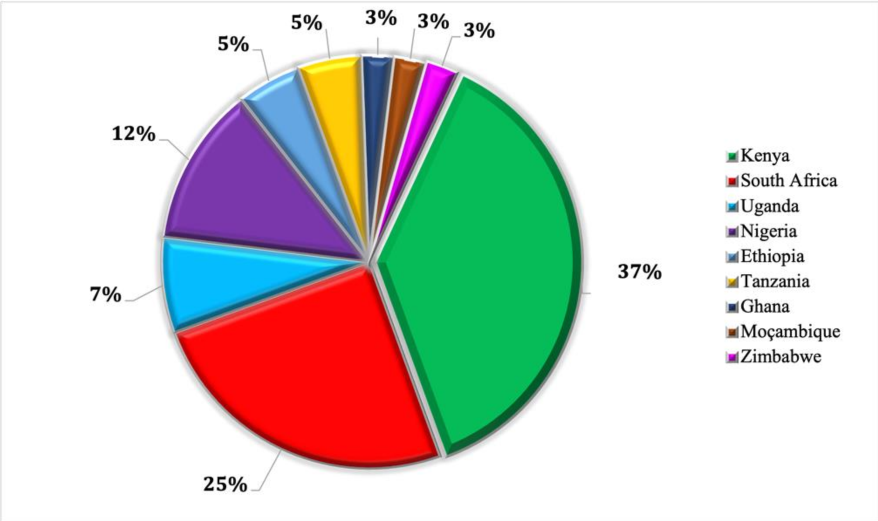

Figure 4
Total percentage of publications per country
Source: Own editing

The main findings in the selected articles revealed that green supply chain management had positively impacted the efficiency and sustainability of supply chains in the region. Specifically, the implementation of green supply chain management strategies has been found to reduce costs, improve environmental and organizational performance, improve efficiency and increase customer satisfaction in different industries in the region, such as construction, manufacturing, sugar cane, and many more. However, the implementation of green practices is still in the early stages.

Furthermore, the literature reviewed also indicates that green supply chain management can be an effective tool for companies in Sub-Saharan Africa to improve sustainability and remain competitive in the global market. In addition, it can also improve their ability to access new markets and meet customer demands. It can also help companies in the region to meet sustainability goals.

Furthermore, the literature search for studies on green supply chain management in the Sub-Saharan region showed a shortage of studies conducted on the topic, highlighting the need for more research.

Conclusion

The economies of Sub-Saharan Africa are largely in the process of development, striving to become more stable and expand their industries. Unlike the West, which developed without the same environmental regulations that are in place today, companies in Sub-Saharan Africa must adjust to the new global context and take steps to protect the environment. Morris and Mike (2004) argue that increased environmental certification could be beneficial and that collaboration between stakeholders is key to the successful implementation of green practices.

African nations have the potential to be major suppliers of essential natural resources, which could be a significant factor in the shift to a more sustainable supply chain. Unfortunately, most African countries, especially those in Sub-Saharan Africa, are lagging behind in terms of investing in sustainable supply chain practices. This is due to political unrest, inadequate infrastructure, and a lack of interest in environmental issues. However, many companies in the region are now trying to create a more sustainable chain that would benefit both the company and its customers. This is essential to prevent them from falling behind and avoid any actions that could damage the environment.

Despite its slow implementation, green supply chain management practices should become increasingly important in Sub-Saharan Africa as global competition increases. For that, organizations in Sub-Saharan Africa must speed up the transition to green supply chain management in order to keep up with the other markets that have already begun to implement these practices.

Furthermore, many African scholars argue that it is important to implement these changes in the context of African markets that significantly differ from Western ones.

More research is needed for a broader understanding of the impact of green supply chain management in other sub-Saharan African countries, as there is little to no research on the topic in some of those countries.

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Mapping work content allocation on an assembly cell

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Abstract: Work content allocation influences manpower utilisation and reachable output of a production cell. Usually, process maps show the order of precedence of technology steps, and workstations are defined so that neighbouring steps are performed on a bench, as far as constraints allow. The need of balancing operator work load might result in having one person serving neighbouring stations or benches.
This study aims to use graph theory and introduce bipartite graphs as a new approach to analyse work content allocation to work benches and workers. In this study, a set of nodes represents workers on the cell, and another set consists of the job elements; and edges connecting the nodes in the two distinct sets are representing a job element being completed by a worker. A projection of such a bigraph draws the backbone of the process flow chart, whereas another projection might indicate the connection and handover points between workers. A very similar projection is definable for the connection of workstations with valuable insights of potential layout improvements of a cell.
A possible application of drawing bipartite graphs of a manufacturing cell is to find out alternative ways of allocating work content, and harvesting ideas for brainstorming the layout improvements of the cell.

Keywords: assembly cell; process map; standardized work; work content; allocation; balancing; bipartite graphs

1 Introduction

Efficient use of resources is of major interest in electronics manufacturing, however, the high costs of clean room manufacturing also brings layout and floorspace requirements into focus. Lean manufacturing techniques help identifying losses such as interruptions of flow of production, for example buffers and supermarkets, idle times of machines, inefficient allocation of work contents, non-value-adding motions, and many more. However, waist majority of implemented process improvements are spot kaizens – workplace organization, parts presentation, simple tooling improvements, which rely on intuitive ideas of engineers, managers, and, most importantly, workers on the line.

Implementation of standardized work focuses on safe operation and predictable output by improving motions of operators to a more balanced work content allocation. It is often said in an implementation workshop that the team is seeking the best reachable combination of man, machine, material and information; poorly defining what "best" in this sentence means. It is hardly examined if a standardized work scenario introduces a critical job position into a cell, nor is if there are better options than the one implemented.

This study aims to introduce an analysis of the network of operators and machines in a final assembly cell of an electronics manufacturing company. The questions raised in the research study are:

- How can a bipartite graph represent the work content allocation of machines and operators of a manufacturing cell?
- What aspects of safe operation through allocation can be examined by using bipartite graphs, in addition to the traditional balancing of a manufacturing cell?

2 Literature review

2.1 Standardized work: capturing work content and balance

A key concept in the lean journey of a manufacturing company is the standardization of work, which extends far beyond the content of work instructions. In addition to mapping work contents and improving motions to reduce waste, training and job relations are key elements of standardized work (Misiurek, 2016). Improvement teams are seeking the best combination of man-machine-material and information, though it is poorly defined what "best" means in this context. In lean, this generally means less in-process stock, better repeatability of work resulting in better quality, better utilization of resources at an improved efficiency. The effectiveness of standardized work is measured on balance charts and capacity utilization metrics.

Capturing job elements, the method and key points of an element is crucial to create a proper work instruction (Dinero, 2005). However, allocation of jobs is more of an intuitive process of engineering experience. In our study, we used the precedence charts and already existing work instructions as a starting point for time measurements, and in situ observations to capture handoffs of material flow.

2.2 Graphs and their application in process mapping

Though graphs and networks are widely used nowadays to describe and analyse interconnectedness and features of networks (Barabási, 2016), hardly any examples of production networks are found where work content allocation is examined in detail.

The simplest process models, i.e., the process flow chart (Gilberth, 1921) are requested by the industry-wide quality standards. A typical process flow chart is shown on Figure 1. Flow charts are usually more complex than a simple linear series of steps, however industrial practice just captures the precedence of process steps.

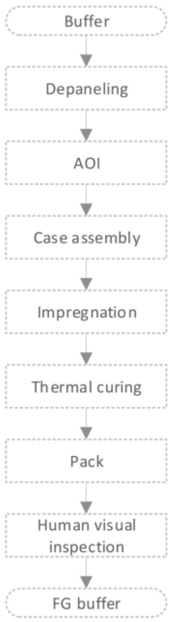

Figure 1

A section of the process flow chart of the area under study

A more detailed graph of the process flow is a value stream map were not only process steps but buffers and logistics connections are also highlighted. The aim of value stream maps is to provide common understanding of the manufacturing process to those who take responsibilities in running the production (Rother-Shook, 1999.)

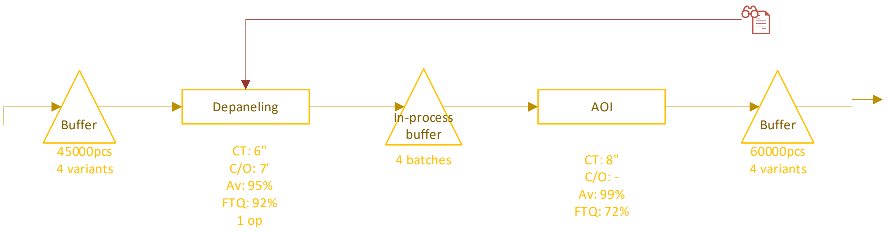

Figure 2

A section of the value stream map of the studied area

3 Methods

The manufacturing cell under study is one of the final assembly cells of an international electronics manufacturer company located in central Hungary. As the process is making a concurrent product in a competitive environment, claiming to be unidentifiable, neither the name nor the details of the product are unveiled in the study, and the job elements are grouped to a generic level without losing any important detail.

Job elements of an existing production process were observed and listed from various sources available in the industry:

- the technological order of manual and machine process steps,
- work instructions of operators of the manufacturing areas,
- observations, time studies and video analyses of work contents of the respective manufacturing areas in serial production conditions,
- motion counts of mock-up simulations.

Constructing a bipartite graph required manual job elements to be grouped into work contents performed outside a machine cycle. With the groups of work contents, I have reconstructed the flowchart so that a manual work content is always followed by a machine work, and a machine work is always followed by a manual operation. Typical details of manual work contents of a position can be:

- Before machine cycle
    - grab a piece
    - align into tool
    - do some manual assembly steps
    - close tool
    - send tool with parts into machine
- After machine cycle
    - remove tool from machine
    - open tool
    - remove part and place into in-process container
    - return tool to previous position
    - repeat from beginning with next piece

After improvements, in-process containers and trays were eliminated as handling and storing them added no value to the product. Thus, buffers were eliminated and manual work contents got reduced, without affecting the completion of value-adding job elements. As a result of improvements, the “after” state contains less work contents and requires less time to complete a product.

A flowcharting and graph drawing software, Microsoft Visio Standard 2016 was used to represent graphs of allocation.

4 Results

4.1 Constructing bipartite graphs

Bipartite graphs require adjacent nodes to be elements of disjunct sets of nodes. In the study, a manual work content is constructed so that it is always followed by a machine job, and a machine job is always followed by a manual work content, as shown in Figure 3. Direction of arrows shows the flow of material between stations and operators.

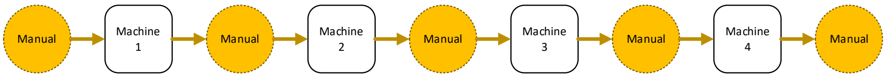

Figure 3
Precedence order of manual and machine process steps

By rearranging the above segment of the process flow diagram, I have constructed the two sets of work contents, as illustrated in Figure 4:

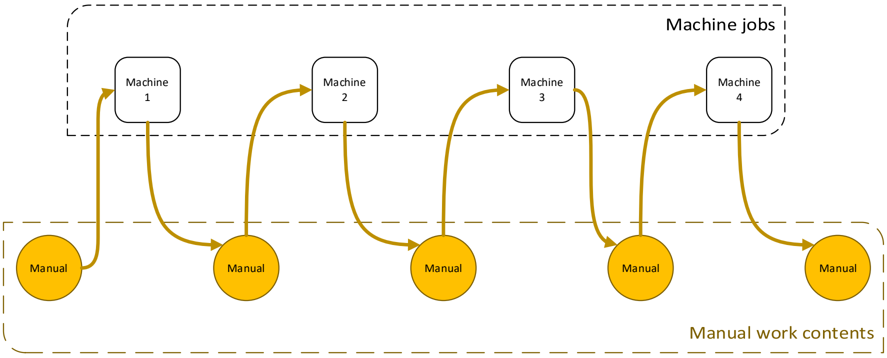

Figure 4
Precedence order of manual and machine process steps, grouped by type of job

As in the existing setup the manufacturing area followed a functional layout (Slack – Brandon-Jones – Johnston, 2013), the work contents were allocated to distinct operators of the functional units, making it impossible to combine work contents and thus reduce headcount, resulting in far underefficient operators.

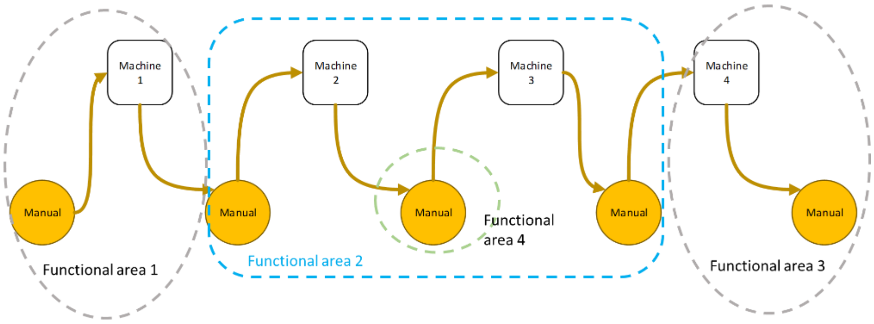

Figure 5
Illustration of functional units that limited manpower efficiency and flow

The lack of cooperation of areas resulted in extremely fluctuating buffer levels, causing overstock a day and insufficient material another day, and in parallel the operator efficiency remained far under target. The initial business problem, allocation and balance are illustrated on Figure 5 and 6, that is where improvements started from.

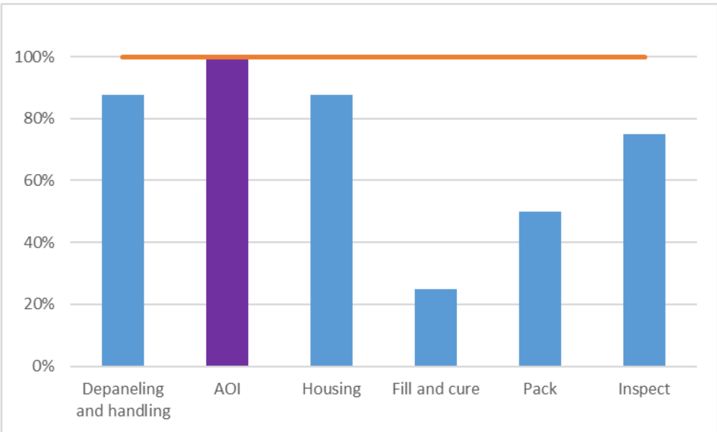

Figure 6
Balance chart of the affected workers, in % of the pace maker process.
Machine jobs apart from the pace maker process are not shown

4.2 Reallocating work contents

With the need of reducing in-process buffers and reducing headcounts, the management of the area turned ready to investigate if the equipments and workstations can be brought into a cell layout, thus enabling elimination of redundant job elements – i.e. place into tray, move and store trays, pick from tray in next job. The rearrangement of layout also enabled reducing walking distances.

Summing up the value-adding work contents and the remainder of handling activities, it turned that 3 people can cover work contents at design takt time.

Figures 7 and 8 show the allocation of work after the improvements, and the bipartite graph of the improved allocation. An arrow pointing from an operator to a machine means an operator serves the machine; an an edge directed from a machine to an operator indicates that machine is unloaded by the operator. As the work contents performed by the operators are indicated on Figure 7, the respective work instructions are also derivable.

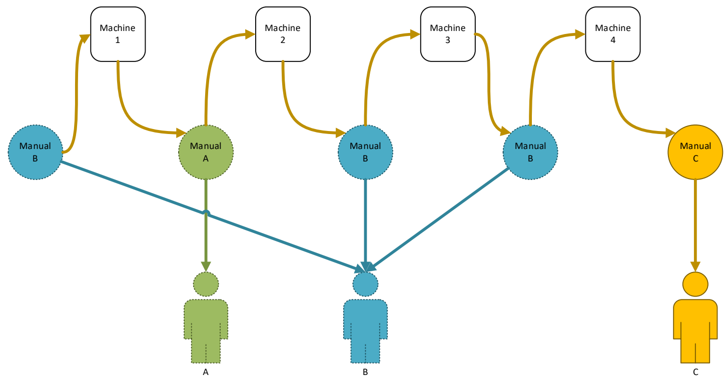

Figure 7
Allocating the work elements after improvements

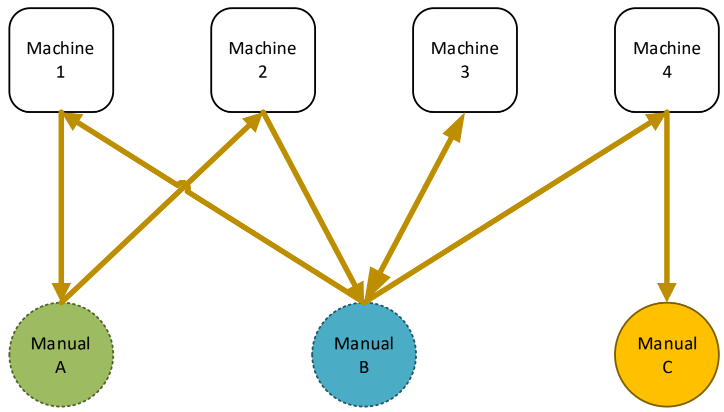

Figure 8
Bipartite graph of allocation after improvements

Breaking with the simple order of job elements, a contraintuitive grouping of non-neighbouring work contents of the precedence chart builds up the job sequence of Operator B of Figure 8. The sum of work contents added up to a better balance, compare Figures 6 and 9. Knowing that Operator B has the highest number of connections, i.e. serving four machines of different speeds and reliabilities, his/her duty is responsiveness, thus, the load must be lower. The team has decided to centralize noncyclical and off-cell activities to Operator B of Figure 8.

The proposed work content allocation has been tested on a mock-up simulation for a significant production run (AIAG PPAP, 2006).

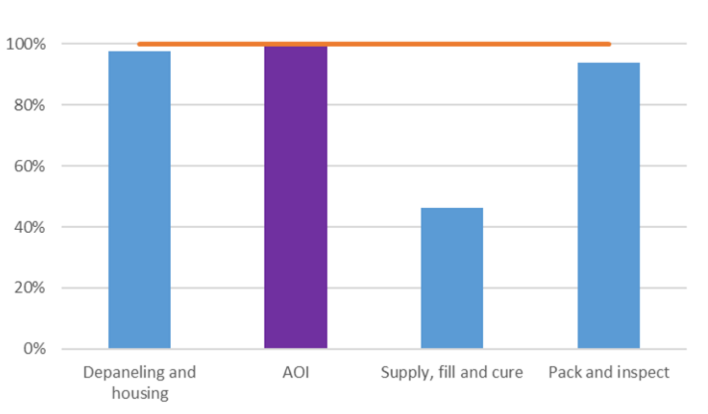

Figure 9
Balance chart of the reallocation of work contents

5 Discussion

Implementing standardized work brings better balancing of the work content allocation which is demonstrated by plotting yamazumi charts. The equivalent information content can be represented by adding weights to the edges: the weight of an edge could represent the time needed to complete the work content by the operator. The sum of weights of edges pointing to or from a node of an operator equals the load of work performed by the operator.

There are considerations so that in a case of a production break, i.e. lunch break of operators, the whole line shall stay in balance, with having the same in-process stocks steady, and having every station stop at the same time, and every operator go on break simultaneously. In spite of that intention, our team has observed that operators A and B behaved more interlinked, whereas operator C worked asynchronously to them, and no supervisorial attention was sufficient to keep the team together.

With the use of projections of the bipartite graph shown on Figure 6, we can find a feature of the cell that is in accordance with the observed behaviour of operators.

Projection to operators is constructed as explained in Figure 10. A directed edge between two operators exists on the projection only if there was a sequence of unidirectional edges between the operators through a machine. In the example below, Operator B serves Machine 1, then Machine 1 is unloaded by Operator A, thus, the section of the projection of the bipartite graph to operators would contain an edge from Operator B to Operator A. From Operator A to Operator B, one can also find an edge, as Operator A is loading Machine 2, and Operator B is unloading Machine 2. Thus, on the projection graph, between operators A and B, there will be a bidirectional edge.

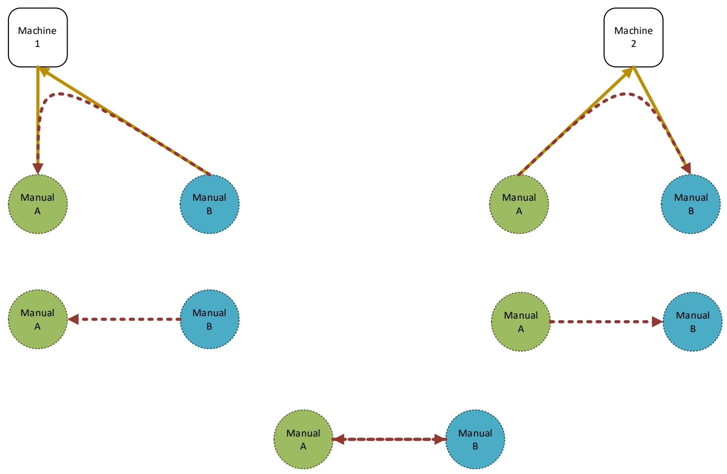

Figure 10
Explaining how the operator projection is constructed

The same procedure is then repeated between every operator, until there are no more machines left on the graph. Figure 11 shows the result of projection: Operator A and B are connected with a bidirectional edge, whereas there is an unidirectional edge from the node of operator B to C. The structure of the projection is in accordance with our observations of the behaviour of operators of the cell setup. Further studies are needed to examine the effect of inter-relatedness of operators and the meaning of the weights of edges to the safe operation of the cell.

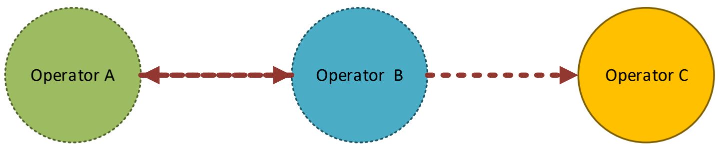

Figure 11
The operator projection of the bipartite graph of work allocation

A very similar series of steps is needed to project the bipartite graph to the set of machines, with the outcome shown on Figure 12. The machine projection of the allocation graph will not necessarily match the order of precedence of process steps; thus, its meaning is out of common sense of process engineers. The weights of edges to a machine compared to the machine cycle time determines whether the machine is a local bottleneck. The practical interpretation turned the attention of the engineers to workplace organization in that particular case: if a machine's cycle time turned longer than the weight of an edge, i.e., the sum of manual element times serving the machine, then a one piece in-process buffer seemed sufficient on the output side of the respective operator. Further studies are needed to examine the effect of reliability and other factors of variance on the safe operation of such a manufacturing cell.

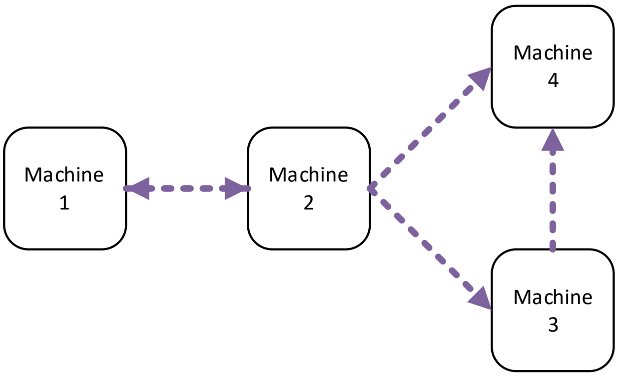

Figure 12
The machine projection of the bipartite graph of work allocation

6 Conclusion

Applying a bipartite graph for visualizing and analysing the machine and manual work content allocation enables analysing man-man and machine-machine connections separately.

The interrelatedness of operators discovered by projecting the allocation graph to the set of nodes representing operators turns our attention to job relations, and raises the question if some common-sense managerial considerations are worth to be studied deeper. In the manufacturing cell studied, it turned that the intuitive behaviour of operators during the breaks are in accordance with the projection, thus, it seems acceptable to split the team of cell workers during the break. The sum of weights of edges is a good indication of balance of operators.

Connection of machines shown on the projection might result in discovering the propagation of machine capacity losses, e.g. breakdowns. Machine balance chart and capacity utilisation chart can also be constructed similarly to the same of operator balance, which can serve as an input for right-sizing machines. Further studies are however needed to discover the potential of applying bipartite graphs on operational safety of manufacturing cells.

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Singapore's Multifaceted Strategy of Sustainable Benchmarking

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Abstract: This paper aims to present the effective convergence of state governance and business leadership through the example of Singapore. To synthesize the multidisciplinary theoretical background with its practical implementation, we performed the research and data collection process according to the guidelines of the PRISMA 2020 protocol. We examined the application of various business management strategies in the public administration sector in the pre-Covid era compared with the period starting from the outbreak of the coronavirus pandemic in early 2020. As a result, we found that the cumulative ripple-down effects of the complex health, economic, energy, and food crisis required a mixed approach. In this regard, the innovative and resilient Southeast Asian city-state has applied a determined but adaptable strategy to maintain its high degree of welfare and well-being without compromising financial sanity, sustainability, and overall security. In addition, creating shared value for all citizens and future generations appears to be paramount, which underlines the necessity for modern policymakers to have a partly entrepreneurial mindset, putting Singapore anew in a benchmark position.

Keywords: business management; digitalization; good governance; leadership; Singapore; strategy; sustainability

1 Introduction

The principal role of a state is the establishment and maintenance of the social order, optimally, based on the rule of law and the efficient allocation of resources to create growth and welfare (including education, healthcare, and equal opportunities). The quality of management of this dialectic relationship, i.e. the dynamically changing interaction between governance structures (Fligstein, 1996), society, and market forces (businesses), translates into the level of development, wealth, and opportunities toward adaptive sustainability (Stewart – Hocking, 2019).

Therefore, the root of the examination of how an unfortunate start of statehood turned into a world-class development success, serving as a benchmark in many regards to those that previously inspired and expedited the city-state's unique and unimitable transformation process, unarguably revolves around the concept of governance. Although it can manifest in different spheres, for this research, we primarily concentrate on the business organizational and national levels. Furthermore, to determine its extent of conformity with a selection of relevant management and leadership models and theories, it is essential to summarize the differences between the two notions. The identification of overlapping characteristics then allows for exploring their impact on and relevance regarding Singapore's unprecedented rise. Once the link is demonstrably established, theoretic ideas can be matched with observed practical implementations. In this context, its importance lies in the chain reaction starting with trust and growth being correlated, low corruption and transaction costs boosting innovation (Bergh – Henrekson, 2011: 890), and the latter being a pivotal prerequisite of sustainability, which, after all, should be among the key goals of every forward-looking and responsible government, especially, if your country has become a global benchmark in many regards.

2 1 Literature Review

2.1 Understanding Good Governance

Although coeval with the emergence of primitive human social formations, the accurate definition of the concept of governance has been a process in the making since the 1980s. Initially, used in the context of the proper and targeted channeling of financial aid and technical assistance provided for foreign development projects in emerging economies by developed Western nations (The World Bank, 1994: vii), it has permeated the corporate and state environment. In this broadened sense, differing from leadership and government, it spans a wide array of interpretation, such as the indeterminacy of the exact location or nature of authority and control (Lofchie, 1989), the conscious management to enhance political legitimacy (Hydén – Bratton, 1992: 7), the synergy of an accountable, democratic, and legitimate character (Bratton – Rothchild, 1992), where legitimacy is reinforced by its "overarching and integrative function" (Wright, 1997: 13). In additon, described as being the prerequisite for a developmental state in contrast to an administrative-management and ideological democracy-promoting approach (Leftwich, 1993: 606–620), it also covers the relationship configuration of civil society and the government-led state (McCarney – Halfani – Rodríguez, 1995: 95–96), to the extent where governance is perceived as steering "with and through complex networks of actors and organizations" (Rhodes, 2003: 72). Furthermore, in the case of a nation-state, governance stems from the broad consensual relationship with the governed, with the primary challenge of "finding the right balance between freedom and security" (MacKinnon, 2012: 63, 305).

The term "good governance" was first coined in 1989 as being indispensable in accompanying "private sector initiative and market mechanisms" (The World Bank, 1989: xii, 61), particularly emphasizing accountability, efficiency, and reliability. Effective and good (democratic) governance, both in the economic and political sense of the term (The World Bank, 1994: vii), positively correlates with growth (Hope, 2005: 284)—especially in income equality, openness, and social equity (Tavares – Wacziarg, 2001: 1371–1372)—and human development (UNDP, 2002: vi). Also, a system respecting human rights and devoted to good governance practices furthers sustainable development (The World Bank, 1994: 43). As sustainability has become a central global matter, in recent years, to counterbalance and possibly reverse the adverse effects of natural and human-made disasters, it is essential to take the standard-like characteristics of good governance (Figure 1) into much deeper consideration than previously.

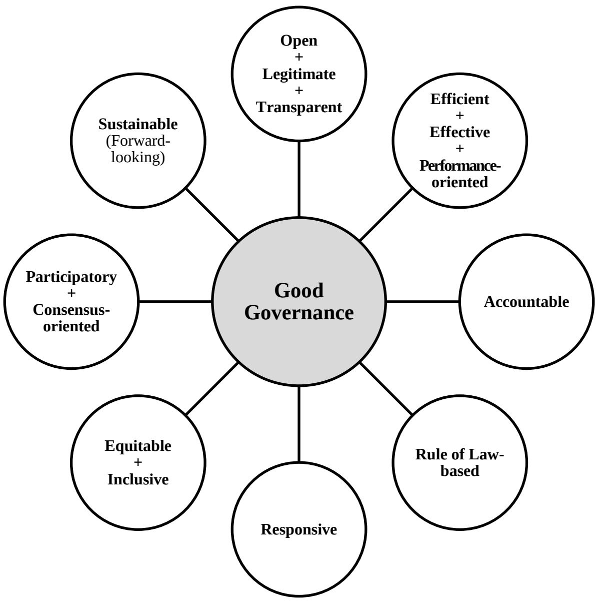

Figure 1
Characteristics of Good Governance (Compiled by the authors based on UNDP, 2002; Hope, 2005; Hope, 2008; The World Bank, 1994)

Contrary to a fragile institutional setting, good governance practices—that protect citizens or employees who, for their part, are actively participating and influencing decision-making processes while contributing to further growth and welfare—expedite the shift toward a sustainable future (Hope, 2005: 286-287).

2.2 Following Leadership

To be as effective as possible, various social structures require, by definition, a certain hierarchy, the manifestation of which stretches from the elemental categorization displayed in Maslow's pyramid of needs, through organizational evolution to the implicit contract among stakeholders. Despite some intersections between managing and leading any explicit goal-oriented or issue-based grouping, detailed conceptual differences are extensively covered in the existing literature. While management is about authority, skills, analysis, tactics, rational decisions, and execution, leadership envisions, strategizes, inspires, motivates, empowers, involves, connects, creates, integrates, and shares. However, in compliance with the current objective, this paper focuses on drawing a parallel between partially overlapping public governance and corporate leadership. After all, leadership, with a more comprehensive quality and development-driving force, makes it the more powerful and substantial factor of comparison.

The transformation of entrepreneurial attitudes since the energy crisis in the 1970s is remarkable. Milton Friedman's doctrine stipulated profit maximization as the "only one social responsibility of business" (Friedman, 1970) in free societies. Since then, there has been a radical shift toward a more responsible way of conducting business. Inspired by the normative Social Enterprise Audit model, influencing cooperative action by taking human, democratic, and social factors into account (Spreckley, 1981: 12, 32), and international surveys from the 1990s, the concept of Corporate Social Responsibility (CSR) emphasized the imperative for businesses to embrace the combination of economic, social, and environmental aspects (Elkington, 2004). The next evolutionary step consisted of a significant upgrade by creating shared value, meaning that economic activities, on top of higher productivity and yields, aslso generate a lasting and tangible improvement for society in meeting community needs (Porter – Kramer, 2011). The additional value of linking economic and societal development lies in its capability to create cross-sectoral and multi-stakeholder partnerships, e.g. innovation clusters, that have a high potential of leading to the desired outcome of a comprehensive sustainability.

In addition, the collapse of the bipolar world order ignited a wave of Americanization, which included the swift spread of the trend of managing businesses or governing countries in the style of an American CEO. Since, as previously discussed, governance means serving as a bridge and integrator, the role of the CEO is to link the organization with its environment, including "society, the economy, technology, markets, customers, the media, public opinion" (Drucker, 2004). Although instinct and talent largely contribute to a leader's effectiveness and value, success is not automatically guaranteed. In addition to the gift of having a charismatic personality to exert idealized, goal-oriented influence on people, it should be complemented and improved with a skill-enhancing training process, the outcome of which is the ability to individually motivate through inspiration and intellectually stimulate others. The simultaneous interaction of these four attributes creates transformational leadership. This people-oriented approach is more adaptive (flexibility) and effective (improvement of performance) than the mere transactional relationship existing between managers and regular staff members (Bass, 1990). Similarly, customer-centric silo busting enhances performance through self-reflection, an open mindset, strong ethics, connectivity, coordination, cooperation, and a commitment to personal growth and empowerment (Gulati, 2007; Giles, 2016; Northouse, 2021) within a safe environment.

Leadership is the combination of innate properties (talent) and processes acquired through lifelong learning (experiences and training) (Jago, 1982: 315), used to influence (a group of) people over a shared vision or common goal (Northouse, 2021). Exemplary leaders are also defined as role models who inspire and motivate those pursuing the same shared vision, seize opportunities, and learn from experiences while recognizing and rewarding outstanding individual performance (The Five Practices of Exemplary Leadership®) (Kouzes – Posner, 2017: 63-82). The highest degree of leadership (Level 5 Leadership) manifests when an executive demonstrates humility by putting vision way ahead of personal ambition without ever shying away from asserting their will (Collins, 2011: 20-21, 44-45). Adaptive sustainability widens the scope of leadership to an extent where the lack of either creativity, resilience, agility (rapid responsivity), focus, or trust (integrated CRAFT Leadership model) (Kalmár, 2022: 39-40) comes back as a competitive disadvantage.

Despite their complex character, none of the above models is an absolute. Instead, they corroborate and overlap each other, offering the practical benefit of out-of-the-box thinking, such as adaptive organizational management and governance, generating sustainable transformation (Thakore et al., 2022: 32). Similar to the necessity for the corporate sector of embracing the sustainability paradigm, modern governments and their related agencies ideally (should) exercise inclusive, future-oriented, transparent, and value-creating governance while fostering socially responsible, symbiotic partnerships with all stakeholders. It is also important to emphasize their responsibility in building "sustainable wealth-creation clusters," i.e. establishing an appropriate framework and providing opportunities for companies, micro-, small and medium-sized enterprises, in particular, to successfully transition (Elkington, 2004: 3, 11-13). As integrated inclusive innovation systems generate innovative development, those also have the capability of transcending borders if being sustainability-oriented and transformation-driven (UNCTAD, 2017: 9, 33). Hence, issue-focused management across multi-stakeholder networks is not only an effective tool for solving problems but generates trust-building and open dialogue based on valuable shared interests (Roloff, 2008). In this connection, both regional and global cooperation is a prerequisite for achieving comprehensive sustainability.

3 Methods

We conducted research for this systematic review to synthesize various characteristics and models to point out similarities that underpin empirical evidence of a mixture of corporate leadership and public governance in Singapore, significantly contributing to the city-state's success, resilience, and benchmark status. First, with the guidance of the PRISMA 2020 statement (Figure 2), we identified records primarily on Google Scholar and ResearchGate, based on the following keywords or their combinations: adaptive, administration, approach, Asia-Pacific, business, characteristics, comprehensive, cooperation, coronavirus, corporate, COVID-19, digital, effective, governance, innovation, leadership, management, model, private, public, Singapore, society, Southeast Asia, sustainability, state, strategic, strategy, system, transformation, value, and vision. Furthermore, we also examined and extracted information from the official websites of relevant government agencies, both regional and international institutions.

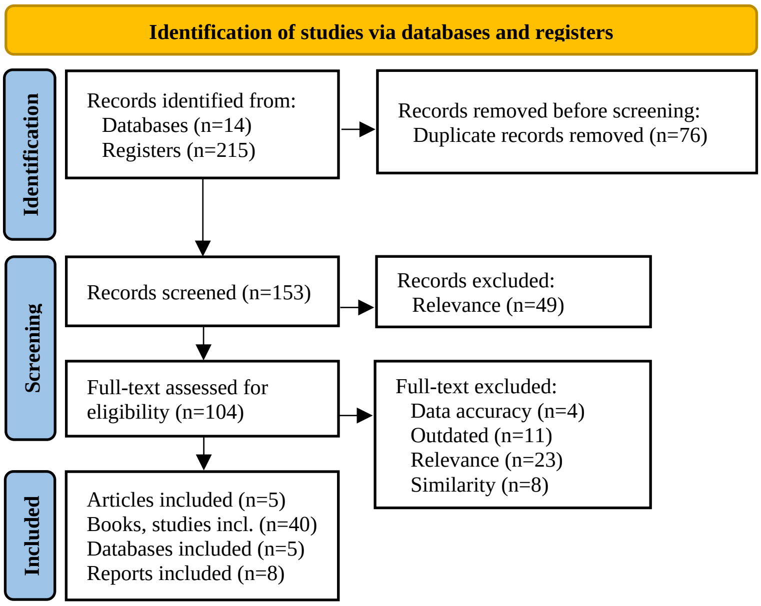

Figure 2
PRISMA 2020 flow diagram for new systematic reviews, which included searches of databases and registers only (Source: Page et al., 2021)

After removing duplicates, we screened the remaining databases and registers (titles, abstracts, back-cover blurbs, or executive summaries) conforming to the predetermined inclusion and exclusion criteria. In this regard, book chapters, conference proceedings, qualitative and quantitative studies, reports, reviews, and scientific journal articles in English (preferably, with a multidisciplinary approach) were included while uncited entries and nonofficial, non-peer-reviewed sources were excluded. The following full-text screening for final eligibility helped determine the extent of the content matching both the purpose and scope of this paper.

Given that the authors are of Hungarian origin and due to the accelerated escalation of various security challenges (mostly within critical infrastructure) affecting sustainability goals, subsequent research is suggested to determine the applicability of the findings in Central and Eastern European countries and for enterprises of different sizes, operating in various sectors.

4 Results

4.1 Cross-Sectoral and Multidisciplinary Interaction

Both corporate and public social structures form from the highly interconnected nature of their cultural, economic, and political environment (Fligstein, 1996: 670). There is a dynamic in the interaction between businesses and states. While social responsibility used to be an exclusive government function and entirely neglected by companies in the private sector, the gradual evolution of corporate management and leadership, adding shared value and adaptive sustainability to the list of entrepreneurial priorities, has influenced public governance into adapting effective and proven methods. In that regard, significant global changes of the last decades, such as the bi- becoming a unipolar to turn into a multilateral world order, or globalization, instigated an increase in the interdependence of intra- and international structures. This interaction has shaped governance structures and allowed nations led by decision-makers with an open, adaptive, and cooperative mindset to thrive. The prerequisite of success, of course, is the application of a customized toolset. Regardless of the sector, strategic thinking is rooted in coherent and coordinated goal setting, but also thorough planning to generate (further) growth and promote sustainability. The implementation process requires clear and transparent communication to encourage active and comprehensive stakeholder participation, underlining the vision set while there is a strong focus on situational adaptability without compromising executability or stability.

Corporate leadership and state governance follow the same basic pattern as they conceptualize a shared vision embraced and implemented by employees or citizens. Thus, this level of interaction largely transcends the traditional linear authoritative structure of a corporation or government, setting a framework and exerting supreme (management and regulatory) power over its employees or citizens. In addition, fueling public enthusiasm and patriotism through periodically organized "national-level engagement exercises" (Tan, 2016: 237), is similar to the business management method of imprinting the feeling of corporate belonging and attachment in employees. Research also shows that “pre-employment tests, incentive plans, and labor-participation management” help curb turnover rates (Cho et al., 2006: 274) in a corporate environment. Hence, their application in public administration management also translates into a generically elevated level of trust-based commitment, whereupon the increase in the size of an organization represents a limitation since traditional trust-building “functional familiarity” (e.g. personal eye contact, handshake) is replaced by contracts (Schein, 2010: 256), becoming more and more automated and digitalized. However, the virtuous circle of mutual inspiration inevitably lingers on as stakeholders have become more interdependent than previously.

4.2 Inspiring Leadership for Adaptive Sustainability

Lee Kuan Yew, often referred to as the “founding father” of Singapore, was ahead of his time by exerting visionary leadership, providing intellectual stimulation (education), and establishing a comprehensive social contract (public housing, extensive social safety net) marked by transparency and people-oriented public administration. Although the strategic vision has been initially unfolding within a strictly regulated and task-oriented framework, it has evolved to a more people-oriented and sophisticated level that supersedes traditional structures by adopting a corporate leadership style devoted to shared value creation. At this stage, compliance with the majority of characteristics of good governance is amplified with high responsiveness and a comprehensive view, indispensable for an open and resource-demanding economy amid a highly competitive and continuously changing market environment. Still, inclusiveness and social equality remain key construction sites in Singapore as further improvement is needed. Despite the decreasing tendency and with the lowest score on record in 2020, mainly due to the government’s COVID-19 support schemes, the island state’s Gini coefficient, the proportion of income or wealth inequality within a society, is comparatively high for its development and wealth level. Thus, Singapore must keep challenging itself on the envisioned path toward sustainability with an adaptive and responsible attitude. Despite that, Singapore-style governance has shown strong similarities with the models and practices appearing in the presented literature even before their conception. The right combination of intuition, conscious design, participatory implementation, and adaptive sustainability give birth to exceptional leaders or, for that matter, states becoming global benchmarks of excellence.

5 Discussion

5.1 The Ongoing “Singapore Project”

Singapore is a welfare state with remarkable characteristics, an interdependent socioeconomic environment combining capitalist and socialist elements (Koh, 2009; Tan, 2018: 17). It is also a meritocratic setting, where individuals’ contribution to society, based on their talent and skills, determines their status (Magasházi, 2021: 257), that can be interpreted as a value-based social contract. Social policies, including education, healthcare, public housing, and retirement funding, are executed and supported via highly interconnected institutions, with comparatively moderate public spending, that help generate sustainable economic growth as the chief driver of further social development (Lee – Qian, 2017: 934). Owing to its open economy and business-friendly environment, innovative and vibrant startup ecosystem, world-class education, health, and social system, Singapore, based on the rule of law and devoted to transparency, has been a foreign direct investment (FDI) magnet for decades, with US$99.1 billion in 2021 (a 31 percent rise compared to 2020), accounting for 55 percent of the total inward FDI flows within the Southeast Asian region (ASEANstats, 2021), and the corporate sector’s total FDI stock of US$1,584.9 billion in 2020 (DOS). In addition, the city-state ranks very high in two distinguished innovation indexes, commissioned by the World Intellectual Property Organization and the German Federation of Industry, with an overall global position of 7 and 2, or 2 and 1 on a regional level (Dutta et al., 2022: 50; (Frietsch et al., 2020: 3), respectively. Apart from the ranking deviation, deriving from the methodologic approach and indicators used, and concerning this research, it is pivotal that Singapore scores second best after the United States of America in several key indicators, including government effectiveness (Dutta et al., 2022: 45), international scientific cooperation but also the transfer of knowledge and technology (Frietsch et al., 2020: 5-7).

Although there is a large variation in corporate strategic decision-making processes, becoming more structured with the increase of a company’s size or growth speed, similar patterns seem to occur in the case of leaders with the same educational curriculum background (Yang et al., 2020: 28). This equally applies to Singapore’s business and public administration elite, since corporate executives and high-ranking public servants have studied at and/or graduated from prestigious American and European universities. The elements that have defined and accompanied Singapore’s development curve show a high level of conformity with several characteristics of the previously presented CRAFT Leadership model, such as credibility, discipline, improvement, innovation, inspiration, partnership, resilience, skillfulness, strategy, systemic approach, transparency, and vision. To give a real-life example as an analogy, senior management of Singapore Airlines, one of the most prestigious air travel service providers worldwide, is directly involved in the meticulous staff selection process (Pfeffer, 1998: 70) to ensure high quality on all levels as a strategic imperative for shaping the company’s future leadership pool.

5.2 Corporate-Style Public Governance

The Southeast Asian city-state of Singapore is a multicolored corner of the world, a genuine melting pot of different cultures, ethnicities, and religions. For an Asian state with a tradition-respecting, authoritarian, collectivist, caring (socially sensitive), strongly long-term oriented (vision-based) culture, showing low uncertainty avoidance and a moderate level of indulgence (Hofstede Insights, 2020), similar to other areas, the leadership attitude appears to be prevalent in Singapore. Governing a small country requires more of a corporate (strategic) leadership attitude than merely policy-making skills (Singh, 2007: 118). In this regard, the city-state was referred to as a "G-rated experience, micromanaged by a state that has the look and feel of a very large corporation" (Gibson, 1993), already in the early 1990s.

Good governance in Singapore describes a meritocratic and pragmatic policy-making process where integrity is key (Tan, 2018: 14). Corruption, a considerable obstacle to sustainability and a factor that significantly increases inequality, flourishes under weak governance conditions. In a region where more than a third of targeted investments are subject to it (UN – ADB – UNDP, 2017: 106), Singapore stands out due to a very low rate (being second on a global scale with Norway and Sweden, although mainly as a result of strict policy advocacy instead of civil restraint) (TI, 2021: 2, 9). However, it reinsures investors, strengthens the trust-based relationship between stakeholders, and, thus, generates new opportunities for further development and prosperity. Despite the government gradually adopting managerial attitudes parallel to the economic boom in the 1990s (Tan, 2018: 19), it was not earlier than the 2011 General Elections when the ruling People's Action Party (PAP) had to face real opposition for the first time since Singapore gaining independence in 1965. This initiated a transformation process of limited liberalization (Tan, 2016: 233-236; Lee – Qian, 2017: 930-931), leading to an increase in the engagement and participation of citizens in and introducing inspirational leadership to the political arena.

The many concepts and practices presented in the literature review, including transformational and CRAFT leadership, shared-value creation, and good governance, are applicable in both corporate and public environments (Table 1). As a consequence of this and with a strong focus on sustainability, Singapore, to offset its vulnerability owing to its comparatively small size and extensive dependence on a variety of resources, i.e. to ensure economic growth, peace, and stability, employs a unique combination of governance and leadership features while, at the same time, performing a holistic balancing act of rule-based regional cooperation. Capacity building, as well as technical assistance and the transfer of knowledge and best practices to neighboring countries via the Singapore Cooperation Program (SCP) (Parks et al., 2018: 24, 63), highlight the importance of public-private partnerships and cross-border collaboration.

Table 1. Comparison of different aspects of adaptive, sustainability-oriented, and transformational leadership in a big corporate and public administration environment (Compiled by the authors)

Big Corporate (MNC/TNC) **Transformational Leadership**	**Leadership-style State Governance** (Singapore)
Legal entity of economic nature	Legal entity of political, socioeconomic nature
Strategic thinking	Strategic vision
Global mindset	Global mindset
Top-down approach (owners)	Dual/Mixed bottoms-up (elections) and top-down (hybrid system, authority) approach
Transformational leadership	Stable and adaptive leadership
Main focus on constant growth	Economic growth-oriented
Psychological contract	Social contract
Value-based employment	Meritocracy
Transparent communication (motivation)	Transparent communication ("In this together" – common goals)
Talent grooming/retention Staff training and development	Knowledge import, talent-grooming programs Lifelong learning (education) → Smart Nation
Corporate Social Responsibility (CSR) Creating Shared Value (CSV)	Welfare state Value-based shared interests
Profit → Reinvestment	Budget surplus → Reinvestment
Employee diversity	Multiethnic and multinational "laboratory"
Highly skilled and well-remunerated staff → Little employee turnover	Highly educated and well-paid public officers → Little corruption and personnel fluctuation
Longevity and sustainability	Adaptive sustainability
Resilience	Resilience
Free trade	Free trade
Stable and predictable legal framework	Rule-based world order
Dominance	Regional cooperation Public-private partnerships (PPP)

Taking the evolution of management and leadership practices, as well as the characteristics of Singapore's successful transition into account, added value, transparent and mutually respectful communication, good governance, and comprehensive stakeholder involvement appear as key elements shaping a resilient fabric of both corporate development and state-level sustainability. In this regard, the Economic Development Board (EDB) largely contributes to enhancing Singapore's international image by being "the most successful business promotion agency" (Mahbubani, 2020: 42) in the world, managing vast amounts of inward and outward FDIs, both in number and proportion, to safeguard the visionary and adaptive phenomenon of a global hub for commerce, finance, and innovation. It does so through constant renewal while guarding basic values.

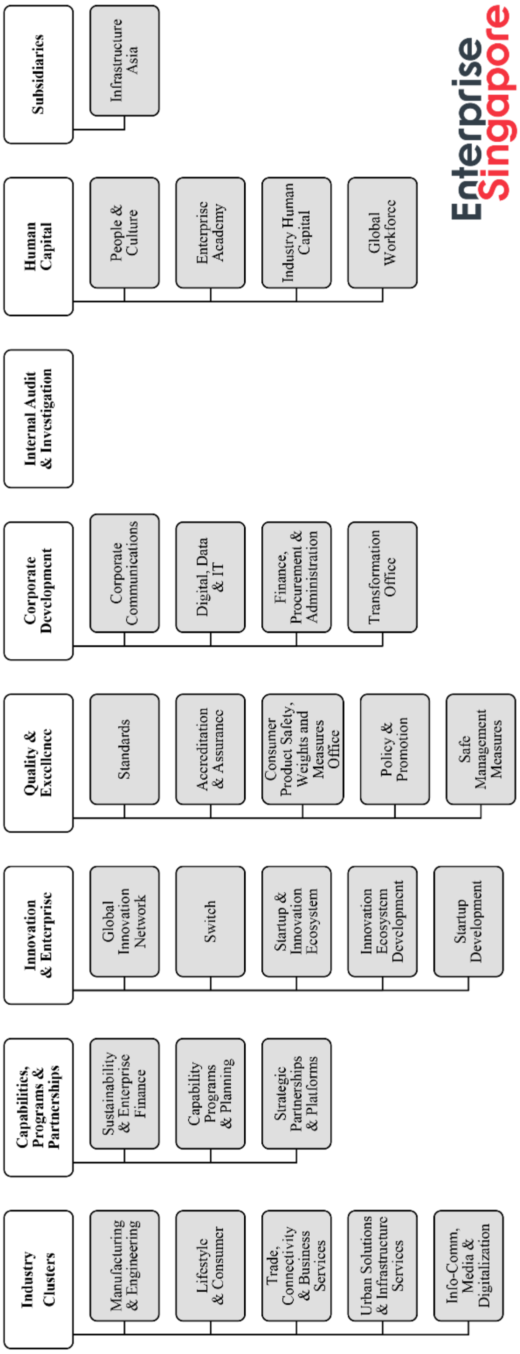

Figure 3
Organizational structure of Enterprise Singapore (Source: enterprisesg.gov.sg)

Individual successes are inputs adding to the national wealth level. Thus, Enterprise Singapore serves as another striking example of the strategic transformational approach applied to maintain the island state's exquisite position within the global economic ecosystem. As implied by its designation, this government agency has been entrusted with the task of supporting the customized development of companies (Figure 3) for them to successfully tackle challenges, domestic and abroad. It does so, i.a., via standardization, both capability (skill-enhancing education) and capacity building (technology adoption) for small and medium-sized enterprises (SMEs), startups, and big corporations alike, as well as innovation, talent fostering and retention.

5.3 The Inequality Challenge

The multiple and long-lasting impacts of the complex crisis induced and aggravated by the coronavirus pandemic, the global repercussions of the ongoing armed conflict between Russia and Ukraine, as well as the ever-growing threat of climate change have put the emergency level of any legal entity in the world on high alert. Enhanced adaptability and short reaction time are required to cushion the harmful repercussions of a volatile administrative, business, and natural environment. Hence, a mixture of tools from various leadership and (crisis) management practices should improve resilience.

At present, besides the abiding limitation of environmental sustainability on a larger scale, deriving primarily from energy supply dependence defined by size and natural resource scarcity, Singapore falls short of preferable (social) inclusiveness. The Gini coefficient reflects a country's household income or wealth inequality level. It ranges from 0 (perfect equality) to 1 (perfect inequality). In the case of Singapore, the ratio has been on a downward trend since 2012 (Figure 4).

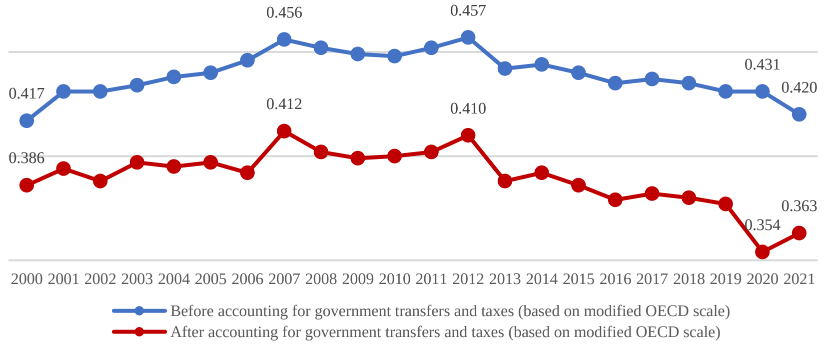

Figure 4
Gini coefficient among resident-employed households in Singapore, based on modified OECD scale (2000-2021) (Source: DOS)

Unfortunately, as everywhere around the globe, the comprehensive impacts of the coronavirus pandemic have widened the inequality gap. The lowest value on record of 0.354 in 2020 was merely the consequence of the government's intervention with a series of holistic support schemes intended to shield citizens and businesses, thus, the economy from collapsing. Through the partial release of past budget surpluses and reserves and the reallocation of funds, comprehensive fiscal stimulus packages in 2020 alone amounted to approximately US$70 billion, equal to almost 20% of the country's GDP. However, Singapore's 2021 score of 0.386 (DOS, 2021: 4), as compared with the Slovak Republik, Slovenia, the Czech Republic, Iceland, Belgium, all Scandinavian countries, and Austria, scoring between 0.22-0.28 (OECD Data), is elevated for its wealth and development level. Hence, this is a construction site where further work is necessary.

Conclusions

As adapting to change is essential for organizations to succeed and prosper, a cooperative approach in service of a goal or vision, featuring clear processes, open and efficient communication, and active stakeholder participation, is necessary. Promoting civic engagement, i.e. organizing public consultations and empowering people to take their destinies into their own hands while being collectively shielded by the state from harmful economic repercussions, consolidate mutual trust and reinforces the social contract, enabling it to continue on the path toward sustainability dynamically and peacefully. However, as remaining a "significant but fragile success" (Tan, 2016: 236), it is essential to preserve this outstanding multiethnic and prosperous socioeconomic experiment turned creation, called "The Singapore Story." Furthermore, bearing the primary goal of constant economic growth in mind, adaptive and comprehensive sustainability have become imperatives for safeguarding the Southeast Asian island state's global benchmark status.

Author contributions

Ivan Aigner wrote the paper after conceiving, designing, and performing the analysis, based on the reviewed data and registers, while Tibor Pál Szemere supported and supervised the methodology process, as well as, together with Mónika Garai-Fodor, performed the professional supervision of the content.

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Identification of chaotic patterns in work processes

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Abstract: During work, the performance of employees is not uniform, but fluctuates. In the case of algorithmic workflows, the goal is to keep this fluctuation as small as possible. The aim of the research was to reveal whether the fluctuations are random or organized into some kind of pattern. The research examined fluctuations in the performance of those performing algorithmic work based on their performance data over several months. During the investigation, we used the test of near returns, which is a topology-based procedure suitable for detecting small-dimensional chaotic behavior. The research showed that, in the case of the examined persons, performance fluctuations are not random, but individual patterns can be identified. With further targeted analysis, individual patterns provide an opportunity to reveal the hidden causes of chaotic behavior, which can reduce the fluctuation of workers' performance.

Keywords: performance fluctuation; chaotic behavior; close return analysis; algorithmic works

1 Introduction

Many factors influence human performance during work. These factors can be external factors related to the place and time of work, such as the light and temperature or noise conditions of the work environment. But there can also be internal factors related to the individual, such as the individual's mood that day, fatigue or health. Traditional performance measurement methods only measure the individual's output performance values, and the causes of performance fluctuations are only sought in external factors, and that too globally, not individually. However, in addition to external factors, an individual's momentary internal factors also influence his performance at a given time.

In addition to the traditional methods of measuring the performance of algorithmic work, methods that try to reveal the internal causes of individual performance fluctuations are gaining more and more emphasis. These methods create an opportunity to increase the performance of a group not only by taking into account the static external factors of the work environment, but also the dynamic internal factors of individuals.

In companies that perform algorithmic work, individual performances are constantly measured, because this is part of the quality system. As a result, unique time series performance data is available. The aim of the research was to use mathematical methods to investigate whether there is any pattern in the performance fluctuations of individual people. The method used is the method known in chaos theory, which is suitable for recognizing nonlinear behavior and chaotic systems.

2 Literature review

The concept of chaos in ordinary language is the same as random. However, from a scientific point of view, chaos and random are two fundamentally different things. In a mathematical sense, the temporal development of chaotic systems is not random, but deterministic, i.e. the equations describing the dynamics of the system are precisely known. Chaotic behavior does not arise from random, but from the fact that even a small deviation of the initial conditions results in large deviations during the development of the system over time. Short-term prediction is not a problem in chaotic systems, but long-term prediction is almost impossible. From a mathematical point of view, we can talk about chaotic behavior if the uncertainty inherent in the initial state of the system grows exponentially over time, and because of this, long-term prediction is not possible (Brown, 1997). In chaotic systems, the process does not move towards a stable equilibrium point, but stable and unstable states are intricately connected. Even in the development of a fully deterministic system, it is not certain that explicit prediction is possible. This was first noticed by Poincaré (Poincaré, 1892), and later confirmed by Birkhoff (Birkhoff, 1927). Cartwright and Littlewood showed that even a system defined by simple equations can have a very complicated solution (Cartwright – Littlewood, 1945). Such systems can be described by nonlinear equations. From a mathematical point of view, nonlinearity means that the variables of the equations describing the dynamics of the system do not occur only to the first power. The initially close orbits move away from each other at an exponential rate during the development of the system. These systems do not respond proportionally to the effects on them (May, 1976). However, nonlinearity is only a necessary condition for chaos, but not a sufficient condition. In addition to nonlinearity, chaotic systems are also characterized by feedback. When these two characteristics are present together, chaotic behavior can occur. In the 1950s, weather scientists predicted that long-term weather forecasting would soon be possible thanks to computer modelling. Edward Lorenz, however, came to the opposite result during his weather-related research. Lorenz's results showed that short-term forecasting is possible in a nonlinear system, but even a small difference in the initial conditions results in a big difference in the long term (Lorenz, 1963).

The temporal development of chaotic systems can be displayed in a coordinate system whose axes have the independent variables of the system. Such a coordinate system is called a phase space. Chaotic systems draw well identifiable patterns in phase space. The first system that can be described by simple equations but has an easily identifiable pattern in its development was first discovered by Smith (Smith, 1874), then the German mathematician Cantor introduced it to mathematics (Cantor, 1883), what we know today as the Cantor set. Mandelbrot gave the name fractal to the mathematical objects appearing in such chaotic systems, based on the Latin word *fractus* that meaning irregular (Mandelbrot, 1975). The methods of chaos theory are now used in many scientific fields, and as a first step in the search for nonlinearity, they look for patterns in phase space. The presence of the pattern indicates a non-linear system, which does not yet prove that the system is chaotic, but warrants further investigation of the chaos.

3 Methodes

3.1 The topological test of nonlinearity

The first step in investigating a chaotic system is to find a convincing indication that nonlinearity is indeed present in the system. Only then is it worth exploring the system of equations modelling the system. Topology tests help to detect the presence of nonlinearity in the system. The unique pattern drawn in the phase space of the chaotic system is called a strange attractor The topological tests are not sensitive to noise and preserve the temporal sequence of data showing the presence of chaos, so knowing the topological form makes it easier to determine the system of equations describing the system (McKenzie, 2001). To recognize nonlinearity, it is therefore worth choosing a method based on visually, because the appearance of the pattern indicates the nonlinearity of the system.

The most well-known univariate nonlinear system is the logistic mapping, which can be described by the nonlinear equation below

$$x_{t+1} = ax_t(1 - x_t) \tag{1}$$

where x_t is the state of the system at time t, and a is the growth parameter characteristic of the system. Figure 1 shows the temporal behavior of the system described by equation (1) with initial parameters $x_t = 0.1$ and growth parameters $a = 3.98$.

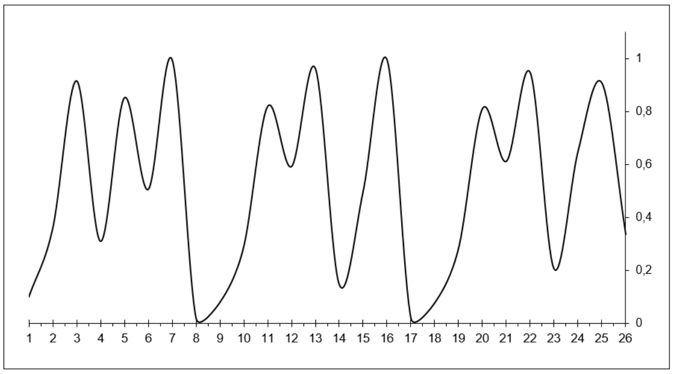

Figure 1

The logistic mapping for parameters $x_t = 0.1$ and $a = 3.98$ (Own figure)

It can be seen that there is no exact repetition in the system, yet similar patterns can be easily identified over time.

Another well-known system of two-parameter nonlinear equations is the Marotto model, which is described by the system of nonlinear equations below:

$$x_{t+1} = (1 - ax_t - by_t)(ax_t + by_t)$$

$$y_{t+1} = x_t \tag{2}$$

Figure 2 shows Marotto's strange attractor for the parameters $a = 2.5,\ b = 2,\ x_t = 0.0001, y_t = 0.0001$. It can be seen that the system does not take on values in a significant part of the phase space, but thickens a unique pattern.

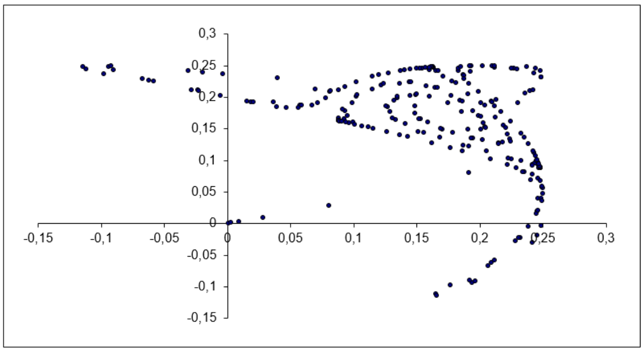

Figure 2

Marotto's strange attractor (Own figure)

3.2 The CR (Close Return) test

Gilmore developed a topological test suitable for detecting chaotic systems with few variables (Gilmore, 1993). Compared to other nonlinearity tests, the CR test can be used successfully even on small and noisy data sets. Although a subjective threshold value must be chosen in the CR test, changing the threshold value does not significantly change the nature of the sample. Since the CR test looks for close points in the time series data, the potential trend does not smooth out the differences between the near and far data (McKenzie, 2001).

The CR test looks for unstable periodic orbits in the strange attractor. In a chaotic time series $\{x_t\}$ if x_t is near the periodic path, then after an interval I the values return close to x_t and $x_t - x_{t+I}$ can be arbitrarily small. We can find many such close returns under long observation. During the test we calculate all $|x_t - x_{t+i}|$ difference, where $t = (1, \dots, n), i = (1, \dots, n-1)$, and n is the length of the time series. Then we choose a threshold value ε and if the $|x_t - x_{t+i}|$ smaller then ε we are taken it as close return. Generally, 2-5% of the range (R) of the time series is taken as the value of ε, but the topological results do not depend critically on the value of ε. The nature of the pattern remains even at different ε values.

The obtained values are represented on a diagram by taking the x_t values of the time series on one axis of the graph and the i values on the other axis. If $|x_t - x_{t+i}| < \varepsilon$ then the result is marked in black, if $|x_t - x_{t+i}| \geq \varepsilon$ then the result is marked in white on the graph. If the time series is random, no pattern will appear and the distribution of points will be homogeneous. However, if the time series is chaotic, the graph shows continuous sections. Figure 3 shows the CR diagram of the logistic mapping and a random data set.

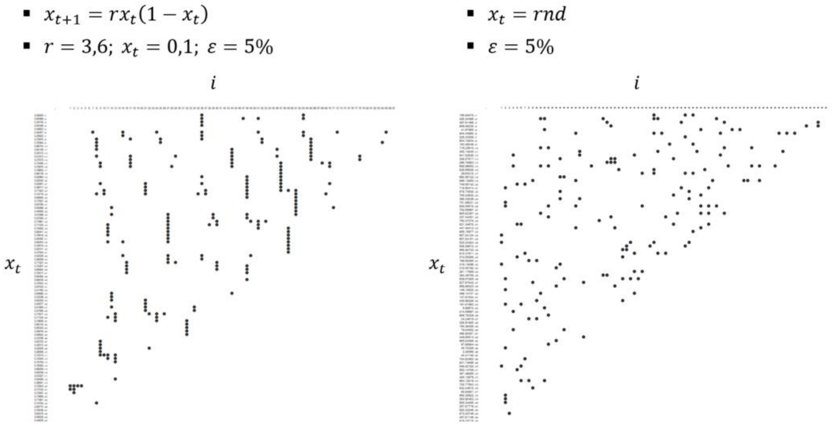

Figure 3
CR diagrams of the logistic mapping (left) and a random data set (right). (Own figure)

It is clear from the figure that the patterns between the random and chaotic data sets differ greatly, and the logistic mapping clearly shows chaotic behavior.

The CR test is often used to analyze the price movements of stock market securities. In my research, I used the CR test to show that this method can also be used in the field of management.

3.3 Data

Five employees of the data processing department of a Hungarian financial organization participated in the research. They perform algorithmic administrative work, recording paper-based payment receipts in a computer system. The work was carried out in a common room, with the same tools, in the same period, so the external parameters of the work can be considered the same. For the analysis, 100 - 160 items of daily performance data of the employees were available, in anonymized form.

4 Results

Although the data of individual employees were of different lengths, a clear pattern emerged even in the case of data sets with the smallest number of elements. My research proved that the CR test can also be used for samples with a small number of elements. During the test, no pattern emerged in the case of $\varepsilon = 2\%$, but in the case of $\varepsilon = 10\%$, a clear pattern emerged on the CR diagram of all employees.

The diagrams of the CR test for each worker are shown in Figure 4. The patterns are clearly visible in the diagrams, but no continuous vertical lines were formed. I also performed the test with different ε values, but in no case did the continuous vertical lines that confirm the chaotic behavior. Therefore, the CR test only verified the non-linearity during the work, but based on this, it cannot be stated that the performance of the workers is chaotic.

However, it is noteworthy that the CR diagram of different employees is also different in nature. This suggests that the CR test revealed unique nonlinearities, but the test does not prove this, this can only be decided with further research. We can observe that the pattern of User1 in the first 20-22 days (in the graph above) is almost random and infrequent. But then it draws a dense pattern in the next period. This may indicate that there was a significant difference in User1's work in the two periods.

The CR test does not show what causes the non-linearity in the employees' performance. Since non-linearity is present in the performance of all employees, it is not possible to decide whether it is due to external environmental or personal reasons. This can be explored by changing the external environmental characteristics individually while observing how the CR test patterns change.

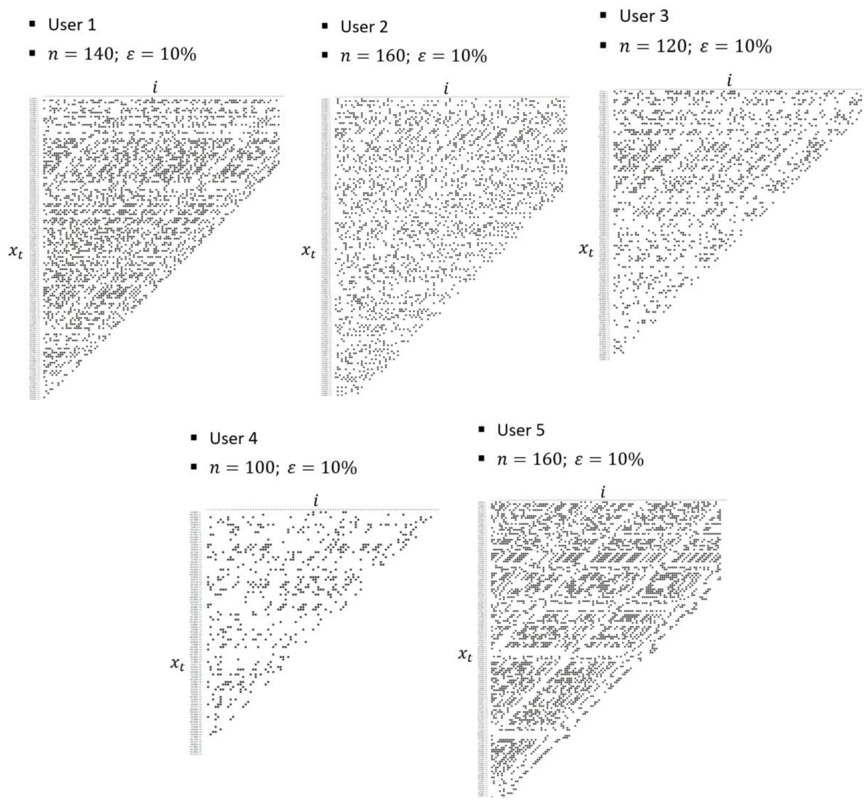

Figure 4

Diagrams of the CR tests of the employees User1-User5 (Own figure)

Conclusion

The research showed that the CR test is suitable for detecting non-linearities present during work. With the help of the test, I showed in the examined sample that the fluctuation of the workers' performance is not random. Although the test is not suitable for revealing the causes, it creates an opportunity to develop algorithmic work processes in such a way as to point out the non-linearities present in the company's process system. Combining the CR test with process and quality management methods can open up new development opportunities for companies. Since the CR test is also suitable for detecting individual nonlinearities, methods can be developed in the field of HR that take into account the individual characteristics of employees.

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Occupational health and safety representatives and mediation

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Abstract: In our workplace, we can get involved in conflict situations countless times. One of the solutions to these conflicts can be conciliation, or otherwise mediation. It is special dispute resolution method, when a third party, who is the mediator, mediates between the two participants, with the consent of both of them. Mediation is nowadays integrated into our legal system as an alternative dispute resolution option. In this study, we tried to find a connection between mediation and occupational health and safety, including occupational health and safety representatives. The study is primarily based on secondary research, in which we are looking for opportunities to connect to occupational health and safety, but it also includes a questionnaire survey, which was carried out with the involvement of occupational health and safety representatives. With the help of the questionnaire, we tried to verify workplace conflicts related to occupational health and safety, as well as the awareness of mediation among occupational health and safety representatives. Last but not least, we tried examine the raison of preventive mediation to promote the activities of occupational health and safety representatives.

Keywords: occupational health and safety representative, mediation, preventive mediation, psychosocial risk

1 Introduction

Conflicts are practically as old as life on Earth, from plants to animals to humans, every living being fights to obtain and maintain the available resources. We can be resolved conflicts in many ways, from quarrels to war [1]. Despite this, in the history of mankind we can already find sources pointing to a peaceful solution in Phoenicia, which can be found in different ways to this day, and have also been incorporated into the legislation of the countries [2].

But how can the occupational safety representative be connected to mediation, since mediation is a special conflict management method, where the two parties involved in the dispute settle the situation with the help of a third party accepted by all of them [3].

According to the interpretive provisions of the Hungarian Occupational Safety and Health Law, the occupational safety representative is "a person chosen by the employees who represents the employee rights and interests related to safe and healthy work during cooperation with the employer" [4]. They must represent the rights and interests of the employees, since they elected them, but against whom should they do this?

According to the principle of tripartism, occupational health and safety rests on three pillars, the duties and responsibilities of the state, the employer and the employee, so the state determines the basic requirements, governing and control institutions and national program of occupational health and safety, the employer provides the costs, burdens and the employer's liability does not affect the obligations of the employees, and the employee is responsible for meet the requirements of safe and non-hazardous work [5].

As we can see, the participants of the tripartite system have the same goal, but the possibility of conflict exists, because it may appear due to the nature of the persons, but by guiding the participants in the right direction, positive change can begin [6]. At this point, mediation is connected to occupational health and safety, but it can also play an important role in prevention. In that case, it is sufficient to contact one of the parties involved, and the mediator will participate as a consultant instead of settling the dispute [7].

The study is primarily based on secondary research, but also includes primary questionnaire research. During the secondary research, we explore the main areas of mediation conflict management, possible conflicts in occupational health and safety, then during the primary research, we ask occupational safety specialists and occupational safety representatives how they see these conflicts as participants.

2 Literature Review

In Hungary, to use of mediation has typically spread during legal proceedings, and we basically see it as the possibility of out-of-court solutions. This is supported by the Law on Mediation, §1(1), according to which the purpose of the Law is to facilitate the settlement of civil and administrative disputes arising in connection with the personal and property rights of natural persons and other persons, in which about the parties' right of disposal is not provided by law [8]. In our country, mediation is typically used in the case of families, in connection with criminal proceedings, in consumer protection issues, and during labour problems [2] [6] [9].

During the further literature analysis of labour problems, we can recognize occupational health and safety issues, although these can be primarily identified as psychosocial risks and stress [10] [11]. Some of the listed stressors can be found in part 87§ (13) of the Hungarian Occupational Safety and Health Law too, so we can assume that, each source of danger can cause a conflict as well. Of course, not only the sources of danger, but also the workplace conditions, the workplace managers and subordinates, the relationship between work and family life, as well as the state of health and well-being contain psychosocial risks [12].

The EU-OSHA ESENER 2019 (European Survey of Enterprises on New and Emerging Risks), a research conducted between 2014-2019, with the participation of 33 European countries (EU27 + Ireland, North Macedonia, Norway, Serbia, Switzerland, and the United Kingdom), 45,420 institution found that, after locomotor diseases, psychosocial risks worry employees the most[13].

3 Methodology

Psychosocial risk, according to the interpretation of the Occupational Safety and Health Act, is the totality of the effects on the employee at his workplace (conflicts, work organization, work order, insecurity of the employment relationship, etc.) that influence his responses to these effects, and in connection with this, stress, work accidents, mental or physical (psychosomatic) disease may occur [4].

The aim of the research is to assess the typical conflict actors in the workplace, the representatives' knowledge of mediation, and their opinion on the preferred way of resolving conflicts among occupational safety and health representatives. We also wondered why they were elected to the position.

This phase of the research was carried out using a quantitative method, at occupational health and safety representative training sessions held by an adult education organizer. We interviewed thirty representatives at two locations, eleven in Miskolc and nineteen in Szekesfehervar. After a short personal introduction, the questionnaires were handed out to the training participants at the locations, who filled them out independently in a few minutes. After that, the questionnaires were immediately collected anonymously, so the occupational health and safety representatives did not have the opportunity to discuss the questions.

During our research, we used a questionnaire survey, which is the most frequently used primary information gathering method [14]. During the editing of the questionnaire, we mainly used closed questions, where the respondents could only give a predetermined answer or answers, but there were also open questions, where the respondents could write their own thoughts, and the scale-forming question, where they could indicate their answer on a scale of ten [15].

During our research, we are looking for answers to the following questions among occupational health and safety representatives:

Q1 - Can they identify workplace conflicts and their participants?

Q2 - Do they know what mediation is?

Q3 - What dispute resolution method do they prefer?

Q4 - Why did they become occupational health and safety representatives?

4 Results

Our first question was about how many terms you are starting as an occupational health and safety representative. As shown in Figure 1, eleven of those included in the study have not yet started their first cycle. On the other hand, the fact that one of them has been working as an occupational health and safety representative for thirty years shows a special dedication. He has already started his seventh term.

1st cycle	2nd cycle	3rd cycle	4th cycle	5th cycle	6th cycle	7th cycle
11	8	4	3	3	0	1

Figure 1 Number of cycles started,
own editing

In the next question, we asked them to identify the participants in the workplace conflicts they represented. The number of started cycles we were compared with the participants in the conflicts, but as can be seen in Figure 2, the respondents hardly identified themselves as actors in the conflicts. This is understandable for those starting their first term, but it is difficult to accept among those who have been an occupational health and safety representative for at least five years.

In addition to seeing that there are workplaces where there is no conflict, we can also state that thirteen of the respondents experience the most contentious situations between employees and twenty-one between managers and employees.

We should investigate this issue more widely in the future, as it can help in estimating and evaluating psychosocial risks.

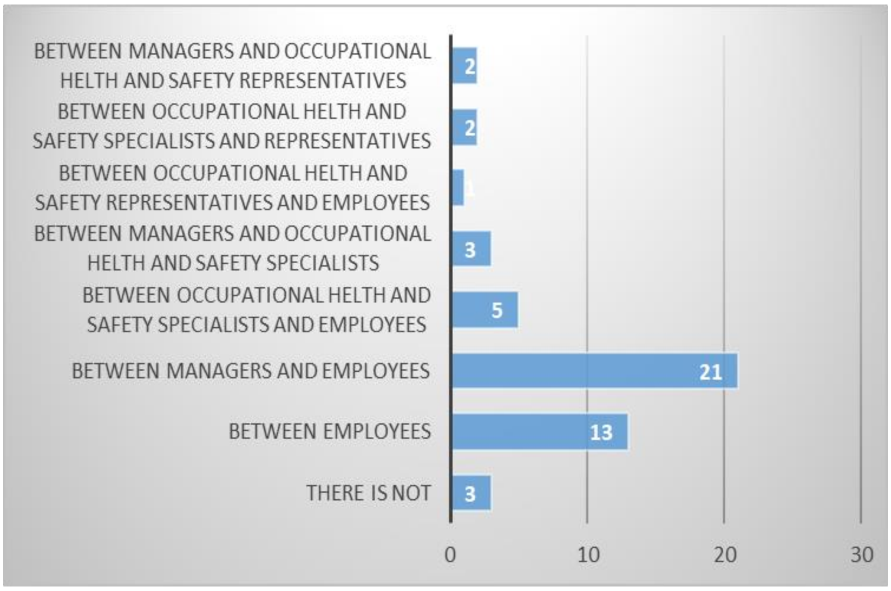

Figure 2 Participants in conflicts,
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We then asked them if they knew what mediation was and if they had ever needed the help of a mediator in their lives. Figure 3 shows the knowledge of the respondents about mediation, less than half of them, fourteen knew the correct answer, but sixteen were not aware of its real meaning.

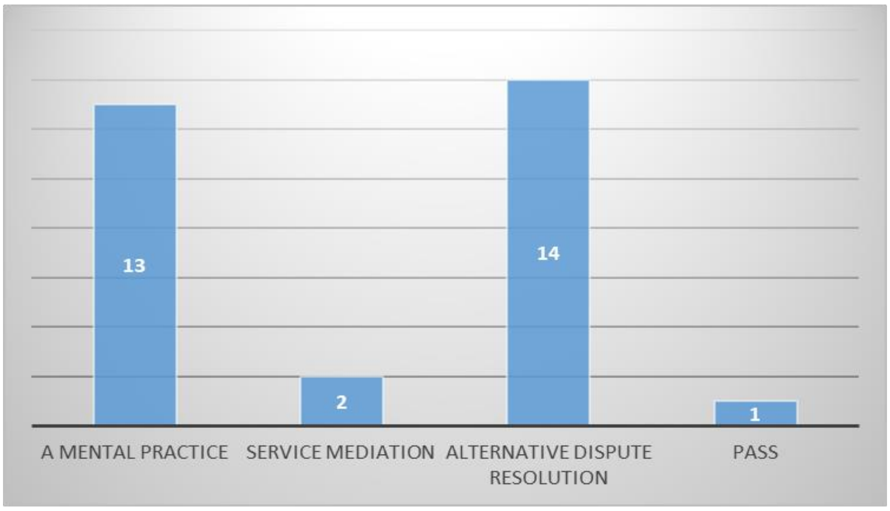

Figure 3 What is mediation?,
own editing

Based on the answers, we also learned that only one of the respondents had used the help of a mediator in her or his life.

For the next question, the respondents had to use a linear scale to indicate whether they would choose the court or peaceful dispute resolution in the event of a dispute. The left side of Figure 4 indicates the possibility of going to court, while the right side indicates the possibility of peaceful dispute resolution. As we can see, even without knowledge of mediation, those surveyed prefer a peaceful solution (27, that's 90%) rather than going to court. A particularly important result is that 9 of them (30% of the respondents) fully see only this solution as appropriate.

In the future, we will have to go through this result in more detail, because although the research was not representative, the sample shows that the examination of the conflict management strategy of individuals can even help the nomination process.

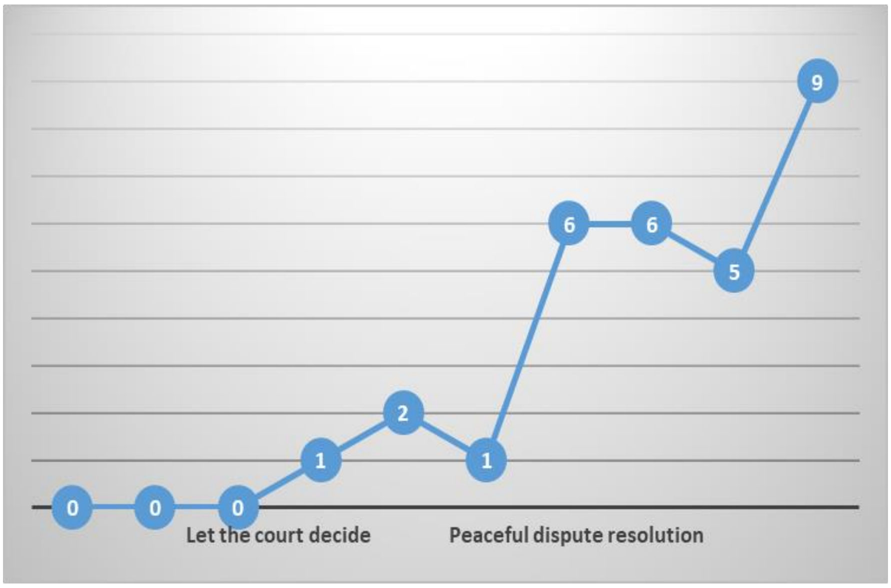

Figure 4 Should the court decide, or should we settle out of court?, own editing

During the last question, we sought the answer to why the interviewees became occupational representatives. The result can be seen in Figure 5, from which we can conclude that 11 of the elected occupational health and safety representatives did not get into this position because of their desire for safety, but because of their fame and their appointment by managers and colleagues.

We need to change this too, we need to awaken the need of employees for safe work that does not endanger their health. The first step to this can be if they exercise their rights and not just know about them.

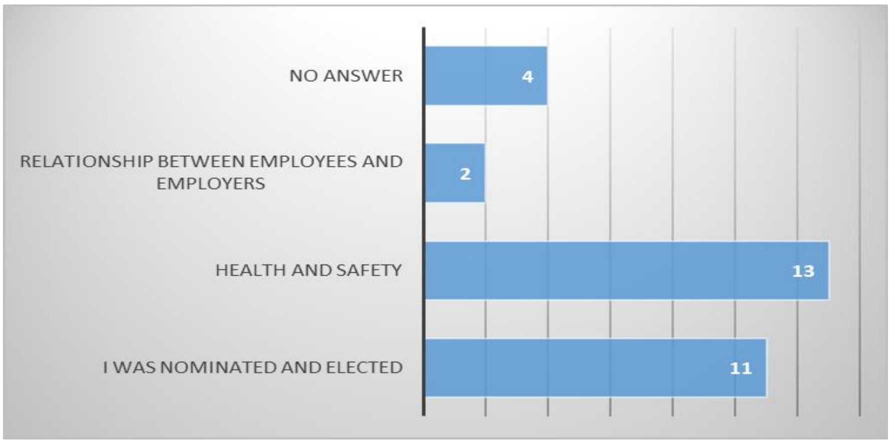

Figure 5 Why did I become an occupational health and safety representative?
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Conclusions

The research revealed that less than half of the respondents were aware of mediation as an alternative dispute resolution option, but only one of them used it. Based on the lack of knowledge, it can be concluded that it would be necessary to provide extensive information about mediation to everyone. In the field of occupational health and safety, occupational safety specialists have the greatest responsibility in this regard, as they are the ones who can incorporate this even into the educational topics.

We were able to establish that the conflicts are in the workplaces, despite this, we cannot expect the occupational health and safety representatives to act as mediators, this is not even the goal, but we could see that they were able to be identified the participants of the conflicts. Based on these, it can be considered that, similar to the involvement of experts, a third party can be involved in settling the dispute. In this way, they can prevent occupational diseases caused by psychosocial risks arising from conflicts.

After evaluating our research, we formulated the following hypotheses:

H1 - We can help with the nomination of the occupational health and safety representative by examining the nominates' conflict management strategy

H2 - Mediation can be used as prevention to reduce psychosocial risk

H3 - An occupational health and safety representative dedicated to the health and safety of employees can function effectively

Acknowledgement

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Management and Performance Evaluation of the Employees in the Municipalities of North Macedonia

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Abstract: The paper's main purpose is to identify the present state and performance management efficiency. It includes a system of appraisal in the organisation of local government in North Macedonia. There is a lack of a management system of performance and appraisal system in the sectors of government. In the private sector, performance management is implemented appropriately. If the comparison is done public sector officials have achieved less compared to the private sector. The secondary qualitative research method is applied in this paper. Questionnaire and interviews have also been considered. A scheme of performance management in the municipalities of North Macedonia might improve public sector productivity. It can also enhance the national living and function of the overall system. The research is modulated to present a different outlook on the study. Productivity and engagement of employees can be boosted. Communication, training and evaluation play a significant role. Financial security is also essential to motivate employees. Salary needs to be increased and digitalisation has gain a significant position in the public organisations.

Key words: Performance Management, Governance, Municipalities, Public sector, Public Enterprises

1 Introduction

The employees are the basic elements of an organisation and they require special attention from the top management of the organisation. The evaluation of the employees is significant data that has to be modulated by the municipalities and kept a record of. Keeping track of the employees is an essential part of the concern for the organisations to have a clear outlook of the total contribution towards the improvement of the organisation. An organisation should keep a record of the data that have been evaluated after the analysis of the work rate and output of the employees.

In this article, systematic research has been undertaken which will give a diverse outlook of the study of the essential steps that are required to successfully implement the evaluation of the performance and management of the employees. A varied research model has been provided which defines the literature review of the topic. The management and the employees who work in the municipalities of North Macedonia have been questioned. The organisation's diverse aspects that are necessary for the calculation of the data have been given in a well-structured way.
The various sectors covered under the topic include performance management which is essential to be calculated for formulating strategies to upgrade the performance of the employees. The theories related to performance management have been detailed for a better understanding of the fact. The consequences and importance of implementing the strategies have been defined to give a clear outlook of the positive and negative outlook project.
The methodology has been proposed with the inclusion of the research philosophy, approach, and design. The inclusion of data collection method, source and data analysis have been made.

2 Literature Review

2.1 Performance Management

Performance management is an effective communication process between employees and supervisors to boost employee engagement and productivity. This systematic process helps to enhance employee performance to easily pursue the organisation's objective (Schleicher et al., 2018). Most government and private organisations implement different types of performance management such as the balanced scorecard, management by objective, and budget-driven management. It is one type of corporate management tool that is most probably used to monitor employees' performance and accuracy. Organisations easily achieve their goals by developing performance management very efficiently.

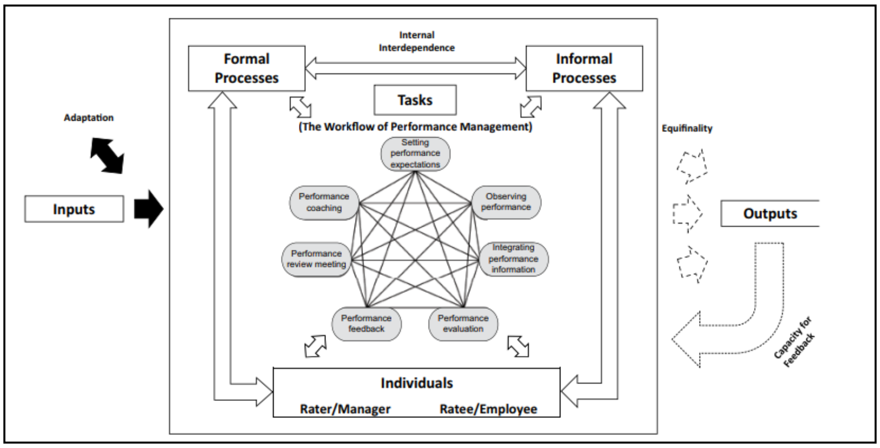

Figure 1:

Performance Management (Source: Schleicher et al., 2018)

2.2 Theory of Permanence Management

There are various types of management theories that are used by the organisation to develop the entire workplace and employee performance. The most demanding theories that multinational company uses are Frederick Taylor's Scientific Management and Elton Mayo's Human Relations theory. The first theory highly focuses on developing the management of the organisation and identifying the development very effectively (Camilleri, 2021). Another theory plays a significant role in managing human resources by developing management and monitoring the entire work culture very effectively. Every theory had its specific role that developed employee performance and entire management very effectively. The developed theories mostly help to easily develop performance management and enhance the entire management system very effectively. The core benefit of implementing performance management theory is to enable the management to effective employee performance that helps organisations to easily achieve their business objective (Tseng and Levy, 2019). The scientific theory mainly analysis the process of employee productivity and effectiveness. Employee performance is one of the most important factors for every organisation. So developing performance management help to develop the employees' accuracy very effectively. This most common performance management theory enhances the organisation management that supports every organisation to develop their performance.

2.3 Consequences of Performance Management

Performance management is an essential part of the system and is necessary to be carried out for the better establishment of a well-structured environment. There are several benefits that the organisation can benefit by the execution of performance management.

- Development of trust among the employees toward the organisation is an essential consequence of performance management (Franco-Santos and Otley, 2018). The implementation of this method increases transparency between the organisation and the employees which is a matter of significance for the employees to keep trust in the organisation.
- Improvement in the communication of the employees is a significant effect of the performance management strategy which helps the employees to connect with the other employees or employers which will increase clarity among them and will increase work efficiency.
- It involves growth in the financial condition of the company as it will improve the management statistics of the company through an increase in the work efficiency of the employees (Schleicher et al., 2019).
- Appreciation from the employees is one of the major impacts that a company can gain; from the implementation of performance management in the organisation.

2.4 Importance of Performance Management

Performance management works for improving the presentation of an organisation. A successful and productive performance management system plays an important key role of to manage the performance of an organisation (Lee, 2019). The system of performance management contributes to manager benefits and employee benefits and also increases job satisfaction and loyalty among the employees. Managed and organized performance management can define and achieve the goals of both employees and the organisation. And also capable of developing training plans required for the employees. The performance management system also increased the ability of the employees to understand their roles in the organisation.

Every employee can figure out when, where, and how to do their jobs in the favour of the company. The best thing about performance management is it built strong trust between the organisation and the employee. It also helps employees to get rewards, and incentives and develop and improve their careers (Schleicher et al., 2018). Based on the performance management system new employees develop their knowledge of training and development to perform well in the organisation. This system influences the conflicts between the subordinate and the peers to improve performance. At last, it can be said that Permanence management is the key to motivating both the management and employees to perform well.

3 Methodology

The chosen methodology for this research work is predominantly secondary qualitative data. However, primary research through survey is also being conducted for this research work.

3.1 Research Philosophy

The predominant research philosophy for this research work was interpretivism philosophy. Interpretive philosophy is highly effective in understanding the social world along with interpreting it in a subjective manner (Frechette et al., 2020). It is highly effective in understanding various people from the real world. It is highly effective in providing the research work with a higher level of flexibility for building prior knowledge regarding the topic. Moreover, future readers of the research work will be enabled in formulating their views and relating them to their previous understandings.

3.2 Research Approach

The predominant research approach for this research work was the deductive approach. This research approach was chosen as it can help the researcher in thinking more logically regarding the research topic along with making meaningful decisions for proceeding with the research work successfully. It will allow the researcher to make informed decisions during the whole research work. Moreover, the research paper will be enabled in creating effective relationships between the variables and concepts that are present regarding the concepts of performance management.

3.3 Research Design

The research design that was chosen for this research work is an explanatory research design of research (Phillipson and Hammond, 2018). This was highly helpful for this paper as it is effective in understanding the particular problem regarding performance management for obtaining more information regarding the topic. This was highly effective in predicting the causes that impact performance management effectively and predicting the future.

3.4 Data Collection Method

The data was collected using both quantitative and qualitative methods. Two methods were chosen for this research work to effectively address the questions of the research along with obtaining a deeper knowledge regarding those questions (Lester et al., 2020). It can be seen that more understanding regarding the context, phenomena, and experiences regarding performance management was obtained through using these data collection methods. Moreover, it is highly effective in stimulating interdependence and interpersonal relationships between human beings.

3.5 Data Collection Source

The researcher selected primary and secondary data collection methods to easily identify the authentic data that help to accomplish the entire research paper. The primary data collection sources are survey and interviews that helped researchers to collect authentic data and secondary data collection sources are articles, journals, and website data used to conduct the entire research paper. The primary data enhanced the research paper with authentic information and the secondary data helped to easily develop the learning principle with useful data.

3.6 Data Analysis

The thematic data analysis was chosen by the researcher to conduct the research paper (Spiers and Riley, 2019). The main reason to choose this data analysis is to develop the study concepts with a deep understanding. This research data analysis helps researchers to develop study concepts and analyse the qualitative data critically. The research paper developed a great understanding of performance management with theories. This research data analysis tool establishes the entire study with thematic approaches that help the viewer easily identify the key principle of the research paper.

4 Analysis and evaluation the analysis results

Based on the survey undertaken on 166 public servants working in the municipalities in North Macedonia, from those 39.5% are in the position managerial whereas 60.5% hold the position of non-managerial. Regarding gender 38.8 % of the employees are male, while 61.2% of workers are female. 6.6% is the fixed-term employment status out of 166 responses and 93.4% is the permanent status of workers in the municipalities in North Macedonia. A major category of the municipality employees in North Macedonia are urban with 65.3% whereas the rural category is 34.7%.

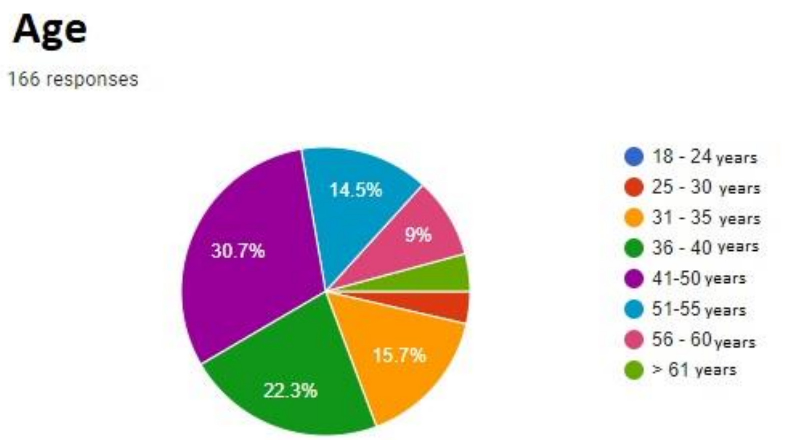

Figure 2:

Age of the municipal employees

More than half of the employees working in the Macedonian municipalities are in the age group 36-50 years of age. On the other hand, only very small insignificant 4% are below 30 years of age which means that the youth are very poorly represented in the local government.

Regarding the work experience in the municipalities, we received more diverse numbers, out of 165 responses;

Table 1

Work experience in the municipalities

0-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	>35 years
18.9%	18.3%	20.7%	24.4%	10.4%	6.7%	0.6%	0%

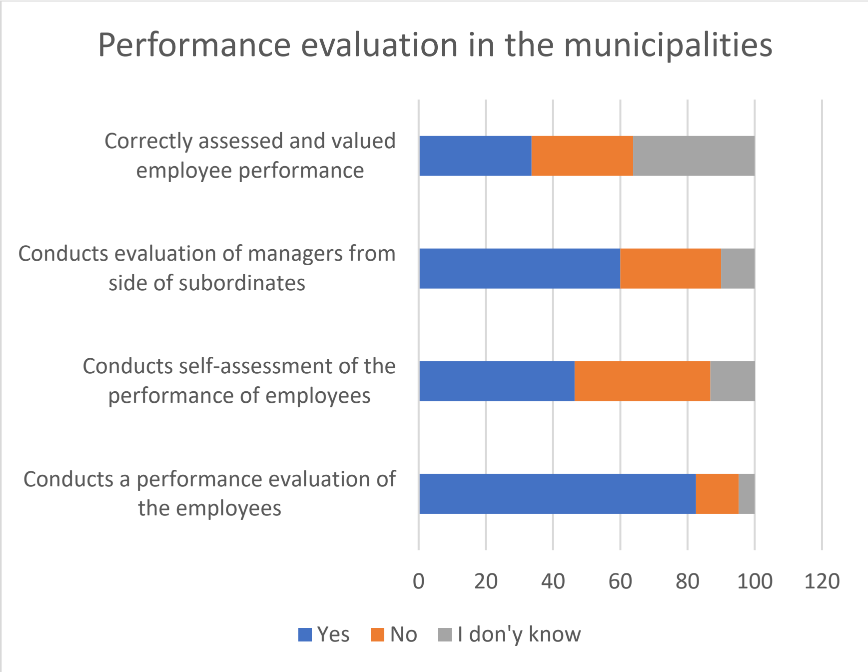

Figure 3:

Performance evaluation of the municipal employees

The chart showcases that employee performance evaluation is done by most of the municipalities. However some of the employees have said no or don't know, which indicates that some of the municipalities are not conducting basic performance evaluation of the employees. Self-assessment based on the performance of employees is also taken into consideration. This is done to improve employees' weakness, accordingly 70% of the respondents agreed that employee performance in the municipalities are not correctly valued and assessed. Therefore reform of the way how public servants are evaluated need to be done urgently. Introduction of the MERIT[11] system, valuation of each worker / non-worker and appropriate reaction to it, report on the work done and the key for a successful public administration is de-partization and admission solely due to knowledge, expertise and professionalism, on the same principle as privately owned companies employ. If the culture of the organisation is enriched, there can be more scope to improve and promote employees status and their service. Clearly defined work tasks and scope of tasks within the level of the officer, evaluation of the work done, constant

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[1] The merit system is the process of promoting and hiring government employees based on their ability to perform a job, rather than on their political connections

communication and confidentiality between the officer, the team and the head of the department and appreciation or punishment for good work or not work. If there is less workplace diversity the service can be provided of greater quality.

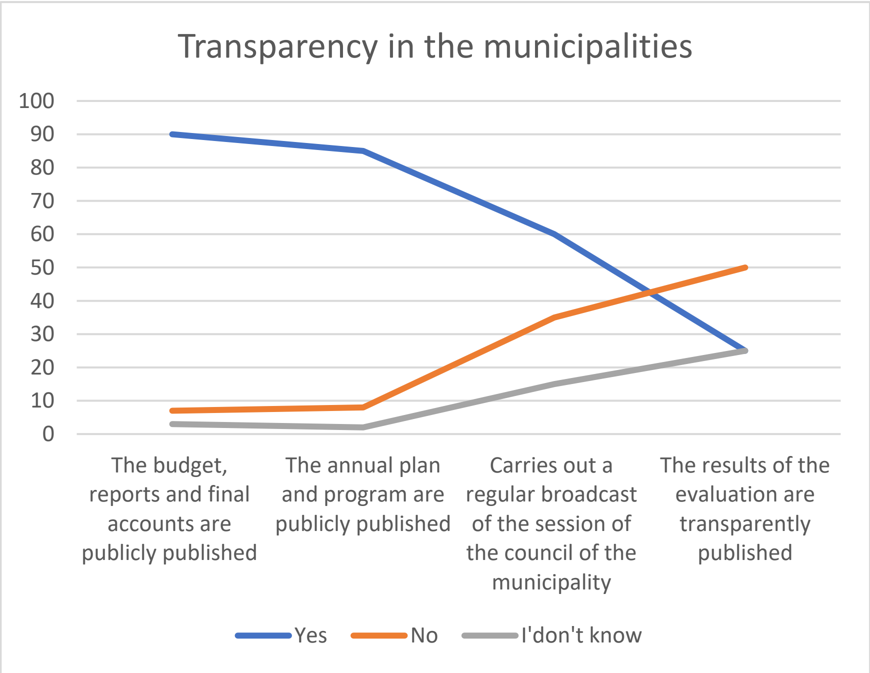

Figure 4:

Transparency of the municipalities according the employees

According the survey undertaken, if reports, final accounts and municipal budgets are transparently published. Here, most of the respondents have answered YES, 87.9% of the employees have agreed, that the public can easily access the annual program and plan of the municipality, however 5% of the respondents answered that their municipalities don't have a web page. Additionally 84.8% of the respondents have answered positively that their municipality carries out online live broadcast sessions of the municipality councils. Regarding the transparency about the process of performance evaluations undertaken, most of the respondents have responded negatively. Furthermore the respondents agree that the process of selection of candidates for employment in the municipalities should be transparently done externally based on the skills and qualifications, opposite of how is done currently based on the political party from which the mayor is coming from. According the results from the survey 69% of the employees in the municipalities agree that people currently engaged in the municipalities in North Macedonia are based on political party affiliation.

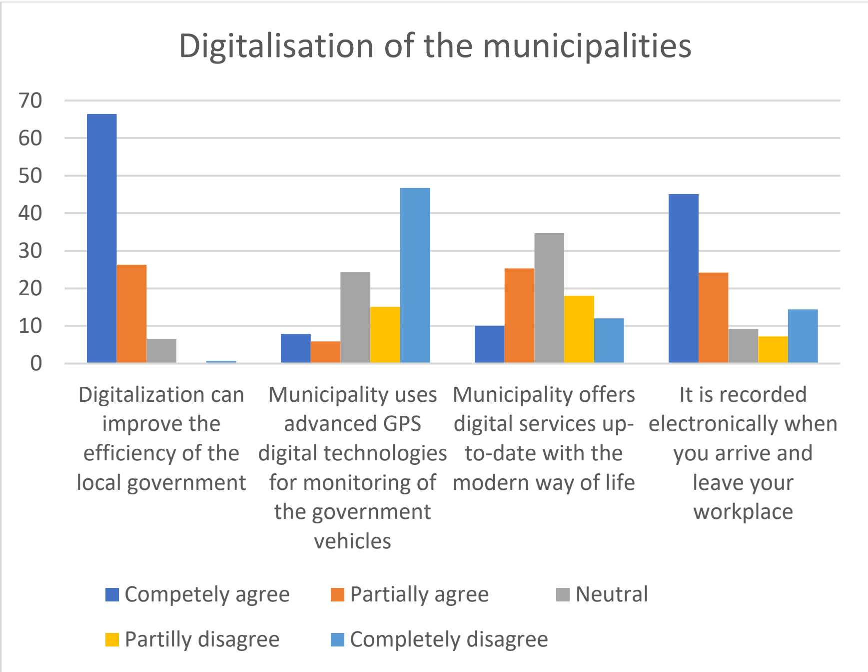

Figure 5:
Digitalisation of the municipalities

Discussing the digitalisation as a tool for improvement of the performance management of the employees in the public service, I've refer several questions to the municipalities staff. Based on the above graph, they have completely agreed that if digitalisation takes place, the efficiency of the local government might improve. Modern means of doing work help to resolve the problem within a given time. If digitalisation takes place, process claims can easily be done electronically by instant response in the local government. It results in higher satisfaction of citizens. Specialized tools help in doing the task in an automated way, which is precise, time effective and helpful in managing the performance of employees.

According the respondents, it can be said that the municipalities of North Macedonia are not digitalized adequate to keep pace with the modern way of living. To control the municipality vehicles movement, 46.7% completely disagree that advanced GPS digital technologies are used by the municipality, although it might improve the way of doing work, save finance and reduced the taking advantage of public goods for private needs, additionally 66.4% of employees have strongly agreed that if digitalisation takes place, the efficiency of the local government might improve.

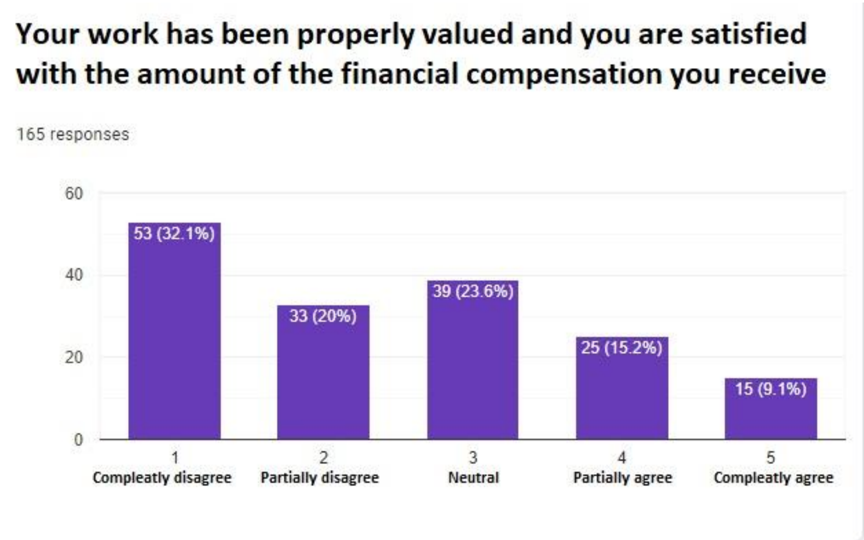

Figure 6:

Feedback on salary satisfaction

I firmly come to an understanding that the municipal staff are not satisfied with the financial compensation they get. Regardless if they do overtime or not at the end they receive the same fix salary. If the public servants are fairly awarded for their good work, there can be an improvement in the atmosphere of working and their overall performance. Financial assistance helps in motivating the workers and enhances their carrier. Job satisfaction and security are two essential parameters of employees and organisation's success. If the employees are able to maintain the standard of living, it boots up their morale to work in an efficient way. The employees might face difficulties in managing their standard of living if the wage rate is low and their extra input is not valued. It can increase the level of frustration, stress and anxiety. Through this the employee might not be able to fully devote and concentrate properly. So, it is important to give proper salary and enhance employee satisfaction.

5 Findings

- **Digitalization**

Based on the results, digitalisation can improve the efficiency of local government. It can also help in maintaining the transparency of the organisations. Currently, digitalisation has taken up a huge space in the global market (McDermott et al., 2019). Working with modern machinery helps in improving productivity. The internal process and tasks can be automated. Municipalities in North Macedonia might utilize software of time tracker for monitoring productivity of employees. It helps in beneficial insights. More engagement of employees is possible with the adaptation of modern technologies. Enhancement of collaboration within the firm is likely to take place. It is important for the organisations to make the employees work as team. It delivers more customer satisfaction. Greater efficiency can also be earned as digitalisation helps in maintaining the transparency within the institution. Tracking the employee performance electronically as they arrive and leave the workplace and updating the website page of the municipality might be beneficial.

- **Financial assurance**

It is seen that employees are not happy with the salary they get. To make the working atmosphere pleasant the wage rate needs to be increased. Getting financial security and promotion motivate employees to work properly. Budget plays a significant role in controlling the financial aspect of the municipalities in North Macedonia. It helps in measuring the performance of the organisation and interpreting the budget. The municipality need to use performance information. It can be done for management, spending and allocating the resource of finance. The main financial aspects are thus prioritized which helps in efficiency. It results in improvement in the expenditure of public fund. The traditional budgeting pattern can be improved. Over here as well technology plays a significant role. Based on findings from the open ended question in the survey regarding the overtime engagement of the employees, most of them answered that they have worked overtime but rarely someone was paid extra for the overtime, some of them were receiving a day off in compensation but generally there is stigma for paying overtime at the municipalities in North Macedonia although the implementation of complex capital projects are time-consuming and requires extraordinary overtime engagement. This results very demotivating for the hardworking employees and generally the municipal staff is avoiding to be involved and working towards successful implementation of big projects because at the end of the day this brings them just more work and responsibility for the same salary.

- **Communication**

There is a communication problem among the supervisor and staff of municipalities of North Macedonia. Fair communication is necessary, it can strengthen the working culture (Yildiz and Ahi,2022). The working pattern can be advanced and the performance of employees can be improved. In order to have a good management of performance, having good communication skills is essential. The productivity level gets enhanced and morale of the employees gets boosted up. Better team cooperation and collaboration can be done by the municipality with greater communication skills. Mangers by having good skills of communication might share their ideas. The mayor can come up with better solution and mitigate the employee’s issue. Good communication might help the workers to understand the requirement of the organisation. It can help in contributing for the firm in this competitive market place. Therefore regular meetings are required.

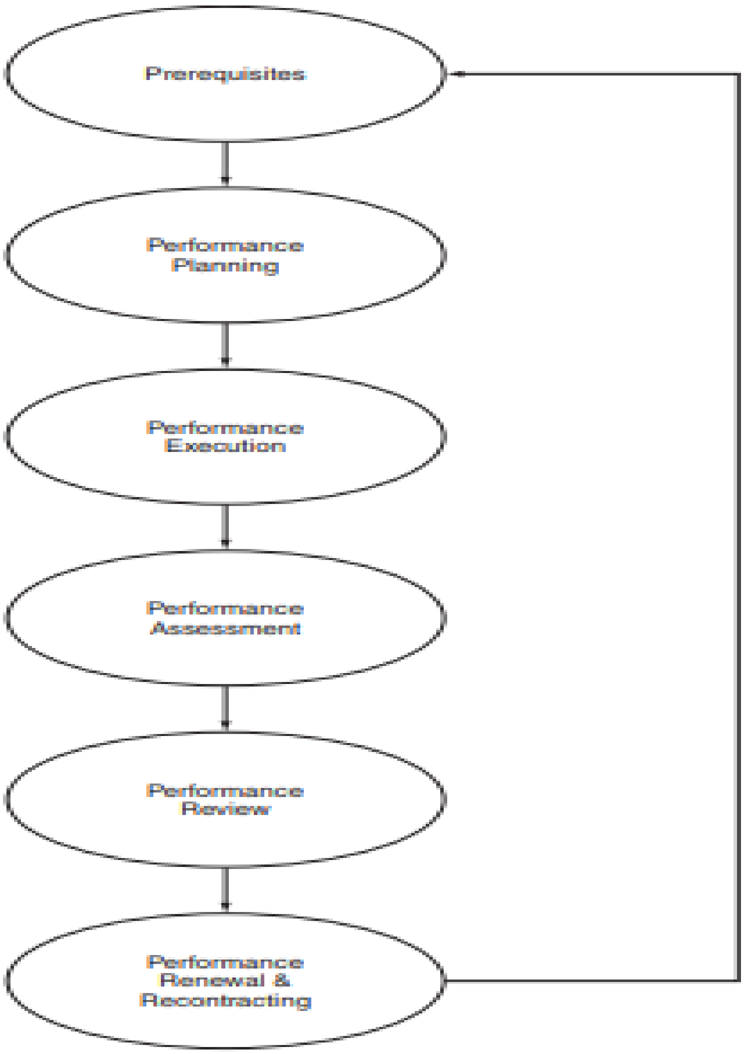

Figure 7:
Process of Performance Management (Source: Aguinis, 2019)

The above diagram presents the performance management process. If all the mentioned process is followed properly the municipalities in North Macedonia is like to have positive outcome. It is beneficial in organizing the tasks and delivering it efficiently.

- **Training and evaluation**

Giving proper training to employees of the municipalities of North Macedonia increases the performance level. Getting to know about modern technologies might help to perform effectively. Keeping track of the performance of staff helps in rewarding the workers. Training and evaluation gives a proper framework for performing the tasks and concerned duties. Evaluation of the performance can be considered to be employee's stepping stone. The mayor might discuss with the employees area of improvement. Investment in training rewards the whole organisation especially its clients. The employees of the municipality might acquire new set of skills whereas the existing ones can be improved. This helps the employees to perform in a better way and in future they might become a better leader as well. Evaluation and training might help to achieve the short term and long term goals. A positive reinforcement might be helpful in enhancing top performers. The workplace morale can easily be boosted up with the help of staff performance evaluation.

- **Innovative solution**

The management needs to come up with solutions that are innovative for resolving a working cultural issue. It is also needed to enhance municipality teamwork and gain the trust of the employees. The mayor or the supervisor needs to understand the problem of the employees. Giving innovative solution might help in understanding the root cause of the problem. This can generate trust of employees towards the organisation. Getting proper solution can help them to work efficiently. It is also beneficial in terms of satisfying clients. Employees also get work satisfaction and tend to improve their skills. The uncertainties can be tackled in an appropriate manner. The complex situation of the organisation can easily be dealt and a suitable development might occur.

6 Conclusion

Based on the above discussion, an evaluation of the performance management of the municipality of North Macedonia is done in this study. Employees are considered to be the most important element of an organisation. If the track of employees is kept recorded, problems can easily be found and mitigated. There is a mostly positive outcome of performance management. It increases the trust development among employees for the organisation. Fair communication might enhance productivity levels. There can be significant growth in the performance aspect of the organisations. It is found that digitalization, giving training and evaluation are positive approaches towards an organisation's development. As long as those who work and those who do not work are paid the same, it will be hard to motivate public servants to provide better services. That is why the law/system of salaries and rewards for those employees who work well and provide quality services to the citizens should be changed in order to keep them in the institutions, otherwise only non-workers will remain in the public institutions, and most of the good people will leave. The consequences of this tendency are devastating. There is a clear indication of limitations in the applicability of proper appraisal and performance management systems in the local government sector in North Macedonia whereas private sector companies are much more actively implementing performance improvement and management practices. This has resulted in comparative lower achievements of employees in government sector against private sector organisations. It can be concluded that giving proper training helps in strengthening the skills of the employees. Area of improvement can better be discussed by the mayor. This can help in boosting up the morale of the personnel. Getting a clear idea about the requirements of the task resolves the issue. This makes the work to be done in an efficient way. Evaluation of performance is done to reward the employees with some benefits and allowances. It accordingly motivates them to engage more within the organisation.

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Central Asia from the Perspective of Hungarian Economic Diplomacy

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Abstract: The spring of 2022 marked the beginning of a new geopolitical era, the like of which last occurred in the last decade of the 20th century, and which has since brought about a drastic and fundamental structural transformation never before expected. The "Middle Corridor" - multimodal transport route includes Central Asia - between China and Europe has become more prominent. In an economic sense increasingly open, rich in resources Central Asian countries are increasingly important foreign trade partners also for Hungary. There is much criticism of this Hungarian "Turkic relationship building", often identifying it with obliterated Turanic sympathies, however in today's crisis, competitive advantage must be exploited of the fact that in Central Asia Hungary is considered "the most eastern of the Western and the most western of the Eastern related folk". This study aims to analyse the economic relations between Central Asia and Hungary by presenting the typical economic performances of Central Asian countries, with a view to contextualize in a Hungarian economic diplomacy sense.

Keywords: Central Asia; Uzbekistan, Hungary, economic diplomacy, foreign policy, commercial diplomacy

1 Introduction

Figure 1

States of Central Asia (www.vectorstock.com)

Central Asia is the region east of the Caspian Sea, with Russia to the north, China to the east and Iran and Afghanistan to the south. This four million square kilometre area includes five former Soviet republics: Kazakhstan, Uzbekistan, Tajikistan, Turkmenistan and Kyrgyzstan.

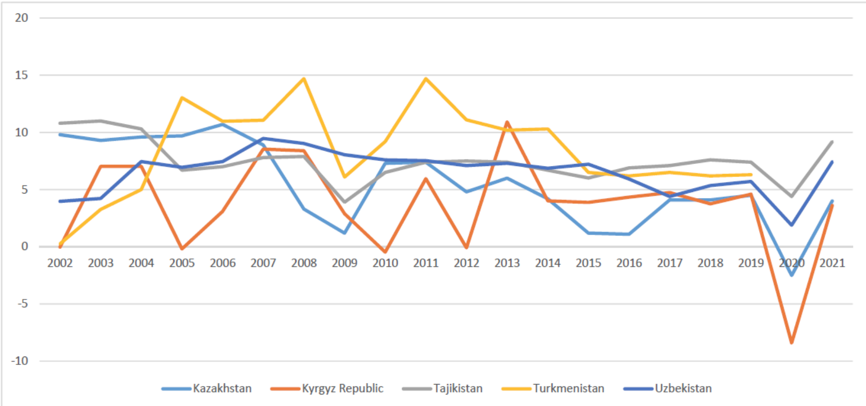

Figure 2

GDP growth in States of Central Asia 2002-2021 annual %: (www.data.worldbank.org)

As of 24 February, 2022, 95% of rail freight traffic between China and Europe was through the northern transport corridor, i.e. through Kazakhstan, Russia and Belarus. However, in the wake of Western economic and financial sanctions imposed on Russia, the Russian freight and logistics sector has come under an increasingly difficult situation, and international carriers are looking for transport routes that bypass Russia. One potential alternative is the so-called Middle Corridor, the Trans-Caspian International Transport Route (TITR), which has been operating since 2017 (Bernek, 2022).

Figure 3

The “Middle Corridor” (Koishibayev, 2022)

The Middle Transport Corridor is not yet competitive compared to the northern transport corridor, despite the huge infrastructure improvements.

Theoretically this may change in the near future, as the EU has a significant interest in developing new transport routes linking China and Europe (Bernek, 2022). However, in reality, the EU should have a clearer and more realistic strategy focusing on Central Asia, i.e. focusing on economic diplomacy instead of classical diplomacy. (Vasa, 2020). In the meantime the in an economic sense increasingly open, rich in resources (Table 1) Central Asian countries are since 2010 increasingly important foreign trade partners for Hungary (Figure 3).

Table 1

Hydrocarbon reserves and renewable energy reserves in the countries of Central Asia (Statistical data sources of Central Asian countries)

	Uzbekistan	Turkmenistan	Kazakhstan	Kyrgyzstan	Tajikistan
Petroleum (barrel)	600 million (2019)	600 million (2019)	30 billion (2019)	5 million (2020)	12 million (2019)
Natural gas (cubic metres)	1.2 trillion (2019)	19.5 trillion (2018)	2.7 trillion (2019)	6 billion (2020)	5.663 billion (2018)
Carbon (billion tonnes)	1.375 (2019)	No data	26.6 (2019)	1.3 (2020)	4. 5 (2019)
Hydroelectric potential (TWh/year)	88.5	24	199	163	527
Solar energy potential (GW)	593	655	3760	267	195
Wind energy potential (GW)	1.6	10	354	1.5	2

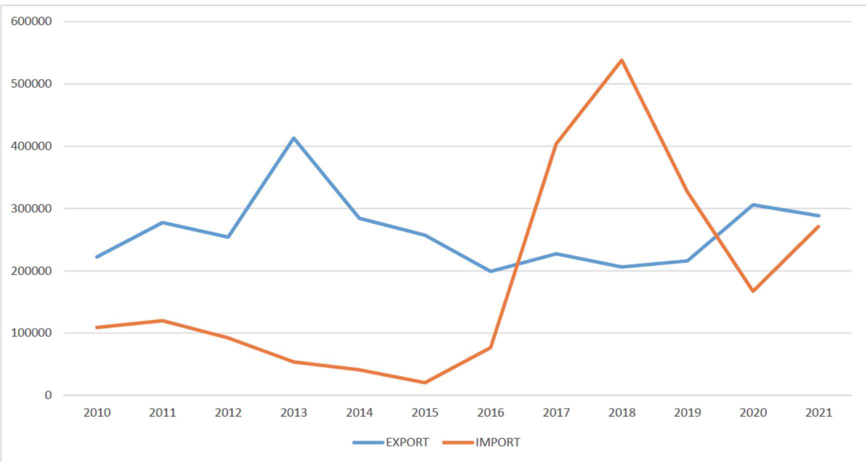

Figure 3

The evolution of Hungarian trade with the countries of Central Asia 2010-2021 Unit : US Dollar thousand (www.trademap.org)

2 Background to the study

In Central Asia Hungary is considered “the most eastern of the Western and the most western of the Eastern related folk“. In connection with this seemingly interesting finding, it is worth reviewing what this might mean for Hungary on the basis of the relevant literature, and how this can be turned to advantage:

By the beginning of the 21st century, many traditional trade barriers have been reduced or eliminated, perhaps the best example of this is the creation of an internal and unified market between all member states of the European Union, and it may give the impression that this trend will continue in the future. We can define four categories of foreign trade barriers (Van Veenstra, Yakop, Van Bergeijk, 2010):

- lack of export knowledge (e.g.: informational barriers);
- internal resource constraints (e.g.: financial or human resources);
- exogenous barriers (e.g.: licensing procedures);
- procedural barriers (e.g.: cultural differences).

In all cases, entry into new foreign markets requires a good knowledge of foreign legislation, cultural differences and local preferences.

Firms need diplomacy to gain foreign market access and to negotiate in foreign market environments, and governments need diplomacy to get foreign firms investing in their home states and to protect their home firms operating abroad. Whereas in the world of diplomacy, commercial diplomacy is a known concept, the concept of economic diplomacy may not be so common. Commercial diplomacy has been with the world of diplomacy probably since the days of bi-lateral inter-nation commercial relationship for the purpose of expanding trade and business between themselves. Economic diplomacy is much broader than commercial diplomacy. Its primary objective is to develop policies for economic relations between sovereign States and to make the bases for inter-State economic relations fair and equitable.

Economic diplomacy is primarily concerned with policy-making for economic security of a country by diplomacy and through dipomatic negotiations. These negotiations can take place at bilateral and multilateral bases. Whereas bilateral negotiations which take place between two States, for example, for securing private foreign investment opportunities, or technology transfer or for any other venture between the two States concerned, economic diplomacy at a multilateral platform, such as regional bodies or the UN agencies, aims at developing new rules of State conduct or what should be achieved by the members of the international community for international development in the proper sense of the term. (Chatterjee, 2020).

We can state that in overcoming procedural obstacles, Hungary can gain a competitive advantage over other countries with non-Turkish roots.

In 2010 was the new Hungarian foreign trade strategy defined. One of the prominent parts of which is the so-called “Opening to the East“ strategy, the main goal of which is to expand exports as much as possible to emerging Central Asian countries that are achieving rapid economic growth (Figure 2).

3 Methodology

The focus of international relations (IR) as an academic discipline primarily expand to various issues. Globalization becomes the key term to describe that dynamic, a complicated process that involves multiple aspects of life connecting and exchanging economy, culture, politics, and technology (Campbell, MacKinnon, Stevens, 2010). Using the Decision-making Theory (Chatterjee, 2010) seeks to focus on the decision-making aspects for analyses of IR of nation-states. The subjects of enquiry in this theory mainly relate to issues like how and why ruling elites of states behave in certain ways in IR.

One of the key assumptions of the theory holds that political actions follow ways which the decision-makers as “actors” want them to follow. Therefore, the “how” and “why” of a foreign political action, and the reasons behind it, are the preferred areas of study in decision-making theory. In other words, the setting or background in which policy decisions are made is studied by the theory. Therefore, basic research was carried out in this study, examines the operation of processes or concepts, the data in order to reveal the unknown by satisfying the sense of curiosity.

4 Economic relations between Central Asia and Hungary

Figure 3 clearly illustrates that as a result of the new foreign trade strategies. The most significant in Hungarian exports are the pharmaceutical products, followed by live animals exports and Machinery, mechanical appliances. It is worth examining the reasons for these results (www.trademap.org). The Hungarian “Opening to the East“ strategy announced in 2010 was renewed in 2012.

Within the framework of the Kálmán Széll Plan 2.0 adopted the strengthening of economic diplomacy, i.e. the establishment of a network of foreign trade diplomats, as well as closer cooperation between the export financing state banks, the Ministry of National Economy and the National Foreign Trade Office was emphasized (Government of Hungary, 2012).

The product structure of exports must be diversified, focusing on the following areas: health industry; pharmaceutical industry; agriculture; food industry; vehicle industry; electronics industry; creative-innovative industries; green industries; services.

The relational activity of economic diplomacy must be increased, i.e. the network of foreign trade diplomats must be strengthened, the development of specific business and cooperative relations must be supported in the activities of foreign representation, consultations for strategic partnership cooperation agreements must be conducted in order to create and sign partnership agreements.

I try illustrate the effectiveness of Hungarian economic diplomacy in Central Asia between using the example of Uzbekistan:

In the growth of Hungarian-Uzbek trade in 2017-2021, Hungarian exports increased by 25%, while imports increased by 70%. It deserves special attention that in Hungarian exports, by 270%, commodity group 76 (aluminum and articles made from it), commodity group 70 (glass and glassware; optical glass) by 270%, commodity group 38 (various products of the chemical industry) 167% increased by. In imports, the turnover of commodity group 8 (food-grade fruit and nuts), commodity group 84 (nuclear reactors, boilers, machines and mechanics) and commodity group 52 (cotton) increased by 65%.

The above results could have been facilitated by the strengthening economic diplomatic cooperation, especially if we take into account what happened after (Barkanyi, 2022):

- March 2021 (Tashkent) meeting (Viktor Orbán and President Savkat Mirziyoyev)
- March 2021 (Tashkent) businessman and ministerial meeting
- June 2021 (Tashkent) Foreign Minister Agreement
- June 2021 (Tashkent, Szamarkand, Bukhara) 1st Uzbek-Hungarian Rector's Forum (attended by heads of more than ten prestigious educational institutions in Hungary)
- September 2021 (Tashkent) meeting (Viktor Orbán and President Savkat Mirziyoyev)
- October 2021 (Budapest) customer loan agreement
- April 2022 telephone meeting (Viktor Orbán and President Savkat Mirziyoyev)

- May 2022 (Tashkent) 7th Hungarian-Uzbek Intergovernmental Committee meeting (Deputy Prime Minister Péter Szijjártó and Sardor Umurzakov, Minister responsible for investment and foreign economic relations)
- May 2022 Online meeting: ("Uztoqimaliksanoat" association and Global Faktor Zrt.)
- August 2022 (Budapest) meeting (Ambassador of Uzbekistan Abat Fayzullaev and Miklós Lengyel, Deputy State Secretary responsible for scientific and educational cooperation of the Ministry of Foreign Affairs and Trade)
- October 2022 (Kaposvár) Agricultural fair and the rural development conference (Minister Aziz Voitov and Csaba Gyuricza, Rector of the Hungarian University of Agricultural and Life Sciences)
- October 2022 (Budapest) official visit (President of Uzbekistan Shavkat Mirziyoyev and Ambassador of Uzbekistan Abat Fayzullaev; Deputy Prime Minister Sardor Umurzakov is the head of the presidential administration, Minister of Investment and Foreign Trade Dzhamshid Hodzhaev is the co-chairman of the intergovernmental committee and 4 other ministers, as well as representatives of the leading business circles)
- October 2022 (Budapest) business forum
- November 2022 (Samarkand) business forum (representatives of more than 50 large Hungarian companies operating in various fields)

The development of Hungarian-Uzbek economic relations in 2021:

- Compared to 2020, the trade turnover of Hungary and Uzbekistan increased by 38% in 2021
- In 2020-2021, despite the negative consequences of the epidemic, it showed growth dynamics
- Richter has been on the Uzbek market for 25 years and is already the 13th largest player
- work plan for the development of Uzbek and Hungarian agriculture, food supply and animal husbandry
- four Hungarian investments can start (vegetable oil factory, vegetable production plant, cattle farm)
- water management framework agreement
- the Uzbek-Hungarian Potato Research Center was inaugurated

- inter-parliamentary friendship and cooperation groups were established in the Hungarian Parliament and the Olij Majlis of Uzbekistan
- Strategic Partnership Joint Declaration
- Hungarian-Uzbek startup program can start (budget amount of HUF 700 million)
- Hungarian-Uzbek Business Council was established, bringing together 27 Hungarian and 58 Uzbek companies: (chairman: OTP Deputy CEO Wolf Lászlót, co-chairman: Adkham Ikramov, President of the Chamber of Commerce and Industry of Uzbekistan; Sectors: agriculture, food industry, food processing technology, health industry, construction technology, water affairs, tourism, ITC, banking and financial services)
- signing of a statement of intent to purchase a majority share by OTP Bank
- (Ipoteka Bank, 5th largest bank, nearly 9% market share, more than 1.2 million retail customers)
- 5-year loan agreement between Mikrokreditbank and EXIM
- the Uzbek Mikrokreditbank buys 300 ATMs from NCR Hungary (EXIM customer loan)
- Interregional Cooperation Agreement

The development of Hungarian-Uzbek economic relations in 2022:

- In the framework of the Hungarian-Uzbek Startup and Research Development Program (February 10): KÜRT Information Security and Data Backup Zrt.'s own developed software (30% deductible, the software can become part of Uzbek university cyber security training)
- in the last 4 years, the volume of bilateral trade has tripled, bilateral trade increased by 48% in the first half of 2022
- the Hungarian Eximbank opened a credit line of 105 million euros
- specific project proposals of branch managers: 2022-2023 industrial cooperation joint programs
- Regional cooperation working groups (Tashkent-Navoi-Jizzakh and Pest-Veszprém-Fejér)
- preliminary agreements for the implementation of joint investment projects:
- high-tech enterprises, production of products with high added value

- Cooperation memorandum: customs, justice, environmental protection, Horticulture, greenhouse, viticulture investments, the Academy of Public Administration of Uzbekistan and the National University of Public Service, the Samarkand region and Hajdú-Bihar, the International Relations Information and Analytical Center of Uzbekistan and the Hungarian Institute of Foreign Trade and Foreign Affairs, the Tashkent State Agricultural University and the Hungarian University of Agriculture and Life Sciences.
- Uzbekistan opens a diplomatic mission in Hungary
- Uzbekistan has appointed an extraordinary and plenipotentiary ambassador to Hungary (Austrian Ambassador Abat Faizullaev)
- defining the program steps of interregional cooperation (joint exhibitions, business forums, trade missions)
- development of joint educational programs
- tourism cooperation agreement
- agreement on the establishment of direct relations between textile enterprises
- The Hungarian study quota in Uzbekistan was increased to 170 (100+50+20= separate scholarships in the fields of medicine, sports and ICT and for PhD studies)
- Agreement on scientific cooperation (Hungarian University of Agricultural and Life Sciences and Tashkent State University of Agricultural Sciences)
- Signing 15 documents:
- Industrial Cooperation Development Joint Program 2023-2024
- Scientific and Technological Cooperation Development Action Plan
- Science Development Cooperation Agreement
- Action plan for the expansion of agricultural cooperation

Conclusion

Hungary has an extensive foreign representation network that fully – excluding Turkmenistan due to its specific policycovers – the Central Asian countries:

- In Kazakhstan in Almaty between 2010 and 2014, Hungary opened a consulate general, and a consular office and embassy in Astana.
- In Kyrgyzstan, the Hungarian honorary consulate was opened in Bishkek, then, after 2014, an embassy, consular office and honorary consulate general, and an honorary consulate in Os.
- In Tajikistan in Dushanbe honorary consulate.
- Consular office and embassy in Tashkent, Uzbekistan.

The above are also extremely important strategic steps, because the economic and trade relations with the countries of Central Asia differ from those usual in Europe (Dawisha, Dawisha, 2015):

- Particular emphasis is placed on the development of personal bonds and trust, which can be achieved and nurtured by an active, personal representative with a meaningful presence.
- More active foreign trade with countries outside the member states of the former Soviet Union actually became "available" in Central Asia from the second decade of the 21st century.
- First of all, the Turkish countries have "activated" themselves and are striving to create a unified geopolitical, geo-economic and cultural area, while preserving their national characteristics.

The Organization of Turkic States is of outstanding importance in this, in which Hungary has been participating as an active observer since 2018 and in 2019 was open Turkic Council Office in Budapest.

In the study, I tried to show that Hungary chose the right strategy due to the specifics of Central Asian countries. It is true that, compared to other European countries, it started utilizing the competitive advantage of “the most eastern of the Western and the most western of the Eastern related folk” a little late. However, in today's changing geopolitical situation, the timing does not seem late, because the countries of Central Asia increasingly count on Hungary's support in their opening to the countries of European Union.

Taking into account the growing importance of economic diplomacy in Eurasia, I think it is worthwhile to continue what was formulated in the “Opening to the East” strategy, so that in the long term Hungary does not come out as a “loser “in today's geopolitical reorganization.

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Is your firm’s reward system affect your overall performance? An emphasis on Equity theory in compensation strategy

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Abstract: To be strategic, rewards must support and advance the organization's business and people objectives. Towards a strategic approach to rewards, a total reward strategy may include cutting-edge learning programs and flexible working arrangements. The current study examines the relevance of equity theory while designing the overall compensation system in a firm. Accordingly, the study was conducted in a UAE-based contracting firm, purposively. The theory assisted in preparing a questionnaire and a sample of 150 was selected by stratified proportional sampling for diverse demographic responses. Descriptive statistics, Confirmatory Factor analysis, and Path analysis were used to test the conceptual model. It maintained the significance level of the latent variables to design an appropriate compensation program in the firm. Hence, firms taking a strategic approach to compensation realize the need for innovative methods to meet strategic goals. Finally, the study paves the way to ensure that what is being rewarded is consistent with the firms' objectives as compensation systems need to expand and evolve.
Keywords: reward strategy; compensation; equity theory;

1 Introduction

Technological advances and global competition contributed greatly to the need for a strategic reward system in all organizations. To ensure uniformity with their organization's performance measures, organizations must reevaluate their compensation programs within the context of their corporate strategy and specific HR strategy. This can lead to taking relevant measures to recruit, retain, and engage the people it needs to achieve its business goals (CIPD, 2022). In general, compensation is considered a critical strategic area for firms because it impacts an employer’s ability to attract applicants, retain employees, and ensure optimal levels of performance from employees in meeting the organization's strategic objectives (Mello, 2019).

1.1 Statement of the study

Globally, nations are modifying their regulations to address concerns about fairness in the reward system. People management policies and practices are required by law to treat employees fairly. Pay data is legally required to be disclosed by large employers in the UK, for instance by gender (CIPD, 2021). Typically, jobs that are based on knowledge and skills, which are acquired or developed through formal education or early job experiences are highly valued and measured by pay levels (Martocchio, 2018). However, in 2005, Walmart announced that it would raise the pay for all of its U.S. employees to at least $9 per hour, which would exceed the federal minimum wage level by $1.75 per hour pay. This move would raise the pay of more than one-third of the company's workers. So, the common assumption on the high demand for workers applies only to highly skilled jobs is wrong (Morath, 2015).

1.2 Significance of the topic

Relating to the changing needs of organizations and employees in recent years, compensation practices are advancing and altering. Many firms have highlighted employee performance and contributions rather than seniority in compensation decisions. Also, employers are taking a more holistic approach to compensation by offering enhanced and flexible benefits to meet individual employee needs and preferences. Nowadays, organizational rewards are directly linked to the organization's mission, strategy, and goals. And in many firms, compensation decisions and regards are becoming more individualized rather than applied equally, "across the board," to all employees. Moreover, greater emphasis has been placed on more immediate and intermittent rewards rather than waiting for the annual performance evaluation to announce compensation decisions (Chen, 2006; WorldatWork and Deliotte Consulting LLP, 2014; Boeing, 2015; Parameswaran, 2021).

1.3 Purpose and Objectives

In designing the overall compensation system, the firm needs to consider with perceived equity or fairness of the system of employees. When individuals perceive that they are being treated inequitably to their peers, they usually try to establish equity by increasing their outcomes or decreasing their inputs. Increasing outcomes might involve asking for additional compensation or pilfering from the firm. In the second case, the employee might use inequality to justify theft (Adams, 1963).

Equity theory suggests that people estimate the ratio of contributions (inputs) to outcomes (outcomes) for themselves and a selected reference (Adams, 1965). Employee contributions in their workplace, such as education, work experience, performance, skills, etc., are the inputs and the outcomes are the rewards that the employee receives in the form of compensation, career opportunities, promotions, etc. Whenever there is an imbalance between inputs and outcomes, individuals may adjust their attitudes, contributions, or outcomes to reduce the discrepancy (Restubog et al, 2015). In this background, the study explores the relevance of this theory in the compensation system of the selected firm. The objectives are as follows:

- To analyze the factors of internal equity toward the perception of fairness,
- To investigate the parameters of external equity toward the perception of fairness,
- To examine the measures of individual equity toward the perception of fairness.

2 Review of Literature: Importance of aligning the reward framework to the wider organizational contexts and strategy

Considering the legal regulations, UAE Federal Decree-Law No. 33 of 2021 governs the Labor Law and its corresponding Executive Regulations and all other ministerial orders implementing this law and these laws regulate employer-employee relations to a great extent. Employment laws protect employees from unjust terminations and guide employers on minimum wage standards, employee compensation, retirement plans, and other employment-related issues. Associated with employee attraction, engagement, and retention in the UAE, a survey conducted by Bayt.com and YouGov (2022), reveals that the three factors that attract prospective employees are: salary and compensation (64%), office environment (61%), job security (61%), and the post joining factors are job security (38%), career opportunities (37%), and training and development opportunities (35%).

2.1 Alignment between Internal Equity and perception of fairness toward employee performance

Internal equity relates to the perceived fairness of pay differentials among different jobs within an organization. In attempting to establish internal equity, employers can evaluate jobs by using four techniques: job ranking, job classification, point systems, and factor comparison (Torre et al, 2015). Job ranking identifies jobs based on “worth” to the organization relative to other jobs. It is simple, inexpensive, and easy to understand however, it is random, subjective, and not useful in large and

informal organizations. Job classification prepares job grades/classification and assigns the job to the appropriate class. It can apply to a large number of varied jobs, is easy to understand, and is flexible, but is detailed, time-consuming to develop, and lacks flexibility. About the ‘point method,’ defines compensable factors and evaluates jobs on these factors relative to other jobs (Mello, 2019). The first hypothesis for the study is:
H1: There is a significant level between internal equity and employee commitment and performance.

2.2 Alignment between External Equity and perception of fairness toward employee performance

Not only in past, but in recent times employees try to explore compensation outside their work with similar jobs. Organizations collect the market rates through external sources, professional associations, human resource (HR) consulting firms, or primary research. Usually, firms choose strategies like lead policy (pays higher wages than competitors to ensure that the firm becomes the employer of choice), lag policy (compensates employees below the rates of competitors, but provides other benefits through career advancement, incentive plan, good location, conducive work environment, or employment security), or market policy (sets salary levels equal to those of competitors) (Carrel and Dittrich, 1978; Dulebohn and Werling, 2007). The second hypothesis crafted is:
H2: There is a significant level between external equity and employee commitment and performance.

2.3 Individual equity

Literature provides a wide variety to determine individual salary levels and pay differentials among employees in identical jobs. This type of equity relates to employee perceptions of pay differentials among individuals who hold identical jobs in the same firm. The seniority-based system determines compensation according to the length of time on the job or the length of time with the employer. This system provides a little incentive to be more productive, and they encourage workers who may be mediocre or substandard performers to remain within the organization.
Another strategy is incentive pay, which allows the employee to receive a portion of his or her compensation in direct relation to the financial performance of the individual unit, or the entire organization. This allows firms to adjust their compensation expenses based on organizational performance. An increasing number of firms are using this strategy namely; commission sales plan, profit-sharing plans, gain-sharing plans, and stock ownership, distribution, or option plans. Williams and Grimaldi (1999), stressed that a well-designed incentive plan can be

the deciding factor in an applicant's decision to accept or reject a job offer when base compensation is set at the market level and nondistinguishable from that of competitors. Likewise, merit pay systems compensate individuals for their performance and are permanently added to an employee's base pay. The disadvantage of this system is that it is more aligned with subjectivity due to the inherent feedback system. If the performance feedback process is biased or unfair, then the employee perceives this system as unfair. Also, performance-based pay that is variable tied to an employee's work unit's or organization's results is popular with both employers and employees. Approximately, two-thirds of U.S. companies offer some form of variable performance-based pay, and about 10 percent of all compensation paid in the U.S. is variable. Additionally, one survey found that employees who provide variable performance-based pay to their top employees are 68 percent more likely to report outstanding bottom-line financial performance than those who do not (Bates, 2003). Further, skill-based pay is profound in recent times as it not only gives employees incentives to learn new skills or upgrade new ones but also promotes the strategic needs of the firm. The third hypothesis to test is:

H3: There is a significant level between individual equity and employee commitment and performance.

3 Methodology

The study utilizes a mixed approach, which consists of a close-ended questionnaire (Table 1) generated from literature, and interviews with managers and employees by a stratified proportional sampling method. It consists of two parts, where the first part comprises 6 control questions (Table 1) and the second part contains 15 questions divided into three groups; internal equity, external equity, individual equity, and perception of fairness. The Likert scale was used for the assessment of responses, where 1 means "strongly disagree," 3, "neutral," and 5, "strongly agree." The data universe consists of 150 respondents from a contracting firm sector located in Dubai, UAE. The first task was to do descriptive statistics to estimate the reliability and validity of the measures used in the research.

Table 1 Items for the Questionnaire

Construct	Questions	Description	Source
Internal equity (Q1)	Q1_1	My supervisor makes judgments on more challenging jobs	Adams, 1963;1965
	Q1_2	Our jobs require similar effort, ability, training, and responsibility in particular classes and compensates within a grade	Mello, 2019
	Q1_3	There exists a quantitative assessment of job content for compensation	
	Q1_4	I compare my compensation with various jobs within our firm.	
External Equity (Q2)	Q2_1	My firm determines market wage rates.	
	Q2_2	My firm conducts a compensation market survey	
	Q2_3	My firm practices a lag policy.	
	Q2_4	I compare my wages with external similar jobs.	
Individual equity (Q3)	Q3_1	My company considers seniority for compensation.	
	Q3_2	My company compensates individuals for their proven performance.	
	Q3_3	My company compensates in direct relation to the financial performance of the individual/unit/firm.	
	Q3_4	I compare the pay differentials among individuals in my firm.	
Fairness of perception (Q4)	Q4_1	Fairness in compensation can increase my level of organizational commitment.	
	Q4_2	Fairness in compensation can increase my level of motivation.	
	Q4_3	Fairness in compensation can increase my level of organizational performance.	

Source: Literature review

3.1 Sample and data collection

The survey maintains its anonymity and was conducted between June and August 2022 by three UAE-based firms. The survey covered 150 employees, and 133 were properly done (88.67%). The ratio between the sample size and the number of questions is 12.5 and is larger than the prescribed value of 5 (Hair et al., 2006).

3.2 3.2 Demographic characteristics

The model developed for the study consists of three independent variables: Internal equity (Q1), External Equity (Q2), Individual Equity (Q3), and a dependent variable: perception of fairness, (Q4). All these variables were measured using items taken from the previous studies and information received from the pilot study. The demographic traits of the sample are depicted in Table 2. The results convey that the survey included 60.1% male and 39.8 female employees from the selected firms. Only 13.5% of shares less than 25 years from the total respondents. 43.6% of the total number of respondents belong to the age group 36-45, which represents more perception of fairness in compensation equities. Also, 51.3% of respondents have 10-20 years of experience, which shows that more experience can increase the level of commitment, satisfaction, and performance towards the firms. Almost 51.1% of the total number of respondents were in post-graduation and had more chance of comparing the different equities in their personal experiences.

Table 2 Demographic characteristics of the sample

Mark	**Control Variables**	**Category**	**Frequency**
CQ1	Gender	Male	80
		Female	53
CQ2	Age	<25	9
		26-35	38
		36-45	58
		46-55	20
		>56	8
CQ3	Experience	<5 years	12
		5-10	45
		10-20	55
		20-30	21
CQ4	Qualification	Bachelors	52
		PG	68
			13
		Other Professional	

Source: Survey

4 Research Results

4.1 Descriptive Statistics

This was performed by SPSS 24.0. As a statistical method, it collects, sorts calculates, presents, and describes the main characteristics of statistical series used in the research of mass phenomena. The results of 15 variables are shown in Table 3.

Table 3 Descriptive Statistics of variables

Variables	Mean	Std.Dev.	Variables	Mean	Std. Dev	Variables	Mean	Std. Dev	Variables	Mean	Std.Dev
Q1_1	3.7	0.89	Q2_1	4.1	0.81	Q3_1	3.9	0.89	Q4_1	4.1	0.81
Q1_2	3.6	0.88	Q2_2	4.0	0.87	Q3_2	3.8	0.88	Q4_2	4.0	0.83
Q1_3	3.9	0.90	Q2_3	3.9	0.98	Q3_3	3.2	0.98	Q4_3	3.9	0.92
Q1_4	4.2	0.91	Q2_4	4.1	0.81	Q3_4	3.2	0.98			

The above table of statistics represents the quantitative descriptions in a manageable way. It summarizes the samples and measures through mean value (central tendency) and standard deviation.

4.2 Factor Analysis

This section starts with an exploratory analysis to discover the underlying factor structure and the uniqueness of latent variables. Table 4 depicts the result of the analysis using the Varimax rotation method with Kaiser Normalization. The rotated factor matrix created four factors with acceptable results (KMO=0.90, $p<0.000$). Principal component analysis has been conducted as the extracting method for each group of the defined model. Next, CFA was utilized on all latent variables of the measurement model and a correlation between four defined groups. PCA and CFA with maximum likelihood confirmed that the measurement model fit is valid. Moreover, Cronbach's alpha indicates that all the items are reliable. The values of the factor loading, t-value, and p-value ($p<.0.05$) validate that all constructs have robust convergent validity.

Table 4. EFA and CFA for the measurement model

Group	Variable	Exploratory Factor Analysis (EFA)		Confirmatory Factor Analysis (CFA)		
		PCA		Reliability	Convergent validity	
		% variance (one-dimensional factor)	Factor loading	Cronbach alpha	Factor loading	t-value
Q1	Q1_1	59.65	0.68	0.75	0.60	13.47**
	Q1_2		0.65		0.66	13.75**
	Q1_3		0.70		0.61	13.41**
	Q1_4		0.71		0.65	13.73**
Q2	Q2_1	68.57	0.81	0.85	0.65	15.65**
	Q2_2		0.86		0.73	18.89**
	Q2_3		0.84		0.83	19.32**
	Q2_4		0.83		0.68	16.10**
Q3	Q3_1	64.81	0.75	0.73	0.67	14.21**
	Q3_2		0.73		0.66	11.32**
	Q3_3		0.72		0.62	13.52**
	Q3_4		0.79		0.65	14.32**
Q4	Q4_1	68.85	0.82	0.78	0.66	13.59**
	Q4_2		0.85		0.67	15.89**
	Q4_3		0.83		0.68	14.88**

Note: The level of statistical significance :*p <0.10; **p<0.05

Thus, Table 4 describes the factor loadings of PCA and CFA with their significance levels.

The goodness-of-fit measure is the degree to which the actual or observed covariance input matrix corresponds to that predicted from the proposed model. Other Commonly used measures of absolute fit include the goodness-of-fit index (GFI) and Root-Mean-Square Error of Approximation (RMSEA. GFI is a non-statistical measure ranging from 0 (poor fit) to 1 (perfect fit). The higher the value of the GFI indicator, the better the match. Good fitting is indicated by a value above 0.90.

Table 5. Model fit for CFA

Fit Indicators	Values for the control (measurement model)	Values for structural (PATH) model	Recommended values
Chi-Square	488.12	523.38	-
Degree of freedom	232	243	-
Relative Chi-Square	2.10	2.15	<3.0
RMSEA	0.06	0.06	<0.08-0.10
GFI	0.89	0.89	>0.8
AGFI	0.92	0.92	>0.9
CFI	0.96	0.96	>0.9
IFI	0.95	0.95	>0.9
NFI	0.96	0.96	>0.9
NNFI	0.94	0.94	>0.9
RFI	0.95	0.95	>0.9

Based on the obtained values of indicators (Adjusted Goodness-of-Fit Index (AGFI), Comparative Fit Index (CFI), Incremental Fit Index (IFI), Normed Fit Index (NFI), Non-Normed Fit Index (NNFI) and Relative Fit Index (RFI), which have accepted values (>0.90), thus proposed model is apt for the study.

4.3 Correlation analysis

Moreover, correlation analysis was done to ensure the positive relationship between the latent variables which is illustrated in Table 6.

Table 6 Correlation analysis

Latent Variables	1	2	3	4
Internal Equity	1			
External Equity	0.48*	1		
Individual Equity	0.88**	0.54*	1	
Perception of fairness toward motivation, commitment, and performance	0.65**	0.49*	0.54**	1

Note: The level of statistical significance :*p <0.10; **p,0.05
The values confirm the correlation between variables as the values were above 0.45.

5 Findings and Discussion

The result of descriptive statistics clarifies the mean value of the responses ranges from 3.1 to 4.0, and the standard deviation from 0.82 to 1.53. The mean value for all 15 questions, is 3.8 and the mean value for standard deviation is 0.88. This proves that the respondents in the selected firms give much importance to the three equities towards a perceived feeling of fairness, which in turn impacts commitment, motivation, and performance. Further, in all items, Q1-Q4, the KMO indicators are far above the recommended value of 0.6. Barlett's indicator of sphericity is significant and lower than 0.05, which indicates that are correlations among the items in the questionnaire, that is, the correlation matrix is not one. Therefore, the results confirmed that the data set was suitable and fit for factor analysis. The results of factor analysis (PCA) validated unidimensionality in all groups of questions that were put up in the conceptual model because all the test items grouped in one variable were set with an eigenvalue greater than 1.0. Table 4 represents the percentage of variability by each factor. The factor loadings of variables are in the range of 0.67 to 0.90, which is above the recommended value of 0.6. This implies that the group of latent variables defined by Q1 to Q4 can be reliably explained using research questions defined by Q1_1 to Q4_3. The Cronbach's alpha coefficient for all four groups of questions is found as greater than 0.7, confirming the recommended value (0.91). Thus the CFA analysis proves an internal consistency and a good possibility of modeling results for the survey population (Table 4). Next, the comparative results for the measurement model and structural model are exhibited in Table 5. In the measurement model, the RMSEA indicator has a value of 0.07, and in the structural model 0.07, indicating acceptable coincidence parameters of both models. The GFI indicator also shows good correspondence for both measurement and structural models, with obtained values of 0.85 and 0.88 respectively. Based on RMSEA and GFI indicators, it is concluded that there is an absolute coincidence parameter of both models. Moreover, based on the obtained values of the indicator for measurement model AGFI=0.87; CFI=0.89; IFI=0.88; NFI=0.96; NNFI=0.92, and RFI=0.94, thus the values are acceptable and above 0.90. This establishes that both models have a considerable increase in connection. The relative chi-square (x^2/d.f.) of the measurement model is 2.50 and 2.62 of the structural model, which fits in the recommended range from 1 to 3. Therefore, it confirms that the initial data were truly symbolic. From the results of the fit indicator, it can be concluded that good fitting of both models (both measuring and structural) was accomplished. Additionally, a general conclusion can be made that all 15 variables (questions) are valid and reliable to describe the formed 3 groups of latent variables and the last group of the independent variable of the conceptual model. The SEM values indicate that all three research hypotheses are confirmed from the following values: H1(B=0.43, t=6.16, $p<0.05$); H2(B=0.17; t=2.23; $p<0.05$; H3(B=0.62; t=4.41; $p<0.05$). The Squared Multiple Correlations (R^2), Internal Equity, and Individual Equity can be explained with 47% of the variance.

5.1 Recommendations

The flexibility of variable compensation programs allows employers to tailor to organization-wide, divisional, team, or individual performance depending on the interdependence present in jobs as well as organizational strategy. If these variable compensation programs are well communicated and implemented, it assists employees to understand the organizational goals and objectives as well as how their jobs impact organizational performance. However, cultural barriers, both institutional and national, can act as impediments to a successful implementation of a performance-based pay plan.

Employers have a choice of four systems for developing an internally equitable compensation system based on whether they wish to consider complete or specified job factors as well as whether they wish to compare jobs to each other to some standard. Irrespective of these methods, it is imperative for the employees to realize and accept the system to ensure optimal motivation, commitment, and performance.

The selected firms can take a strategy of lag policy as the firm believes that work-related outcomes are multifaceted and more importantly, employees consider more than just salary in weighing their employment options. However, the demographic factors to be considered in such situations, and it needs more insights into the personal and lifestyle choices of the employees it recruits. In the future, the firm can take market policy, where the salary levels are equal to those of competitors. Employers can compete in the labor market by attracting employees via other means (factors listed in the lag policy) in an attempt to neutralize pay as a factor in applicant decisions. It is suggested that compensation surveys are important because they enable compensation professionals to obtain realistic views of competitors' pay practices.

5.2 Conclusion

The compensation strategy represents both intrinsic and extrinsic rewards employees receive for performing their jobs and for their relationships as employees. The study pinpoints the necessity of strategic compensation in this cut-throat competitive economy because it suggests the design and implementation of compensation systems to reinforce the objectives of both HR strategies and competitive business strategies.

Moreover, the results confirm the role of compensation professionals to promote effective compensation systems by meeting three important goals; internal consistency, recognition of individual contributions, and market competitiveness. The first factor expresses the relative value of each job among all jobs within a company and it formally recognizes differences in job characteristics, which therefore assists the managers in the selected firms to set pay accordingly. Also, the results confirm the role of the second factor in attracting and retaining the most qualified employees. Likewise, the third variable validates the pay rate differences for jobs of unequal worth and the framework for recognizing differences in employee contributions. Therefore, the study identifies or assists firms to recognize the pay differences by paying individuals according to their credentials, knowledge, or job performance. Thus, the pay structures can define the boundaries for identifying employee contributions. As a result, employee commitment, motivation, and performance can be retained in firms.

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Factors influencing the introduction of the risk management system in an organization

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Abstract: Several authors have highlighted that effective project risk management can be considered as a critical success factor (see e.g Blaskovics, 2014; Görög, 2013). Thus, an effective project risk management system both on project and organizational levels can help companies to achieve project success. In this way, this study summarizes the lead author's 15-year experience in the implementation of the risk management system. The authors specify the factors supporting and hindering the implementation of the risk management system. According to the lead author's intention, the specified messages may be helpful to practicing experts to avoid the detection, evaluation, and management of risks becoming administrative tasks. They must instead contribute to the long-term successful operation of the using organization.,

Keywords: project management; project risk management; organizational project risk management; effective project risk management

1 Introduction

1.1 Classification of risks into types

Several authors have worked on analysing them on a project or corporate level (see e.g. Hamza et al., 2022; Garai, Szemere & Csiszárik-Kocsir, 2022), or classifying the risks into types (Blaskovics 2014; Verzuh 2008; Vaidya, 2018). During the classification, however, these authors did not elaborate on how the establishment of groups may support efficient decision-making at the different levels. This is the reason why – based on his research – the author recommends the following classification of the risks (Fekete, 2015):

- strategic,
- operational,
- financial,
- project.

Without getting into their detailed presentation, risks are strategic when their impacts appear later (in a minimum of three-five years). Such risk on the market may be the appearance of a new competitor or a change in the consumers' habits. The strategic risk must be obviously considered during strategy creation.

The next large group is the operational risks, the timeframe of which is shorter than that of the strategic risks, typically one year. Operational risk is a generic term including, for example, security risks, compliance risks, but risks arising in connection with the performance of daily routine activities also belong here. An example for the latter is a communication breakdown or failure of the IT system supporting the given activity.

The third large group is financial risks, which also includes different types of risks, including, but not limited to exchange rate risk, interest risk, partner risk, and liquidity risk.

The fourth group is project risks, which is in fact the special mixture of the above-listed types, which are, however, worth grouping separately. There could be special risks arising in connection with the preparation and implementation of projects, which must be managed differently from the other three listed types, again including, but not limited to the excavation of archaeological remains or extreme weather conditions, which are typical examples of project risks.

1.2 Concept of risk

According to MSZ ISO 31000:2018 (2018), risk is the effect of uncertainty on achieving goals. What does this mean translated to the language of practice? Uncertainty is due to the lack of information. In other words, if every piece of information was available, there would be no uncertainty and risk, either. There is lack of information because risks may arise in the future and the future may not be foreseen precisely.

According to Görög (2013), an important essential feature of solving any problem is the presence of uncertainties in the activity process.

Uncertainty in a sense is the same as lack of information, and uncertainties of different origins often appear in the form of some risk. Risk thus does not exist without uncertainty. Uncertainty means that we do not know the occurrence – or not occurrence – of a given event (its time, place, manner) precisely. Accordingly, uncertainty is 'neutral', as we do not know yet if it will have positive or negative consequences for us. As opposed to this, risk generally means the quantifiable negative or positive consequences of uncertainty, while occurrence itself is also uncertain, yet its probability may be described. Consequently, risk may be measured in quantity – the extent of risking –, so it is the product of the probability of negative or positive occurrence and the related loss or gain (Görög, 2008). To evaluate the risk, the risk factors becoming the subjects of the evaluation must be defined first.

Other approaches focus on the 'side effects. In their case, the concept of risk generally refers to an uncertain event, which may have a negative or positive outcome (Hillson, 2002). There is an author, according to whom the level of a given risk may also be specified as the product of the probability of the related events and their size (Hopkin, 2012).

In harmony with MSZ ISO 31000:2018 standard, the definition of risk may be specified as follows (Fekete, 2015):

- Risk may be some event, activity, or failure of activity, which will take place in the future, and if it occurs, it will influence the reaching of the target positively or negatively.

Elaborating on the concept in more detail we may state that during the identification of risks attempts must be made to direct the specification to the future, to have it interpreted in line with some target. It is also very important that we generally interpret risks in everyday language with negative outcomes, however, the outcome of a risk may also be positive. A good example of this is exchange rate risk, when the exchange rate may also change positively. Risk itself, of course, may also be positive. An example of this is the appearance of much higher-than-expected demand when a new product/ service is introduced. Even positive risks may have negative consequences/outcomes if we are not ready for them in time (for example disappointment due to unsatisfied demand).

Finally, after the brief overview of the standard, the key messages are worth summarizing.

- The operation of the risk management system will only be efficient if it is supported by the top management of the given organization. Verbal statements are not sufficient, the necessary human and technical resources as well as methods and procedures based on a professional foundation must also be provided.
- The integrated nature of the risk management system must be ensured, which, on the one hand, means that it covers every activity of the given organization, and, on the other hand, in addition to legal compliance, it ensures the efficient support to decisions to be made at strategic, project

and operational levels, including the examination of interactions between the different types of risks.

- It is important that risk assessment must always be performed in the context of the targets, and attention must be given to identifying and evaluating risks meeting the definitions in the relevant academic literature only.
- The availability of information in appropriate quality and in time for risk assessment must be ensured, and its result must reflect the opinion of every unit.
- It is of key importance that risk management actions specified according to the result of the risk assessment must be implemented – with the considerations of cost efficiency fully considered, of course – and the efficiency of the implementation of the action must also be backtested.

2 Factors supporting and hindering the implementation of the risk management system

The lead author is participating in several projects related to the establishment and operation of the risk management system at different organizations – at large companies particularly. Based on reviewing these more than 50 projects and assessing the risk management documentation, the authors summarize the factors supporting and hindering the implementation of the risk management system.

2.1 Factors supporting the implementation of risk management system

The factors supporting the implementation of the system are the following

- Attention must be continuously called to this: the first and outstanding factor is the support of the top management. It must be emphasized repeatedly that this support must cover more than just communication. The necessary human and technical resources must be provided together with a professional procedure for the implementation. It may help greatly if the top managers show a good example in the exploration and management of the risks. (Richter, 2011)
- In connection with the previous point, the requirements of the owner concerning the establishment of the system, including the advantages of the system’s implementation for the employees, must also be emphasized clearly.

- Implementation may be significantly facilitated by the close cooperation of compliance, internal audit, and integrated risk management. This partly concerns the very precise definition of the tasks of the three areas as well as the clear specification of the connection points. This cooperation may only be successful if it is set up among three equal parties and coordinated appropriately by the top management. (Vaidya, 2018)
- Furthermore, it is important to mention that the established system must be integrated. It means that focusing on the exploration, evaluation, and management of the compliance risks only is not sufficient, the system must cover the examination of every type of risk having regard also to the potential interactions.
- It may help the implementation significantly if a procedure is clear to everyone and a methodology facilitating its implementation and easy to use in practice is elaborated.
- Easy learning of the contents of the methodology description by the persons performing the risk assessment and management must be ensured via examples of cases customized for the given organization, if possible.
- No system implementation may be efficient if it is not supported by the staff affected by the process. Therefore, at the beginning of the system implementation, the key staff providing continuous control by giving their opinion, comments, advice, and feedback must be selected to establish a system customized for the given organization supporting the achievement of the targets specified by the organization. (Wysocky, 2014
- Another supporting factor may be the implementation of a motivation system covering every manager and subordinate staff member participating in the establishment and operation of the risk management system, guaranteeing the successful implementation and operation at the given organizations. One key element of the motivation system is naturally the bonus payment, which is for example tied to the achievement of the targets specified by the given organization. Motivation, however, may not be limited to this only. It may help significantly if the staff is given the opportunity to participate in training related to the topic. Another possibility is to ensure participation at foreign and Hungarian conferences, which is at the same time an excellent opportunity for the participants to do networking. (MSZ ISO 3100:2019)
- The provision of IT tools to facilitate the operation of the risk management system may also be mentioned among the supporting factors. Note must be taken of the fact that the use of MS Office (Excel, for example) is not sufficient for the performance of the task. If the target is indeed the establishment of an efficient risk management system, several IT tools may

be necessary. There are targeted software tools on the market (for example @ Risk, Szigma Integrisk), and it is worth selecting one of them with the precise requirements of the given organization considered. It must also be emphasized, however, that none of the IT tools may be magic tools; they may not replace human knowledge and experience. (Hopkin, 2012)

2.2 Factors hindering the implementation of risk management system

The factors hindering the implementation of the system are the following

- The conclusion may be drawn that the added value represented by the implementation of a formalized risk management procedure is not clear, either, for the managers or the subordinates. Many people are convinced that they know the potential risks even without the use of a formalized procedure, and if these risks occur, they will find a way to manage them, therefore it is not necessary to provide serious human and technical resources to perform this task. (Chapman – Ward, 2003, Hopkin, 2012, Ohtaka, 2010)
- There are only a few managers who know the result of risk assessment may directly be built into the decision-making process, and – even if there is formal risk assessment – its result is less considered during decision-making.
- Another factor worth mentioning among the hindering factors is that There are only a few managers who know the result of risk assessment may directly be built into the decision-making process, In connection with this the negative risks, for example, the exploration of risks concerning legal compliance, reputation, security, fraud is shifted to the foreground. These activities include the production of business continuity and disaster recovery plans, which often end up at the bottom of the drawer. These are doubtlessly important areas, however, in the meantime, there is no attention and energy for the exploration, evaluation, and management of risks that may directly influence the achievement of the strategic targets of the given organization positively or negatively. The opinion of the author is that in the long run only organizations exploring, and assessing, (Verzuh, 2008)
- Another hindering factor is that currently there is no higher education training in Hungary, the expressed purpose of which is the training of risk managers. It means that anybody may work in the exploration, assessment, and management of risks, which does not necessarily guarantee professional performance and the possibility of using the result of the risk assessment in effect and managing these risks – where the result becomes

an integrated part of the decision-making process – will be able to operate successfully. (c.f. Loosmore, 2005)

- Although there are more and more academic books, articles, and other publications in Hungarian language, these generally stay at a theoretical level. Only a few of them provide professionals with methods that are easy to use in practice, or present success stories that serve as positive examples and provide the necessary motivation to perform the risk management activity in higher quality. (c.f. Lind, 2011)
- The number of companies offering risk management advice to potential customers in good professional quality is also low in Hungary. Furthermore, there is no classification criteria system to identify incompetent organizations on the market. Some thought should be given to the establishment and implementation of an objective classification system, if possible. This would result in the fact that companies meeting these criteria would offer authentically high-quality services, which may indirectly contribute to the operation of more and more successful companies and institutions in our country. (c.f. Summer, 2000)
- Another hindering factor is that the number of IT tools to be used by the potential users to perform professional risk assessment, to monitor the implementation of risk management actions, and to backtest their efficiency is limited in Hungary. The offer must be increased, and the existing tools must be popularized. (c.f. Hillson, 2002, Nakatsu, 2009)
- Finally, another hindering factor may be the readiness and willingness of Hungarian organizations to require risk assessment and risk management performed at a professionally higher level according to the approach presented in the present study, too.

Conclusions

In connection with this, it is worth considering the establishment of professional forums that would be suitable for the presentation of best practices and for the risk management experts to share their experiences. By presenting the good practices, every decision-maker must be encouraged to view risk management not as an administrative task, but as an opportunity to receive help for successfully performing the work in the long run. This may be the real added value of risk management. The specifies messages that may be helpful to practicing experts to avoid the detection, evaluation, and management of risks becoming administrative tasks. They must instead contribute to the long-term successful operation of the using organization.

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Volkswagen Group marketing, economic and financial analysation

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Abstract: The following case study investigate about the economic performance and occuring risks also significance on the market from the aspect of Volkswagen Group through SWOT, PESTEL, financial risk analyzis. Also the internal and external factors can detect through the SWOT analyzis which may help to avoid and detect occuring problems within the firm's life. Morovel with the PESTEL findings it assists a company in identifying external influences that might affect internal decision-making. By the 7s model and Marketing Mix (4Ps model) also we can observe the variety of product portfolio from an economical viewpoint. Using these viewpoints, a person can determine wich strategy stands closest to the leadership style and what are the priorities to the company. Also stands for the marketing and financial performance investigation with external benchmark measure in South-African VW AG subsidiery.

SWOT, PESTEL, 7s, 4s, Financial risks, marketing performance

1 Introduction

Any business, including a car dealership, needs to market effectively in order to sell goods and services, communicate with the public, and engage in public relations. In order for these activities to be profitable, investments must be made to increase demand for the goods and services. The company also needs a return on its investment in capital. All businesses want to maximize profits in order to improve shareholders' wealth by getting the best possible return on their initial investment business. also investigate about the marketing and financial performance which evaluating and recognizing a company's strengths and shortcomings and internal benchmark survey.

2 General informaion about the company

One of the largest automotive manufacturers in the world. Numerous well-known middle- and upper-class car manufacturers, including Porsche, Bentley, Bugatti, Audi, Seat, Skoda, and Volkswagen, are part of this conglomerate. Additionally, this organization has subsidiaries that are involved in the production of various types of trucks and motorcycles.

The German Labour Front founded the business in 1937 in Wolfsburg, Germany. Over 27 nations around the world are where the company does business. The group acquired numerous businesses at the period, turning them into subsidiaries. 2019 brought in 252.632 billion euros. Prior to one year ago, their assets cost roughly 488.071 billion euros. 513 642 people work for this organization at its offices and industries. based to data from 2019. The VW Beetle was manufactured from the start of the company's history, but close to World War II, Adolf Hitler ordered Ferdinand Porsche to create an affordable, dependable vehicle. The British government kept the business after World War II. More than a decade later, the government returned it to Germany, and after the country's recovery, it began to acquire additional foreign businesses.After the scandal involving the manipulation of the CO2 emission percentage from approved measuring stations, they now aspire to achieve "green production" and reduce hazardous gas emissions. *(Source: "Volkswagen – Wikipédia.")*

3 SWOT analyzis

The use of a SWOT analysis can be used to pinpoint profitable company sectors. These are the crucial success characteristics that provide the company a competitive advantage. A competitive advantage can be maintained by identifying these capabilities and ensuring that they are maintained.

3.1 Strength

One of the largest automakers in the entire world due to it involves reliable, high-end vehicles from the upper middle and lower classes. As a result, this company among automakers has the broadest selection of vehicles. Despite having luxury automobile subsidiaries, all of the vehicles are more reasonably priced and offer better value than those from other companies.

The 2025 strategy is the second strength. As I indicated earlier, Volkswagen began to increase its manufacturing of electric vehicles once the emission issue broke. They stand a fair possibility of surpassing all other suppliers of internal combustion engine cars as the largest in the world for electric vehicles. They will succeed in the future because of their track record of keeping their promises and their market dominance.

The business stated that they would be able to customize new driving experiences from an environmental protection perspective. Additionally, they are influencing mobility, and the company is devoted to creating new techniques that won't conflict with the emerging way of thinking in the future when conducting testing. Not to mention the enormous sum of money the company has, which is why they are able to secure accurate forecasts for the future.

Its strength stems from its diversification strategy because the portfolio enables it to target broader consumer fields rather than just one region. The Volkswagen models are available in 27 countries, which means that every country has at least one manufacturer. However, in this situation, if a company doesn't have location, innovative shipping and marketing capabilities enable customers to access all Volkswagen group content.

If someone does not have the extra financial resources to allow for the purchase of a new car, the diversification plan offers numerous financial opportunities. This technique integrates with numerous crucial and vital consumer layers. The sale of the car accounts for just 74.5% of the earnings; the remaining portion comes from other financial activities and energy supply. Additionally, other manufacturers' revenues should not be distributed as well as Volkswagen's, and as a result, they miss out on the opportunity to grow concurrently and independently throughout the continents.

The essence of by numbers is illustrated in this pie chart:

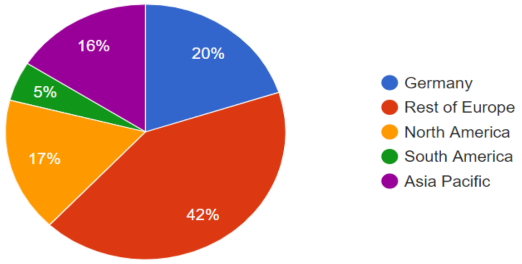

Figure 1.

Volkswagen Group’s Sales by Region

Source: Volkswagen AG group website data findings, own pie chart according to data

The success of the automobile manufacturer is largely due to the synergy between the partners. All of the brands affiliated with the Volkswagen group share research and development resources, making it more effective for them to support one another and share information freely in order to build relationships with customers, not to mention reduce costs and boost sales.

What about the joint venture that the car companies are now working on in China. SAIC Volkswagen and FAW-Volkswagen worked together with Volkswagen. According to 2016 data, this partnership has given the German corporation the opportunity to broaden the range of vehicles it offers, increasing the annual number of vehicles sold by 3.5 million pieces. On the other hand the Volkswagen increased their market share with 14.6% and thankfully they became the second largest automaker in China after General Motors.

3.2 Weaknesses

Everything has a drawback. Despite being one of the biggest automakers in the world, the Volkswagen group has flaws. One of these unfavorable critiques has been made weaker by the media attention. For instance, take the Dieselgate issue from the earlier paragraphs. By implementing a customized program of diesel cars that would control various emission levels during vehicle testing in a laboratory as compared to real-world emission levels, the group aimed to reduce dangerous gas emissions solely in numbers. Investigations indicate that the corporation discovered quilty in numerous nations, and that this cost the company 16.2 billion euros in reparations.Negative publicity targeted the Volkswagen group and thanks to these negative critics, sales declined in 2015 like in 2016.

The company's history has also been damaged by car recalls. These provisions are the most costly, and they suffered a significant loss as a result. The largest recalls among automakers in US history were carried out by Volkswagen in the US market. A rate of 1805 automobiles are recalled for every 1000 vehicles produced by the Volkswagen Group. Vehicle safety and non-compliance with Federal Motor Vehicle Safety Standards are two factors in the recall. Any recall involving the vehicle should be finished right away for reasons of safety. Fortunately, none of the recalled vehicles resulted in serious or fatal injuries. The company's Jetta, Beetle, Beetle Convertible, Golf, Golf Sportwagen, and GTI models from 2011 through 2019 are included in the recall.After this incident the company and the CEO working to regain trust of the customers.

Unfortunately, the company only holds a small portion of the US car market. Ford and General Motors are the two major players on the market. Around 18 million cars are sold in this industry each year (2016). A greater market share would ensure greater earnings.

Making battery-powered cars requires little knowledge and skill. Electric automobiles are first becoming more and more well-liked by people. Volkswagen does not give it the attention it needs. In order to compete with other manufacturers, they are currently working to develop their battery-powered cars. For instance, in Porsche hybrid vehicles, the internal combustion engine is more powerful than anticipated yet the emission levels are higher than we would anticipate from a hybrid vehicle. The corporation has to improve the performance of its electric vehicles because they have one of the shortest ranges among "green automobiles." Volkswagen trails its greatest rival, Tesla, but has an edge over Tesla in that its electric cars are less expensive. High operating costs could result in losses for the company. The costs associated with running Volkswagen have increased year over year. VW's total cost of sales in 2018 was €189.5 billion, up from €186 billion in 2017. (Posky, Matt. "Stats Show Which Automakers Are the Worst Offenders in Recall Land)

3.3 Opportunities:

Future business opportunities will be most profitable in the most cutting-edge fields, including artificial intelligence and emerging technologies. AI and autonomous driving technologies have opened up new potential for automaker businesses in recent years. Volkswagen continuously develops its self-driving systems and algorithms to provide a reliable and sophisticated artificial intelligence.

Acquire skills and competencies through acquisitions since tiny start-up businesses lack the resources to compete with large corporations, even though they have sound business strategies. Due to the acquisition of the small startups, Volkswagen has a decent chance of overtaking them as the market leader.

The media and social marketing have given us this opportunity that our ancestors did not. These days, despite the cost of advertising, that potential generates more and more million dollars annually. In this approach, the business can quickly establish a trustworthy relationship with customers through the Internet and excellent TV channels. The targeted consumers are located by the modern marketing techniques in every area and in every sector of the consumer society. The businesses can influence and appeal to the customers.

Partnerships with numerous established businesses across continents, such as Microsoft, which enhances the provision of mobility services Additionally, the VW group's strategic partner in China is the U.S-Sino truck. All of these businesses work to increase productivity, effectiveness, and efficiency in order to increase profit and hasten the growth process.

Focus on enhancing sustainability significantly because VW completely destroyed consumer confidence in businesses that care about the environment and the communities they operate in. Volkswagen needs to dramatically step up its efforts in sustainability if it wants to win back the confidence of its stakeholders. Fuel appears to be more expensive than it is presently. Because they provided the market with numerous pick-ups despite the VW, several automakers (including Ford and General Motors) have benefited from the cheap fuel price in recent decades. Due to low fuel prices, consumers purchased a lot of pickup trucks, but in the near future, fuel prices will rise, which may be a wonderful opportunity for Volkswagen, particularly if the business competes with rivals in the electric vehicle market.

3.4 Threats:

Over the past few years, the car industry has been under increasing regulatory pressure. As a result of increased regulation, businesses are under more pressure than ever. The bottom line is also being effected by taxes and tariffs. Its cash flow took a serious hit as a result of the diesel scandal. The corporation suffered a loss of about €25 billion due to diesel emissions. Additionally challenging is international expansion because of increased regulatory pressure.

Competition between rivals becomes more difficult as it becomes more intense. Each large company is aware of the constantly expanding and emerging smaller businesses, which are eroding their consumer base. The reason for the rivalry is that car costs are continually falling to keep up with their expanding and growing assortment. It will be very difficult for Volkswagen to compete in the electric car market against new competitors like Tesla with its electric vehicles. Additionally, Google, which is attempting to create self-driving cars, poses a danger to the established automotive sector.

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Figure 2.

Volkswagen SWOT Analysis

Source: Volkswagen SWOT Analysis." Edrawsoft

3.5 Continued focus on cost efficiency – outlook for 2023

In order to strengthen its long-term competitiveness, Volkswagen is working hard to increase its cost efficiency, such as by further reducing its fixed expenses and overheads. We are currently dealing with a number of issues, including the effects of the epidemic in China, rising commodity and energy prices, and geopolitical unpredictability. With our cost-cutting initiatives and by raising the standard of the operating result in certain areas, the company is attempting to mitigate these risks. Nevertheless, sticking to the objective of a 6% operating return on sales in 2023, according to Volkswagen CFO Alexander Seitz.

4 PESTLE analyzis

A PESTLE analysis is frequently applied as a thorough fact-finding process. It aids an organization in determining the external issues that might affect choices made internally. Organizations can make better plans if they are aware of the effects these external factors may have on them.All in all, The PESTLE analyzis will show us the detailed information about the current situation on the market about the Volkswagen group.

4.1 Political

The Political environment can have an impact on entire processing businesses and organizations, etc. As is well known, Volkswagen's subsidiaries and various manufacturing facilities are located far apart from one another. The laws and various taxation systems in these areas may have an impact on potential and actual business performance as well as on relationships in international trade. Huge losses result from high taxes and an unpredictable political climate.

4.2 Economic

Economic conditions are crucial to a company's success because if there are economic fluctuations in the environment, the company will need to find constraints to counteract the worsening economic downturn. The demand for cars is impacted by periods of declining economic activity, which has an impact on Volkswagen's sales and income. During the recession, there was a global decline in employment, which affected consumers' purchasing power and decreased demand for cars. On the other hand, if they are unable to solve the issue, the government may offer assistance through changes to taxation, for example.

4.3 Social

In the twenty-first century, social factors are becoming an increasingly significant factor in the expansion of the corporate sector. Consumer purchasing patterns may be influenced by sociocultural norms, and shifting societal trends may alter people's tastes. These require the organization to improve its sales methods. Because of this, businesses must base their sales and marketing plans on the markets and cultures in which they operate. Additionally, in order to keep up with shifting trends, product and sales tactics must also be changed.

4.4 Technological

Customers' purchasing patterns in the automobile business should be impacted by technological advancements. The technological sophistication of a car brand is equally important in the twenty-first century. Volkswagen invested in the German Research Center for Artificial Intelligence (DFKI). Future urban mobility concepts are being developed at the Audi Business Innovation Center. To introduce more environmentally friendly and secure cars to the market, it is investing in technology. It has also made significant investments to make its manufacturing and distribution procedures technologically superior to those of its competitors.

4.5 Legal

Brands now confront enormous compliance risks due to stronger legal and regulatory frameworks in all sectors, including labor, the environment, and driving safety. In the Diesel crisis case, VW has previously been ordered to pay billions of dollars. The brand was discovered evading emission tests by deploying defeat devices. Therefore, the overall importance of legal considerations in the context of global commerce and the automotive sector cannot be disputed.

4.6 Environmental

Regarding the environment, pollution regulations have become more strict worldwide, and certain markets have hefty fines for brands that don't adhere to the standards. Due to their failure to fulfill the emissions standard, millions of VW vehicles had to be recalled in 2015. Billions of dollars were lost as a result. In order to regain the trust of its customers, the company is now concentrating on creating more hybrid and electric automobiles. Its highly anticipated I.D., I.D. VIZZION, I.D. CROZZ, and, of course, I.D. and of course BUZZ. The regulations governing emissions and the environment have been stricter all around the world, but especially in industrialized nations. As a result, brands like Volkswagen are required to concentrate on models that are more environmentally friendly. *(Source: Jurevicius, Ovidijus. "Ford SWOT Analysis (5 Key Strengths in 2022)."(Bush, Thomas. "PESTLE Analysis of Volkswagen Group." PESTLE Analysis)*

5 Financial risks

5.1 Strategies for hedging financial risks

Changes in interest rates, exchange rates, raw material prices, or share and fund prices can all pose financial concerns. The Group Treasury department is in charge of managing these financial risks and liquidity hazards, and it uses non-derivative and derivative financial instruments to lower these risks. At regular periods, the Board of Management is updated on the risk status. Interest rate risk is the term used to describe potential financial losses that may result from fluctuations in market interest rates. It happens when assets and liabilities in a portfolio or on the balance sheet have different interest rates. the use of interest rate swaps, cross-currency interest rate swaps, and other interest rate contracts with generally matching amounts and maturities to hedge interest rate risk, which is sometimes combined with currency risk, as well as risks related to changes in the value of financial instruments. The Volkswagen Group's Automotive Division's financial agreements must adhere to the rule of matching amounts and maturities. Interest rate derivatives are used as part of the defined risk strategy in the Financial Services Division to control the risk of interest rate changes based on restrictions. On the other hand, foreign exchange risk is diminished particularly through natural hedging, which entails adapting our production capacity flexibly at our locations around the world, establishing new production facilities in the most significant currency regions, as well as sourcing a significant portion of our component needs locally. employing hedging mechanisms to reduce the remaining foreign exchange risk. These transactions serve to reduce the currency risk connected to projected cash flows from operating activities, intragroup finance, and liquidity positions in currencies other than the relevant functional currency, for instance as a result of capital movement limitations.

Company have used forward contracts to hedge some of the requirements for commodities such as aluminum, lead, coal and copper over a period of up to six years. The firm has also entered into transactions to supplement and improve allocations of CO2 emission certificates as part of the European Union Emissions Trading System (EU ETS). The special funds used to invest to excess cash may be subject to equities price risks and fund pricing hazards. By investing money in a variety of ways and adhering to the basic standards outlined in each investment guideline, Volkswagen Group lower these risks. Additionally, when the market conditions are right, exchange rates are hedged.

5.2 Liquidity risk

Volkswagen depends on its capacity to fully meet its finance requirements. A liquidity risk is the probable inability to finance the Group on acceptable terms or to raise the necessary money. This might have a significant negative effect on Volkswagen's business position, assets, financial condition, and earnings. In the Automotive Division, the Company always maintains solvency primarily through retained, non-distributed earnings, credit line draws, and the issuance of financial instruments on the money and capital markets. The primary methods for raising capital for the financial services industry include the domestic and international financial markets, as well as consumer deposits through the direct banking sector. Volkswagen receives financing from supranational development banks as well as national development banks like the Kreditanstalt für Wiederaufbau (KfW) and Banco Nacional de Desenvolvimento Econômico e Social (BNDES).

5.3 Risks and opportunities in the financial services business

When the estimated fair value for the disposal of the financed or leased asset may be less than the residual value determined at contract conclusion, residual value risk is present. However, it's also possible that selling the asset will bring in more money than was estimated based on its residual worth. In order to fully analyze, monitor, respond to, and communicate risks, management of the residual value risk is based on a predetermined control cycle. The ability to manage residual risks professionally as well as systematically refine and improve how we manage residual value risks is made possible by this process structure. Numerous steps are taken to reduce this risk based on the ensuing potential residual value risk. The residual value recommendation for new business must take existing market conditions and potential future influencing factors into account. Risks are handled and tracked within the context of appropriate processes related to financial conditions, collateral, adherence to limitations, contractual duties, and terms outlined by both external and internal parties. As a result, obligations are managed based on the amount of risk they carry (standard, intensified and problem loan management).

(Source: "Volkswagen Konzern - AR 20 - Financial Risks")

I would like to countinue with the 7s model to understand more deeply the economical aspects of the firm. A framework for transformation based on an organization's organizational design is the McKinsey 7-S Model. By focusing on the interplay of seven crucial elements— strategy, structure, system, style, staff, skill, shared-values —it seeks to illustrate how change leaders may manage organizational transformation effectively.

6 7s model analyzis

6.1 Strategy

The firm always create unique plans that are both economical and practical. They endeavor to achieve and reach the 2025 goal as successfully as they can with their new way of thinking and pledges, which don't just leave them with regrets. The business frequently employs the Modular Toolkit concept, which refers to physical modifications made to autos (distance between pedals, track width, wheel size,etc...) The Modular Electrification Toolkit MEB is a concept that the firm is attempting to adapt and use to electric vehicles. By using this technique, the business will be able to include e-mobility into mass production manufacturing, which aids in achieving higher profitability so the business can easily withstand the competition from new entrants.

6.2 Structure

They divided the processes and decisions by brand because there were so many subsidiaries that the division of labor would be extremely difficult overall. Every sector has a CEO, and beneath them are numerous managers who are in charge of making decisions regarding working procedures and breaking down their operations into smaller sectors. However, the unifying goal of all the subsidiaries is to achieve high profitability, stay up with competitors, and adhere to all regulations and political restraints. Due to the great distance and diversification, it is necessary to consult all the subordinates and departments while making financial decisions.

6.3 System

All accounting pronouncements adopted by the EU and applicable for periods beginning in the fiscal year 2019 have been implemented by Volkswagen AG. Additionally, they provided their workforce with training and development through a vocational group system so that they could grow their talents and execute their tasks while collaborating with other seasoned professionals. The Group department's HR central training organization is in charge of this procedure, and their goal is for the staff to apply what they have learned to real-world situations. The corporation Volkswagen Group Academy) also introduced internship programs that provide freshmen the opportunity to work with seasoned personnel.

6.4 Style

The leadership are successful(organizational marketability) after we saw the achived goals and programs and their key factor that the social responsibility and their leading style.

6.5 Staff

The group is still using effective and important methods for managing human resources. The clear stakeholder focus on corporate governance is one of them. Modern working practices and advantageous strategies like agile work are now part of human resources strategy. Collaborative robots will relieve physically demanding work in industries in the future, and digital procedures will streamline administration. Since confessing to systemic emissions fraud in September 2015, VW has lost a number of engine experts as well as marketable staff due to the pollution crisis. (“Volkswagen Konzern - AR 2018 - Training and Professional Development.” Training and Professional Development) (Volkswagen Konzern - AR 2017 - Training and Professional Development.” Training and Professional Development)

6.6 Skills

The innovation is the most powerful one, and it controls future concepts in the automobile business through new discoveries and research, hence the R&D element. The corporation tried to set up that plan to invest in people since it is what pays off in more varied ways, and it is beneficial for the employees to have access to a wide range of training measures. The corporation was able to establish a global footprint in all automotive segments and a voice in the truck and bus industries thanks to technological excellence. *("Volkswagen Konzern - AR 2018 - Training and Professional Development." Training and Professional Development) (Volkswagen Konzern - AR 2017 - Training and Professional Development." Training and Professional Development)*

6.7 Shared values

The Volkswagen Group Essentials outline what the group stands for across all brands, businesses, and nations as a promise to their clients, shareholders, business partners, and themselfs. Also provide orientation for the daily value-oriented actions of all employees. The business acknowledges its social and environmental responsibilities. The company also speaks out against unacceptable behavior and things. However, they are proud of their products and work hard to maintain diversity. *("The Volkswagen Group Essentials")*

7 Volkswagen Marketing Strategy & Marketing Mix (4Ps)

Marketing Strategy of Volkswagen analyses the brand with the marketing mix framework which covers the 4Ps (Product, Price, Place, Promotion). There are several marketing strategies like product innovation, pricing approach, promotion planning etc. These business strategies, based on Volkswagen marketing mix, help the brand succeed. The "marketing mix" of a company, or the strategy used to introduce new products or services to the market, can be improved using the four Ps of marketing. To ensure that the company's offering satisfies a particular consumer requirement or market demand.

Volkswagen marketing strategy helps the brand/company to position itself competitively in the market and achieve its business goals & objectives.

Let start with the Volkswagen Marketing Strategy & Mix to understand its product, pricing, advertising & distribution strategies:

7.1 Volkswagen Product Strategy:

The product strategy and mix in Volkswagen marketing strategy can be explained as follows:

Volkswagen offers several vehicles in different countries. Its top selling and most popular models include Volkswagen Polo, Volkswagen Passat, Volkswagen Jetta, Volkswagen Sirocco, Volkswagen Tiguan, Volkswagen Touran, Phaeton, Eos, and Beetle. All these cars are the product strategy in the marketing mix of Volkswagen. Several various trims and versions are available, depending on the amount of localization, features, comfort, size, seating capacity, choices, engine configurations, and power. Volkswagen provides a variety of body styles, such as the hatchback, estate, sedan, coupe, convertible, SUV, crossover, coupe, and MPV. Additionally, it produces and markets electric, hybrid, and dual-fuel automobiles. The Polo and Gold models from Volkswagen also took up the renowned, 50-year-old European Car of the Year title. The business has spent over $80 billion on the development of electric vehicles.

7.2 Volkswagen Price/Pricing Strategy:

Below is the pricing strategy in Volkswagen marketing strategy:

Volkswagen is one of the top automaker in the world.

With 34500 vehicles delivered per day, Volkswagen offers its goods at affordable pricing for some developing countries and at a little higher price for economies where its brand is recognized as having the potential to command a greater premium. Volkswagen bases its somewhat higher prices on their superior quality. Volkswagen uses psychological pricing as one of its strategies to achieve its pricing goals. They can justify the higher price they pay for Volkswagen cars by reducing buyer's remorse due to perceived and actual good quality. The cost of spare parts is also on the high side. As a result, the pricing strategy in Volkswagen's marketing mix is mostly determined by the area being serviced, the competition in each market group, demand, and the amenities offered in the automobile.

7.3 Volkswagen Place & Distribution Strategy:

The Volkswagen marketing mix's distribution strategy is as follows:

Volkswagen vehicles are accessible practically wherever in the world. having production facilities and assembly lines spread across the globe. These include South Africa, Poland, Germany, Mexico, the United States, China, India, Indonesia, Russia, the Czech Republic, Portugal, and Spain. Volkswagen established a new facility for the production of large transport vehicles and multi-vans at a cost of $140 million after realizing that Indonesia was a top location for the selling of cars and vans. In terms of India, Volkswagen will begin assembling particular export engine modules as well as local engines to raise localization levels from the present 70% to 90%. Volkswagen has expanded into Algeria and opened a new manufacturing facility there to increase localization and lower the cost of automobiles. Volkswagen has a strong global presence and a distribution network that is well suited to the markets it serves.

Volkswagen vehicles are offered in company-owned dealerships and showrooms that carry multiple brands of vehicles all around the world.

7.4 Volkswagen Promotion & Advertising Strategy:

Volkswagen has long used strong language in its advertising efforts. Volkswagen uses 360 branding as part of their marketing mix promotion strategy to sell not only the parent company but also each of its unique vehicles. Volkswagen has driven "higher quality" as a trait of all of its cars and most of its promotions in developing countries advertised the same. This was made possible by the higher grade of tensile strength used in its steel, greater depth and shine of paint, higher craftsmanship of its cabins, and better equipment levels. Its abuse-friendly design, sturdy construction, and extended lifespan were promoted in India, which aided in increasing sales. Since more and more rivals are entering the internet market, aggressive promotional operations employing social media networks and online platforms like Twitter, Facebook, You Tube, and Instagram help Volkswagen remain at the top of the promotional game. Volkswagen uses product distinction as one of its marketing strategies in its promotional campaigns, and the two characteristics that are most frequently highlighted in these advertisements are safety and German construction. Volkswagen collaborates with other well-known brands around the world through sponsored events. In light of this, the complete Volkswagen marketing mix is summarized. *(Team, MBA Skool. "Volkswagen Marketing Strategy and Marketing Mix (4Ps))*

8 Investigation of the marketing performance measurement practices (Hatfield Volkswagen group)

8.1 Marketing and Financial Performance

Financial analysis aids in evaluating and recognizing a company's strengths and shortcomings and, ultimately, the organization's long-term viability. Financial ratios used in the financial analysis show and quantify how certain firm operations, including current assets in proportion to sales, relate to one another. Lack of resources and effort devoted to the marketing return. Many businesses do not devote enough effort to the growth of marketing research because they have not yet built procedures to measure the marketing return.Internal measurement and assessment methods. There is little incentive for employees to contribute to the measurement of marketing return. Work on marketing measurement and return is not encouraged by the compensation structures of corporations. Lack of resources and expertise. Companies lack the internal capabilities and resources to devote to the study of marketing return and measurement, or they are hesitant to do so. The marketing and finance teams don't work together. There doesn't seem to be any drive to promote the comprehension and advancement of marketing measurement because the marketing and finance operations appear to operate in distinct silos. Companies' managers do not see a need or an opportunity to alter the way they now conduct business.

8.2 Bechmark

The external benchmarking procedure evaluates the performance of the business against that of its rivals or more successful peers. No matter how well a company's internal processes and systems work, in order to ensure ongoing improvement, it should always measure performance against rival forces and businesses outside of its area.The managers believed that among the marketing performance measurements, financial measures were given priority by senior management. The importance of competitive market measures is ranked second. Innovativeness measures are rated the lowest, yet they are still scored pretty highly. The preceding findings show that financial measures are most frequently examined by top management, most frequently gathered by departmental managers, and most frequently thought to be crucial by top management in comparison with the various non-financial metrics that are accessible.

Senior management in organizations that are in charge of making strategic and operational choices must now measure performance. Due to this, benchmarks are now used to compare top performance in business (Jin, 2013). Plans for marketing or businesses are frequently used as internal performance indicators (Mills, 2010). (Source: An investigation of the marketing performance measurement practices in Hatfield Volkswagen group by Chris Beukes and Gerhard van Wyk)

8.3 Recommendation

Certain non-financial key performance indicators need to be embodied in financial statements and management accounts. The danger of not incorporating a wider range of external benchmarks is that the departmental managers would have a false impression of their success in terms of measuring marketing performance measurement. This study offers a new perspective on the need for an increase in the focus on all the formal marketing performance measurement tools available. Measures of customer happiness, descriptions and measurements of marketing assets, market share, and comparisons to best practices would all be considered non-financial important indicators. Non-financial relevant indicators include market share, customer satisfaction scores, descriptions and measurements of marketing assets, and comparisons to best practices. There are instruments for measuring marketing performance that may be used to improve marketing performance outcomes more regularly and, in the end, add value by improving the group's sustainability and profitability(Chris and Gerhard 2016).

Conclusion

All in all, I would say after the researches the Volkswagen Group has a significant role in the market but the rising problems on the market also can significantly affect its working and strategies. Despite the fact about the scandal I would say this conglomerate is one of the most enthusiastic, and environmentally conscious about the production and its matters. This fact may be affected by the legal rights and recommendations in a high extent. The diversity of the firm also brought advantages on new markets and helped to fill the occurring market niche internationally. On the other hand, taking into account the financial risks the firm is trying to handle and track it within the context of appropriate processes related to financial conditions by all segments. Despite the fact about its enormous size of the company, it have to taking account all the market possibilities and arising risks to maintain the leader competitive status among the car manufacturers. On the other hand, marketing is essential to business because it determines what customers want and then allocates resources to meet those demands. Performance measurement methods and structures must be created and put into place for businesses to succeed and achieve benefits that are both competitive and long-lasting. In order to improve efficiency and eventually profitability and commercial success, it is crucial to assess and evaluate every aspect of the firm. Throughout to elevate marketing performance results more frequently and ultimately add value through increased profitability and sustainability while taking into account the financial aspects, this study offers a new perspective on the need for an increase in the focus on all the formal marketing performance measurement tools available.

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The digital financial solutions pathway for generations

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Abstract: Digital financial solutions have been in focus since before Covid, whether we look at financial service providers or consumers. Covid has accelerated digitalisation, which has many positive benefits, but we need to understand and research what each generation wants, how they like to bank and what services they need. We need to ask a number of questions about what is worth digitising and at what cost, but we also need generational research, because not all age groups may need to digitise all services. The mainstream focus for financial service providers is central digitisation, but then the financial culture will need to be developed so that we don't go into new rounds of digitisation unnecessarily. Financial literacy education must start with the youngest generations, at pre-school, primary and secondary school levels. The path of development must therefore be planned and the current infrastructure must be consciously built to make future digitalisation truly effective.

Keywords: fintech, generations, digitalization, financial culture, finfluencer

1 Introduction

After the 1990s, as the Internet and other modern technologies developed and spread, an increasing number of applications emerged and revolutionized not only private but also business life. The introduction of Fintech technology not only gives a certain level of comfort for businesspeople, but the increasing demands of consumers / clients nowadays also make it necessary to use these applications. Even in the poorest sections of the world, practically everyone is attempting to catch up and take use of these opportunities in almost every aspect of life.

Similarly, in Hungary, viable businesses and organizations are those that have already adopted more advanced technologies and are able to meet their consumers' expanding demands. Significant developments have occurred in payment instruments in recent years, and the introduction and integration of the immediate payment system into existing payment procedures in March 2020 will further contribute to this. Unquestionably, one of the most significant events of 2020 will be the emergence of the COVID, a pandemic that has profoundly altered the lives of people in every aspect.

2 Way to instant payment system

In recent years, the evolution of information technology (robotization and artificial intelligence, the expansion of cloud services, the adoption of IoT devices, Fintech, proptech, etc.) has presented new difficulties and opportunities to most industries. These technological advancements fundamentally alter the operational procedures of several businesses, and thus, they have incredibly significant economic effects. The financial sector is not an exception to this rule. The emergence of Fintech firms, shifting client needs, and the growing emphasis on customer experience have also brought about substantial changes in this industry, which are continually restructuring our financial and banking practices and expectations (Csiszárik-Kocsir, 2021; 2022). In place of "traditional" bank card solutions, new types of bank cards that are integrated into mobile applications have evolved, as have payment options without bank cards, via new applications, or employing rapid payment methods. Users no longer rely solely on their bank for trust. The use of available Fintech applications is expanding rapidly, and large banks are losing ground. Fintech applications are now formidable rivals to the mobile banking applications of large domestic banks (Fintech Zone, 2020). Applications like Revolut, TransferWise, Curve, and the services of ApplePay and GooglePay have been common in Hungary as well. Revolut and TransferWise were much less popular among Android users in 2018 and did not even make the TOP20. In contrast, among Apple lovers, Revolut was already ranked 18th and TransferWise ranked 20th. In 2019, Revolut was already in the top three in Hungary for both sorts of users (Fintech Zone, 2019).

The instant payment system, which was introduced in March of 2020, and PSD2 provide additional potential for Fintech businesses to build new services, and it should not be neglected that the Hungarian market and regulatory framework also provide a stimulating atmosphere for them. PSD2 will make it possible for third-party service providers to enter the banking environment. The new law enables new multi-channel access for users, thereby enhancing the customer experience through flexible and innovative solutions. It provides them with unrestricted access to payment service providers, who can legally offer digital payment services even if they are not classed as financial institutions. And this will allow Fintech to continue operating in the digital banking sector without any issues in the future (NeoPay, 2020).

2.1 Consequences and prospects of Instant payment regulation

The immediate payment system, which enables transactions under 10 million HUF to be completed within 5 seconds, will become operational in 2020, and it will be accessible 24 hours a day, 365 days a year (Bakonyi, 2020). Numerous nations have adopted QR code mobile payments as a result of the immediate payment system. The QR code has gained popularity in nations where the regulator has produced an open standard with market participants or where banks and service providers with a big client base have developed a standardized solution. In Hungary, the MNB anticipates the introduction of digital payment solutions that are interoperable with the immediate payment infrastructure and that rivals can use at no additional cost.

A QR code is a two-dimensional barcode (point code) that can contain the data of the payer or the payee required to complete a payment (name, address, bank account number, and date), thereby considerably accelerating the payment process by eliminating the need to re-enter the data each time. As a result of the QR code, the possibility of errors is also reduced. The QR code standard in Hungary is based on worldwide standards (the EPC standard), but MNB and GIRO experts have made modifications so that it can be used for in-store purchases, invoice payments, online purchases, and interpersonal payments.

The usability of a QR code is mostly determined by the amount of data that can be encoded within it. Experts took into account a variety of commercial concerns when determining the content of the data so that the quick payment system may be utilized as widely as feasible. The Hungarian QR code allows for a broader variety of data than the data groups transmitted during payment transactions. The QR code additionally specifies the content of the data categories, the data fields, the compatible data formats, and the maximum amount of data that can be entered, making the data suitable for automatic processing (Németh, 2019).

It should also be related to instant payment, a concept of PSD2 that aims to protect customers who engage in online money transactions. PSD2 is the abbreviation for Payment Services Directive 2, whose essence is the formulation and oversight of payment legislation in EU and EEA member states. Within the PSD2 regulatory framework, additional non-bank payment service providers will be permitted to increase competition, but good consumer authentication is a prerequisite for all of them (Green et al., 2020).

As clients and business partners now expect 24 hours accessibility, rapid payments are now the standard. Companies that have fallen behind in technology must catch up and incorporate this opportunity into their business if they wish to survive and pursue growth and development (Eber et al., 2018). In the case of B2B, fast payment enables the enhancement of cash flow, as funds can be received, spent, and invested not only during the week, but also on weekends (Kok, 2019). Also achievable with improved cash flow management is an increase in liquidity provision. The time spent at the cash register is decreased, and management of revenue and expenses is kept current. Also during non-working days, businesses can plan and budget for their operations. Instantaneous payments can untie funds from the financial system and boost competition (Deloitte, 2019). Safe and quick, so that businesses can improve their customer service (Kok, 2019). According to the MNB (2016), the instant payment system serves three primary functions: extending payment alternatives with simplicity and continual availability, ensuring innovation in the financial industry, and decreasing non-transparent payments. In addition to the aforementioned, the paper states that it will be possible to provide immediate feedback as well as create new payment platforms and extra services.

3 Fintech's evolution and definition

After the internet revolution of the 1990s, the online financial sector, e-finance, evolved, with low-cost financial transactions serving as one of its primary drivers. Electronic and digital finance is a broad concept that encompasses all financial activities and transactions that can be conducted via the Internet, including investment, insurance, stock exchange, and the provision and use of financial services without physical contact. Due to this innovation, the services of digital players other than traditional financial institutions, such as online brokerage services and online money transfer providers, have emerged and have significantly reduced the number of physical and personal contacts, while also providing speed, convenience, and security, among other benefits. Smart gadgets, such as smartphones, have accelerated the development of digital financial activities, and new services specializing in mobile phones have developed (King, 2019). Mobile finance is already present in the realms of mobile banking and mobile payments; these, in conjunction with e-finance, artificial intelligence, social media, and big data analytics, have aided the emergence and growth of Fintech since the 2008 financial crisis (Lee and Shin, 2018; Csiszárik-Kocsir, 2016; Csiszárik et al, 2013, Csiszárik-Kocsir and Medve, 2012). Although Fintech has not yet realized its full potential, billions of dollars are spent annually on Fintech companies around the world, and there is no business sector that will not be affected or have no economic influence from it (Schueffel, 2016).

There is no consistent definition for the Fintech phenomenon because it is too comprehensive and complicated; yet, several have attempted to characterize it suitably. Fintech is the abbreviation for Financial Technology, and Fintech startups often concentrate on a particular financial sector or service (Statista, 2020b). Fintech, according to Leong and Sung (2018), is a merger of multiple fields, including Technology, Innovation, and Finance as a transdisciplinary subject. According to Arner et al. (2015), Fintech technology comprises the digital goods and services offered by traditional financial institutions. According to Sekhar (2018), Fintech employs new financial technology, devices, and tools that incorporate formal, invention, and advancement innovations. According to Philippon's (2018) research, Fintech encompasses digital innovations and technology-based business model innovations in the financial sector.

3.1 Categories in Fintech

Since there is no unified definition of the idea of Fintech even today, Chen et al. (2019) grouped Fintech devices according to their application areas and developed the following categories based on the findings of multiple sources, papers, and studies.

- Cybersecurity: employs encryption and authentication to defend against financial attacks in the form of hardware or software (such as API security solutions, DDoS prevention solutions, Single sign-on (SSO) solutions, and data loss prevention (DLP) solutions);
- Mobile transactions: enable payments using wireless devices such as smartphones and tablets. Required applications include Android Pay, Apple Pay, LG Pay, Samsung Pay, Alipay, and PayPal;
- Using technological algorithms, data analytics enables users to examine financial data, whether transactional or consumer data. These include Cloud solutions, Big Data, and artificial intelligence, among others;
- Blockchain: fundamentally utilized in financial services with distributed ledger technologies like Smart contracts and cryptocurrencies (Ripple Payment, Bitcoin);
- Peer-to-peer (P2P): hub-, node-free networks, systems, and platforms that allow a direct and therefore quick connection to perform the financial transactions of the customers (such as Kickstarter);
- Robo-advising: the provision of financial advice to clients through machine learning and artificial intelligence; Internet of Things (IoT): the collecting and transmission of real-time data via smart devices.

Bada (2019) established distinct categories to classify Fintech applications, with the following classification: InsurTech focuses on insurance solutions, while RegTech focuses on regulatory issues. LendTech is concerned with lending, PayTech with payments, TradeTech with commercial activities, WealthTech with personal finance, and BankTech with retail banking.

According to the 2019 Statista Digital Market Outlook, the Fintech market may be divided into four distinct segments: Digital Payments, Personal Finance, Alternative Lending, and Alternative Financing (Statista, 2019).

Opportunities and effects of innovative Fintech

Possibilities of Fintech include enhancing the customer experience with precise tools, efficiently controlling risks, assisting lending procedures in the near future, and possibly providing adequate credit alternatives (Sljukic and Gabler, 2018). Taking into account the primary objective of the present study, it is vital to evaluate how Fintech influences the banking industry. According to a BIS analysis (Philippon, 2017), Fintech has the ability to dismantle and disrupt old structures, but it also facilitates the formation of new partnerships by giving rethought products and services.

According to the impact assessment by Parameshwar et al. (2019), the emergence of Fintech startups poses a significant threat to the profits of traditional financial institutions as the number of clients utilizing their services declines. According to Christi and Barberis (2016), the Fintech sector is booming and has beneficial consequences for early adopters, whereas traditional institutions risk negative repercussions if they do not embrace Fintech as well. According to the authors, the global financial sector is in the infancy of digital disruption, but Fintech is the most promising and all-encompassing industry, driven by creative business models and the transformation of financial infrastructures.

4 The sector of fintech in Hungary

4.1 The MNB Fintech Approach

The Hungarian National Bank (MNB) is making every effort to digitize the financial sector, capitalizing on Fintech's prospects. In addition, it employs a variety of regulatory mechanisms. The 2019-completed MNB Fintech plan intends to promote digitalization in the financial industry through 24 activities that are in accordance with and compatible with the Digital Welfare Program's principles (MNB, 2019b). The MNB's FinTech strategy focuses on four significant areas and presents its strategic objectives within the scope of the plan. These regions are as follows:

Supporting customer-accessible financial services that also offer security, simplicity, low cost, convenience, and personalization, hence increasing the usage of these digital services. Creating an efficient and stable financial system through the use of new and cutting-edge technologies, resulting in lower costs, more effective risk management, and enhanced service quality. Facilitating the growth of the Fintech environment in Hungary by supporting the implementation of laws that helps Fintech acquire traction in the country can also attract talent. Effective Fintech technology can also contribute to the economic growth of the nation. Establishing the nation's financial culture through leveraging digital advantages. In addition to expanding and increasing the usage of new and modern services, the objective is to comply with corporate ethics regulations and give further training and education in the domains of technology and finance (MNB, 2019a).

Although Fintech has the potential to be a major success in Hungary, it is still in its infancy, and mobile and payment services have become pervasive. There are roughly 110 active Fintech companies offering their services in Hungary, and this number is projected to rise since there is a need for their products in the home market. According to the results of surveys done in the demand market, there is a need not only for easier and faster money management, but also for the simplification of lending and savings. However, Hungary has a long way to go before its financial industry reaches a greater degree of digitalization due to the slow pace of transition. Approximately 80% of banks utilize fintech applications for cash flow, but their extensive usage in insurance, capital markets, and asset management is not anticipated until the far future (MNB, 2019a).

4.2 Hungary's fintech players and applications

Taking into account the prices of Fintech transactions in Hungary, the overall value in 2020 is approximately $3.9 million. Based on estimations, the transaction values of the entire Fintech sector between 2017 and 2024. (The evaluation is modified to account for the projected impact of the current COVID-19 epidemic.)

Presently and in the near future, the presence of digital payments in Hungary obviously dominates the Fintech market. By 2024, it is anticipated that the value of these transactions will nearly treble, while the other divisions will grow relatively little. According to Statista (2020b), the current 4.86 million users of digital payments will increase to 5.63 million by 2024, representing slightly more than half of the Hungarian population.

The majority of Hungarian banks are eager to implement Fintech solutions, and they are also expanding their use of e-banking and mobile applications. However, there are Fintech businesses that operate independently of banks on the Fintech digital payment market, and their presence stimulates competition in payment services (Bakonyi, 2020). 90% of the 110 Fintech companies presently operating in Hungary primarily offer financial services to B2B clients (Baráth, 2020). The following are the most significant digital payment service companies.

TransferWise is a solution for international payments. The primary benefit is that the conversion expenses are reduced and fixed for a period, so users do not have to worry about swings in exchange rates. Its business strategy is predicated on the fact that, although it strives to facilitate international financial transactions, currencies continue to circulate inside a country and in tandem with money transfers from other nations, hence reducing exchange rate volatility (TransferWise, 2020).

Barion is utilized by over 6000 companies for online payment processing. It provides minimal transaction costs, simple and quick integration, and e-commerce platform plug-ins. It is a safe, cost-free money transfer option that is accessible 24/7, i.e., at any time (Barion, 2020).

Revolut: Revolut is a Fintech startup that issues prepaid cards. By utilizing it, users can avoid hidden costs in money management, high transaction fees with poor conversion rates, keeping expensive foreign currency accounts, obtaining separate bank cards, and lengthy and complex account openings. It claims a solution for the following: exceptionally favorable exchange rate conversion, free and instant money sending and receiving within the system, free and instant foreign currency account management, instant and quick online registration from any location, and free credit card (Szendrei, 2020).

By establishing a Simple card regardless of where the user does banking. The app also supports mobile payments by touch and is compatible with both Android and iOS. Not only does it permit online payment, but it also offers services for purchasing highway stickers, movie tickets, books, cabs, etc (Simple, 2020).

PayPal offers a comprehensive business solution; users can accept payments on their own website and through their own accounts. It has multi-channel conversion, quick payout, enhanced protection, worldwide coverage, simple integration, expandable, and configurable characteristics (PayPal, 2020).

Wyze.me: Wyze.me, a Hungarian Fintech startup. Wyze.me is the first bank-independent, completely automated personal financial application in Hungary. It allows customers to simply and securely synchronize their online bank accounts, providing a comprehensive view of their money. Wyze.me automatically categorizes revenues and expenses, saving the user time (Wyze.me, 2020).

4.3 Opportunities and effects of Instant payment legislation

The rapid payment system, which enables transactions under HUF 10 million to be completed within 5 seconds, will be available 24 hours a day, every day of the year, beginning in 2020. (Bakonyi, 2020). In many countries, the fast payment system has led to the development of QR code mobile payment. In countries where the regulator has developed an open standard with market participants or where banks and service providers with a significant client base have adopted a common solution, the QR code has gained popularity. In Hungary, the MNB anticipates the introduction of digital payment solutions that are compatible with the immediate payment infrastructure and that rivals can use at no additional cost.

A QR code is a two-dimensional barcode (point code) that can contain the data of the payer or the payee required to make a payment (name, address, bank account number, and date), thereby considerably accelerating the payment process by eliminating the need to re-enter the information each time. Due to the QR code, the likelihood of making an error is also reduced. The Hungarian QR code standard is based on worldwide standards (EPC standard), but MNB and GIRO experts have developed modifications so that it can be used for in-store purchases, invoice payments, online purchases, and interpersonal payments.

The usage potential of a QR code is mostly determined by the amount of data it can hold. Experts took into account a variety of business concerns when selecting the content of the data in order to facilitate the broadest possible use of the instant payment system. The Hungarian QR code enables the handling of a greater variety of data than the data groups transmitted during financial transactions. Additionally, the QR code specifies the content of the data categories, the data fields, the relevant data formats, and the maximum amount of data that may be entered, making the data suitable for automatic processing (Németh, 2019).

It should also be related to instant payment, a PSD2 concept designed to protect clients who engage in online financial transactions. PSD2 is the abbreviation for Payment Services Directive 2, the purpose of which is to create and oversee payment legislation in EU and EEA member states. Within the PSD2 regulatory framework, new non-bank payment service providers will be permitted to enhance competition, but they will all be required to implement robust consumer authentication (Green et al., 2020).

As clients and business partners now expect 24/7 accessibility, fast payments have become the norm. Companies that lag behind in technology must catch up and integrate this potential into their business if they wish to remain viable and pursue growth and development if they want to survive (Eber et al., 2018). Instant payment enables the improvement of cash flow for B2B transactions, since money can be paid, spent, and invested not just on weekdays but also on weekends (Kok, 2019). Through improved cash flow management, it is also possible to increase liquidity provision. The time spent at the cash register is decreased, and revenue and expense management are kept current. Additionally, businesses can plan and budget on non-working days. Instantaneous payments can release funds trapped in the financial system and increase competition (Deloitte, 2019). Secure and quick, so that businesses can better serve their customers (Kok, 2019). According to the MNB (2016), the instant payment system serves three primary purposes: extending payment alternatives with simplicity and continual availability, ensuring financial market innovation, and minimizing non-transparent payments. In addition to the aforementioned, the paper indicates that it will be possible to provide quick feedback and develop new services and payment platforms.

5 Research

Our survey asked about the payment habits of the post-COVID young generation, with 287 respondents. 89.89% of the respondents were in the 18-30 age group, which confirms that university students are currently the most likely to have responded to the questionnaire. In response to the question "Which payment method do you use most in shops?" mobile payments came first in 52.26% of the responses, credit card in second place in 38.37%, and cash in third place in 9.4%. The same question was asked, "Which payment method do you use most in online shops?", here we asked about alternative payment options, but here again, credit card purchases won with 64.11%, the second was Paypal, Apple Pay, and Google Pay, with 22.29% of people making purchases this way. The third one was cash on delivery, the other answers are negligible, but what should be highlighted is that there were 3 answers when it came to transferring, so we are talking about 1%. This tells us quite a lot that instant transfer has not yet entered the payment repertoire. Looking deeper into this question, we asked questions such as "Have you heard of the Hungarian Instant Payment System (AFR)?", the answer was 60.27% yes, which is quite encouraging, despite the fact that it is not used for purchases in online shops, the no answers, in this case, being 39.72%. But we also asked separately highlighting how much young people are aware of AFR 2.0, "Have you heard of AFR 2.0?", here 12.54% of the responses show that they have heard of it, and the remaining 87.45%, unfortunately, do not know what it is.

We didn't let go of the AFR question, especially the AFR 2.0 no and in the question "Based on what you have described before, would you try AFR 2.0 for in-store payments if it were available?" we pushed the envelope further, here we can see the openness of the young people, 70.38% said yes, they would try it, but still a fairly high 29.61% no response. Just a couple of percent higher on the previous question, but for online shopping, 71.77% would try AFR 2.0 online and 28.22% would not.

There is a close connection between the facts and the predictions, in the previous questions we asked about the payment method used for in-store and online purchases, but we also asked about what they would prefer to use. Here the gap is starting to open, they are more willing to try new things.

shops	**facts**	**predictions**
credit card	38,33	31,71
cash	9,41	5,92
mobile payment	52,26	51,22
AFR with QR	0,00	6,97
AFR with NFC	0,00	4,18

5. Figure

shops purchases facts and predictions

source: own resources

As you can see in the previous figure, the facts have changed significantly, as we asked people what they would like to use, credit card payments have dropped, after all, hardly anyone carries a credit card, and cash has dropped. Mobile payments have dropped, although not significantly. AFR was one of the focal points in our research, which as you can see, together account for over 11%. So one in ten young people understand why the uptake of this technology is important.

online purchase	facts	predictions
credit card	64,11	39,02
mobile payment	22,30	24,04
money transfer classic one	1,05	2,79
AFR with QR	0,00	19,16
payment request	0,00	4,18
cash on delivery	11,85	10,10

6. Figure

online purchases facts and predictions

source: own resources

The second figure shows the facts and predictions of online shopping, with an even more significant decline in card purchases, who want to swipe their card online. Classic referrals have increased, interesting that they might be confused with AFR? This would be worth exploring further. However, the QR code version of AFR has increased more significantly here than in-store purchases, by nearly 20%, meaning one in five young people would try it. The payment request is also significant, if we combine this with AFR we get almost 25%, i.e. one in four young people would try the instant payment option.

Conclusions

In this research, we wanted to look at the attitudes of the youngest, but already university-age, generation towards financial solutions. With a particular focus on the AFR technology, which in Hungary at the time of writing has been the subject of a very encouraging and forward-looking proposal from the government. According to the proposal, AFR payments with QR codes and AFR orders initiated with a payment request will be free of charge and free of any consumer fees or charges. This is an attempt by the government to promote the widespread uptake of AFR, which is certainly encouraging, especially as the above research shows that the younger generation is interested in using AFR, but lacked the technology to do so. It is worth revisiting the results of the research, 11-12% would be willing to use AFR for in-store purchases, and the same for online purchases combined, 24-25%.

This encouraging statistic and the government's new policy direction show a really promising future for AFR 2.0. For example, all banks will be required to read QR codes and accept payment requests. A new QR code standard will also be created, which will have a central authentication and security element. Standardized data input based on NFC and deep-link will also be laid down in the regulation, and a confirmation of the transfer will be mandatory, as up to now only a message informing of the failure of the transfer. The biggest change, however, will be the increase from HUF 10 million to HUF 30 million, and the fact that all banks will be obliged to include QR code reading capabilities in their applications.

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Can be the DOSPERT questioner used for mesuring IT risk taking

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Abstract: In a previous study I modified the original DOSPERT questionnaire. And I added a new domain on IT security risk appetite. In a previous publication I presented the results of my surveys with this modified questionnaire. In the present publication, I examine the relationship between the IT security questions in the modified questionnaire and the questions in the other domains of the questionnaire. My hypothesis is that the new questions are not necessary to assess respondents' willingness to take IT security-related risks. I assumed that the answers to the original DOSPERT questions could be used to measure IT security risk appetite in my sample. Statistical tests have disproved this assumption and further investigation is needed.

Keywords: safety consciosness; university students' IT safety consciousness; DOSPERT

1 Literature review

In my literature search, I examined different definitions of risk and security models. From these, I have highlighted tools that deal with the human factor and can be used for assessment. I have highlighted Weber, Blais and Betz's DOSPERT (Domain-Specific Risk-Taking) study published in 2002, in which they created a new psychometric assessment instrument on risk-taking, measuring risk-taking propensity in different domains of life.[1][2]

The domains measured by the instrument:

▪ Financial,

▪ Health/Safety,

▪ Sport and Recreation,

▪ Ethical,

▪ Social

Respondents can answer the questionnaire questions by selecting a value on a seven-point Likert scale. These questions ask about the perceived risk, the expected gain and the likelihood of choosing a given course of action.Attacks on decommissioned smartphones

2 Methodology

For my research, I modified the 2006 version of the DOSPERT questionnaire translated into Hungarian by István Radnóti; I added a new area (do-main) measuring attitudes towards the security of information and communication technology, which contains five new questions. These are simple, situational questions that match the original questions of the questionnaire, both in content and form.

These questions are:

- Would you forward company information to your private email?
- Would you connect to public, open WiFi?
- Would you use your pin, your password or unlock pattern in front of others?
- Would you let someone use your smart device without your prior consent?
- Would you copy company data to your smartphone?

In order not to lengthen the questionnaire, which contained 40 questions before the modification, I removed one question from each domain. To eliminate the questions to be removed and to test the questions related to the new domain, I tested them on a small sample. Then, after evaluating the results, I made small modifications and used the questions presented in the previous paragraph in my research.

In designing the questions, I aimed to formulate short, easy-to-understand behaviours that ask for actions that have an IT security risk and can be carried out by almost anyone.

The aim of my research was to test the DOSPERT questionnaire itself. Is the questionnaire itself suitable to measure IT security risk-taking among university students. In particular, whether there is a significant difference between the respondents to the modified questionnaire in the sample in terms of the degree course they are studying.

I therefore hypothesised that there would be a significant difference in the IT security questions based on the subjects studied by the students. [3][4]

Also, I assumed that risk appetite is a general personality factor that correlates at a detectable level across different domains of life, and thus IT security risk appetite does not need to be measured separately.[5]

3 Data and results

3.1 The sample

The sample was collected in autumn 2019 using an online questionnaire. Minimal demographic information was collected from students (age, gender, major studied)

The sample size was 357 students. Of these, 302 were male and 55 female.

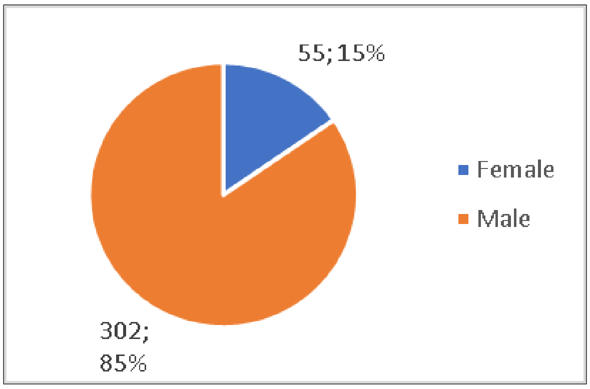

Figure 1.

Sex ratio in the sample

(source: own composition based on the sample)

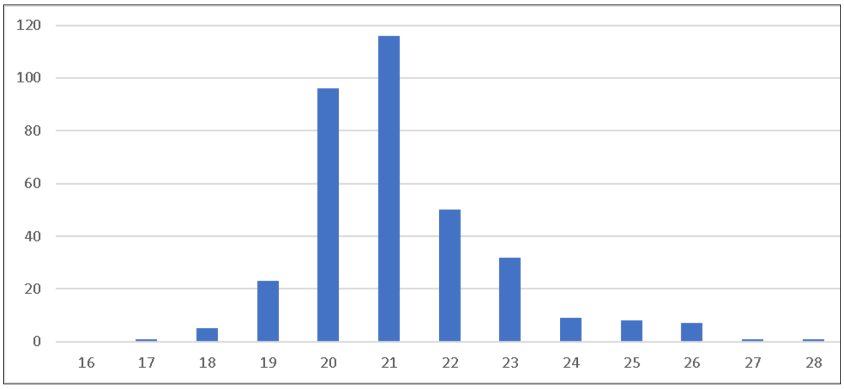

Figure 2.

Age distribution in the sample

(source: own composition based on the sample)

The average age of the respondents was 21.479 years and the average deviation from the mean was 2.684 years, so the sample was predominantly between 19-24 years old. So they are generation Z students and possible future managers[6][7].

3.2 Results

I examined the relationship between my IT security questions and the original risk-taking question from the DOSPERT based on the sample responses. I used a regression analysis for this study.

3.2.1 Would you forward company information to your private email?

Model Summary - ICT KOCKÁZAT Vállalati adatokat a privát emailcímemre továbbítani. 3

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.614
H_1	0.576	0.332	0.277	1.372

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	307.977	27	11.407	6.061	< .001
	Residual	619.155	329	1.882		
	Total	927.132	356			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	3.852	0.085		45.094	< .001
H_1	(Intercept)	-0.125	0.472		-0.265	0.791
	E KOCKÁZAT Megkérdőjelezhető költségeket leírni az adóbevallásban.3	0.217	0.069	0.186	3.141	0.002
	E KOCKÁZAT Más munkáját a sajátomként felhasználni. 3	0.103	0.062	0.090	1.666	0.097
	E KOCKÁZAT Egy barát titkát kifecsegni. 3	0.030	0.059	0.027	0.510	0.611
	E KOCKÁZAT Egy kisgyereket magára hagyni otthon egyedül, amíg elmegy a boltba. 3	0.180	0.056	0.175	3.238	0.001
	E KOCKÁZAT Egy 50.000 Ft-ot tartalmazó pénztárcát megtartani. 2	0.028	0.050	0.030	0.570	0.569
	F KOCKÁZAT A napi jövedelmem feltenni lóversenyre. 3	0.053	0.070	0.047	0.748	0.455
	F KOCKÁZAT Az éves jövedelmem 10% -át befektetni egy mérsékelt növekedésű, diverzifikált alapba. 3	0.001	0.064	8.192×10^{-4}	0.016	0.987
	F KOCKÁZAT Egy napi jövedelmet feltenni egy kockázatos pókerjátszmában. 3	-0.100	0.071	-0.090	-1.422	0.156
	F KOCKÁZAT Az éves jövedelmem 5%-át egy magaskockázatú befektetésbe fektetni. 3	-0.014	0.063	-0.013	-0.232	0.817
	F KOCKÁZAT Egy napi jövedelmet feltenni egy sportmérkőzésre. 3	0.065	0.070	0.061	0.929	0.354
	F KOCKÁZAT Az éves jövedelmem 10%-át egy új üzleti lehetőségbe fektetni. 3	0.059	0.067	0.049	0.884	0.378
	H KOCKÁZAT Túl sok alkoholt fogyasztani egy társadalmi eseményen, például egy esküvőn. 3	0.047	0.052	0.049	0.917	0.360
	H KOCKÁZAT Biztonságiöv viselése nélkül vezetni. 3	0.064	0.069	0.061	0.934	0.351
	H KOCKÁZAT Bukósisak nélkül motorozni.3	-0.039	0.079	-0.031	-0.494	0.622
	H KOCKÁZAT Naptej nélkül napozni. 3	-0.042	0.056	-0.039	-0.761	0.447
	H KOCKÁZAT Hazasétálni egyedül egy nem biztonságos városrészben. 3	0.241	0.064	0.201	3.760	< .001
	R KOCKÁZAT Olyan sípályán lesiklani, ami meghaladja a képességeim. 3	-0.042	0.065	-0.036	-0.649	0.517
	R KOCKÁZAT Vadvízi evezésre menni tavasszal, nagy vízállás esetén.3	-0.004	0.063	-0.004	-0.063	0.950
	R KOCKÁZAT Ejtőernyőzni.3	-0.011	0.064	-0.011	-0.172	0.864
	R KOCKÁZAT Bungeejumpingozni egy magas hídról. 3	0.034	0.066	0.034	0.519	0.604
	R KOCKÁZAT Kis repülőgépet vezetni. 3	-0.101	0.058	-0.095	-1.721	0.086
	S KOCKÁZAT Beismerni egy barátomnak, hogy az ízlésem különbözik az övétől.3	-0.063	0.059	-0.053	-1.069	0.286
	S KOCKÁZAT Egy hatósági személlyel összekülönbözni.3	0.063	0.069	0.052	0.912	0.362
	S KOCKÁZAT Izgalmasabb karrierbe kezdeni egy biztosabb karrirer helyett. 2	-0.077	0.081	-0.052	-0.954	0.341
	S KOCKÁZAT Egy kellemetlen témáról beszélni egy munkahelyi megbeszélésen. 2	0.040	0.069	0.031	0.569	0.569
	S KOCKÁZAT A családtól és a rokonoktól távolra költözni. 3	0.148	0.063	0.124	2.361	0.019
	S KOCKÁZAT Harmincötévesen új karrierbe kezdeni. 2	0.157	0.075	0.118	2.076	0.039

Figure 3.

Age distribution in the sample

(source: own composition based on the sample)

The results show that there is no strong correlation between this question and the other questions. Interestingly, only the question "Walking home alone in an unsafe neighbourhood" shows a weak positive relationship.

3.2.2 Would you connect to public, open WiFi?

Model Summary - ICT KOCKÁZAT Egy nyilvános wifihez csatlakozni. 3

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.568
H_1	0.425	0.181	0.114	1.476

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	158.293	27	5.863	2.692	< .001
	Residual	716.564	329	2.178		
	Total	874.857	356			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	2.714	0.083		32.715	< .001
H_1	(Intercept)	0.443	0.508		0.872	0.384
	E KOCKÁZAT Megkérdőjelezhető költségeket leírni az adóbevallásban.3	-0.033	0.074	-0.029	-0.439	0.661
	E KOCKÁZAT Más munkáját a sajátomként felhasználni. 3	0.048	0.066	0.043	0.722	0.471
	E KOCKÁZAT Egy barát titkát kifecsegni. 3	0.088	0.064	0.081	1.382	0.168
	E KOCKÁZAT Egy kisgyereket magára hagyni otthon egyedül, amíg elmegy a boltba. 3	-0.093	0.060	-0.093	-1.551	0.122
	E KOCKÁZAT Egy 50.000 Ft-ot tartalmazó pénztárcát megtartani. 2	0.012	0.054	0.013	0.226	0.821
	F KOCKÁZAT A napi jövedelmem feltenni lóversenyre. 3	-0.014	0.076	-0.013	-0.182	0.855
	F KOCKÁZAT Az éves jövedelmem 10% -át befektetni egy mérsékelt növekedésű, diverzifikált alapba. 3	0.065	0.069	0.055	0.951	0.342
	F KOCKÁZAT Egy napi jövedelmet feltenni egy kockázatos pókerjátszmában. 3	-0.134	0.076	-0.123	-1.765	0.078
	F KOCKÁZAT Az éves jövedelmem 5%-át egy magaskockázatú befektetésbe fektetni. 3	0.065	0.067	0.058	0.960	0.338
	F KOCKÁZAT Egy napi jövedelmet feltenni egy sportmérkőzésre. 3	-0.045	0.075	-0.043	-0.599	0.549
	F KOCKÁZAT Az éves jövedelmem 10%-át egy új üzleti lehetőségbe fektetni. 3	0.017	0.072	0.014	0.233	0.816
	H KOCKÁZAT Túl sok alkoholt fogyasztani egy társadalmi eseményen, például egy esküvőn. 3	0.023	0.056	0.024	0.408	0.684
	H KOCKÁZAT Biztonságiöv viselése nélkül vezetni. 3	0.122	0.074	0.118	1.643	0.101
	H KOCKÁZAT Bukósisak nélkül motorozni.3	-0.043	0.085	-0.035	-0.504	0.614
	H KOCKÁZAT Naptej nélkül napozni. 3	0.090	0.060	0.086	1.511	0.132
	H KOCKÁZAT Hazasétálni egyedül egy nem biztonságos városrészben. 3	0.205	0.069	0.176	2.966	0.003
	R KOCKÁZAT Olyan sípályán lesiklani, ami meghaladja a képességeim. 3	-0.024	0.070	-0.021	-0.345	0.730
	R KOCKÁZAT Vadvízi evezésre menni tavasszal, nagy vízállás esetén.3	-0.026	0.068	-0.024	-0.384	0.701
	R KOCKÁZAT Ejtőernyőzni.3	-0.034	0.069	-0.034	-0.493	0.622
	R KOCKÁZAT Bungeejumpingozni egy magas hídról. 3	0.017	0.071	0.018	0.241	0.809
	R KOCKÁZAT Kis repülőgépet vezetni. 3	0.130	0.063	0.126	2.060	0.040
	S KOCKÁZAT Beismerni egy barátomnak, hogy az ízlésem különbözik az övétől.3	0.110	0.063	0.096	1.743	0.082
	S KOCKÁZAT Egy hatósági személlyel összekülönbözni.3	-0.021	0.074	-0.018	-0.281	0.779
	S KOCKÁZAT Izgalmasabb karrierbe kezdeni egy biztosabb karrirer helyett. 2	0.019	0.087	0.013	0.214	0.831
	S KOCKÁZAT Egy kellemetlen témáról beszélni egy munkahelyi megbeszélésen. 2	0.181	0.075	0.149	2.427	0.016
	S KOCKÁZAT A családtól és a rokonoktól távolra költözni. 3	-0.006	0.067	-0.005	-0.091	0.927
	S KOCKÁZAT Harmincötévesen új karrierbe kezdeni. 2	0.075	0.081	0.059	0.929	0.354

Figure 4.

Age distribution in the sample

(source: own composition based on the sample)

The next question was whether you would connect to a public, open WiFi network, and no significant relationship was found between this and other questions in the sample.

3.2.3 Would you use your pin, your password or unlock pattern in front of others?

Model Summary - ICT KOCKÁZAT Mások előtt a pinkódomat / biztonsági mintámat használni. 2

Model	R	R²	Adjusted R²	RMSE
H_0	0.000	0.000	0.000	1.536
H_1	0.567	0.322	0.266	1.316

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	270.084	27	10.003	5.776	< .001
	Residual	569.798	329	1.732		
	Total	839.882	356			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	4.176	0.081		51.376	< .001
H_1	(Intercept)	0.645	0.453		1.423	0.156
	E KOCKÁZAT Megkérdőjelezhető költségeket leírni az adóbevallásban.3	-0.071	0.066	-0.064	-1.072	0.285
	E KOCKÁZAT Más munkáját a sajátomként felhasználni. 3	0.156	0.059	0.144	2.638	0.009
	E KOCKÁZAT Egy barát titkát kifecsegni. 3	0.113	0.057	0.107	1.993	0.047
	E KOCKÁZAT Egy kisgyereket magára hagyni otthon egyedül, amíg elmegy a boltba. 3	0.056	0.053	0.057	1.047	0.296
	E KOCKÁZAT Egy 50.000 Ft-ot tartalmazó pénztárcát megtartani. 2	0.026	0.048	0.028	0.536	0.592
	F KOCKÁZAT A napi jövedelmem feltenni lóversenyre. 3	0.009	0.067	0.009	0.139	0.890
	F KOCKÁZAT Az éves jövedelmem 10% -át befektetni egy mérsékelt növekedésű, diverzifikált alapba. 3	-0.034	0.061	-0.030	-0.561	0.575
	F KOCKÁZAT Egy napi jövedelmet feltenni egy kockázatos pókerjátszmában. 3	0.003	0.068	0.003	0.048	0.962
	F KOCKÁZAT Az éves jövedelmem 5%-át egy magaskockázatú befektetésbe fektetni. 3	0.086	0.060	0.079	1.435	0.152
	F KOCKÁZAT Egy napi jövedelmet feltenni egy sportmérkőzésre. 3	-0.046	0.067	-0.046	-0.692	0.489
	F KOCKÁZAT Az éves jövedelmem 10%-át egy új üzleti lehetőségbe fektetni. 3	-0.015	0.064	-0.013	-0.240	0.811
	H KOCKÁZAT Túl sok alkoholt fogyasztani egy társadalmi eseményen, például egy esküvőn. 3	0.058	0.050	0.063	1.180	0.239
	H KOCKÁZAT Biztonságiöv viselése nélkül vezetni. 3	0.054	0.066	0.053	0.812	0.418
	H KOCKÁZAT Bukósisak nélkül motorozni.3	0.111	0.076	0.094	1.469	0.143
	H KOCKÁZAT Naptej nélkül napozni. 3	0.104	0.053	0.100	1.944	0.053
	H KOCKÁZAT Hazasétálni egyedül egy nem biztonságos városrészben. 3	0.212	0.062	0.186	3.453	< .001
	R KOCKÁZAT Olyan sípályán lesiklani, ami meghaladja a képességeim. 3	-0.056	0.062	-0.050	-0.900	0.369
	R KOCKÁZAT Vadvízi evezésre menni tavasszal, nagy vízállás esetén.3	-0.062	0.061	-0.059	-1.020	0.308
	R KOCKÁZAT Ejtőernyőzni.3	-0.101	0.061	-0.105	-1.651	0.100
	R KOCKÁZAT Bungeejumpingozni egy magas hídról. 3	0.241	0.063	0.256	3.839	< .001
	R KOCKÁZAT Kis repülőgépet vezetni. 3	-0.075	0.056	-0.075	-1.340	0.181
	S KOCKÁZAT Beismerni egy barátomnak, hogy az ízlésem különbözik az övétől.3	0.055	0.056	0.049	0.977	0.330
	S KOCKÁZAT Egy hatósági személlyel összekülönbözni.3	0.011	0.066	0.009	0.162	0.871
	S KOCKÁZAT Izgalmasabb karrierbe kezdeni egy biztosabb karrirer helyett. 2	-0.086	0.078	-0.060	-1.103	0.271
	S KOCKÁZAT Egy kellemetlen témáról beszélni egy munkahelyi megbeszélésen. 2	0.095	0.067	0.080	1.430	0.154
	S KOCKÁZAT A családtól és a rokonoktól távolra költözni. 3	-0.054	0.060	-0.048	-0.908	0.364
	S KOCKÁZAT Harmincötévesen új karrierbe kezdeni. 2	0.143	0.072	0.114	1.982	0.048

Figure 5.

Age distribution in the sample

(source: own composition based on the sample)

On the question of whether the respondent would allow others to see his or her password, two weak links were found: one was repeatedly "walking home alone in an unsafe part of town", while the other was "bungee jumping off a high bridge".

3.2.4 Would you let someone use your smart device without your prior consent?

Model Summary - ICT KOCKÁZAT Hagyni, hogy más használja a telefonját a tudta nélkül. 3

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.566
H_1	0.552	0.305	0.248	1.358

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	266.259	27	9.861	5.345	< .001
	Residual	606.956	329	1.845		
	Total	873.216	356			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	3.843	0.083		46.364	< .001
H_1	(Intercept)	0.501	0.468		1.071	0.285
	E KOCKÁZAT Megkérdőjelezhető költségeket leírni az adóbevallásban.3	0.049	0.069	0.043	0.716	0.475
	E KOCKÁZAT Más munkáját a sajátomként felhasználni. 3	0.017	0.061	0.015	0.281	0.779
	E KOCKÁZAT Egy barát titkát kifecsegni. 3	0.232	0.059	0.214	3.954	< .001
	E KOCKÁZAT Egy kisgyereket magára hagyni otthon egyedül, amíg elmegy a boltba. 3	0.069	0.055	0.069	1.257	0.210
	E KOCKÁZAT Egy 50.000 Ft-ot tartalmazó pénztárcát megtartani. 2	0.042	0.050	0.045	0.841	0.401
	F KOCKÁZAT A napi jövedelmem feltenni lóversenyre. 3	0.009	0.069	0.008	0.127	0.899
	F KOCKÁZAT Az éves jövedelmem 10% -át befektetni egy mérsékelt növekedésű, diverzifikált alapba. 3	-0.032	0.063	-0.027	-0.498	0.619
	F KOCKÁZAT Egy napi jövedelmet feltenni egy kockázatos pókerjátszmában. 3	-0.008	0.070	-0.007	-0.112	0.911
	F KOCKÁZAT Az éves jövedelmem 5%-át egy magaskockázatú befektetésbe fektetni. 3	-0.132	0.062	-0.119	-2.134	0.034
	F KOCKÁZAT Egy napi jövedelmet feltenni egy sportmérkőzésre. 3	0.143	0.069	0.138	2.065	0.040
	F KOCKÁZAT Az éves jövedelmem 10%-át egy új üzleti lehetőségbe fektetni. 3	-0.059	0.066	-0.051	-0.898	0.370
	H KOCKÁZAT Túl sok alkoholt fogyasztani egy társadalmi eseményen, például egy esküvőn. 3	-0.002	0.051	-0.002	-0.035	0.972
	H KOCKÁZAT Biztonságiöv viselése nélkül vezetni. 3	0.021	0.068	0.020	0.308	0.758
	H KOCKÁZAT Bukósisak nélkül motorozni.3	-6.432×10^{-4}	0.078	-5.340×10^{-4}	-0.008	0.993
	H KOCKÁZAT Naptej nélkül napozni. 3	0.092	0.055	0.087	1.671	0.096
	H KOCKÁZAT Hazasétálni egyedül egy nem biztonságos városrészben. 3	0.155	0.063	0.133	2.438	0.015
	R KOCKÁZAT Olyan sípályán lesiklani, ami meghaladja a képességeim. 3	0.112	0.064	0.099	1.750	0.081
	R KOCKÁZAT Vadvízi evezésre menni tavasszal, nagy vízállás esetén.3	0.002	0.063	0.002	0.040	0.968
	R KOCKÁZAT Ejtőernyőzni.3	-0.053	0.063	-0.053	-0.829	0.408
	R KOCKÁZAT Bungeejumpingozni egy magas hídról. 3	0.081	0.065	0.084	1.242	0.215
	R KOCKÁZAT Kis repülőgépet vezetni. 3	-0.136	0.058	-0.133	-2.355	0.019
	S KOCKÁZAT Beismerni egy barátomnak, hogy az ízlésem különbözik az övétől.3	0.037	0.058	0.032	0.630	0.529
	S KOCKÁZAT Egy hatósági személlyel összekülönbözni.3	-0.034	0.068	-0.029	-0.506	0.613
	S KOCKÁZAT Izgalmasabb karrierbe kezdeni egy biztosabb karrirer helyett. 2	0.079	0.080	0.054	0.977	0.329
	S KOCKÁZAT Egy kellemetlen témáról beszélni egy munkahelyi megbeszélésen. 2	0.137	0.069	0.113	1.999	0.046
	S KOCKÁZAT A családtól és a rokonoktól távolra költözni. 3	0.079	0.062	0.068	1.270	0.205
	S KOCKÁZAT Harmincötévesen új karrierbe kezdeni. 2	0.014	0.075	0.011	0.193	0.847

Figure 6.

Age distribution in the sample

(source: own composition based on the sample)

For the question on whether the respondent would let someone else use their smartphone or tablet without their consent, a weak relationship was found with how risky the respondent thought it was to tell a friend's secret, but the strength of the relationship between these two questions was also weak positive.

3.2.5 Would you copy company data to your smartphone?

Model Summary - ICT KOCKÁZAT Munkahelyi adatok, dokumentumok mobiltelefonra másolása. 3

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.702
H_1	0.529	0.280	0.221	1.502

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	288.405	27	10.682	4.734	< .001
	Residual	742.407	329	2.257		
	Total	1030.812	356			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	3.868	0.090		42.953	< .001
H_1	(Intercept)	-0.328	0.517		-0.634	0.527
	E KOCKÁZAT Megkérdőjelezhető költségeket leírni az adóbevallásban.3	0.269	0.076	0.218	3.548	< .001
	E KOCKÁZAT Más munkáját a sajátomként felhasználni. 3	0.127	0.067	0.105	1.880	0.061
	E KOCKÁZAT Egy barát titkát kifecsegni. 3	0.067	0.065	0.057	1.028	0.305
	E KOCKÁZAT Egy kisgyereket magára hagyni otthon egyedül, amíg elmegy a boltba. 3	0.126	0.061	0.117	2.076	0.039
	E KOCKÁZAT Egy 50.000 Ft-ot tartalmazó pénztárcát megtartani. 2	0.010	0.055	0.010	0.184	0.854
	F KOCKÁZAT A napi jövedelmem feltenni lóversenyre. 3	0.110	0.077	0.093	1.433	0.153
	F KOCKÁZAT Az éves jövedelmem 10% -át befektetni egy mérsékelt növekedésű, diverzifikált alapba. 3	0.037	0.070	0.029	0.533	0.595
	F KOCKÁZAT Egy napi jövedelmet feltenni egy kockázatos pókerjátszmában. 3	-0.121	0.077	-0.103	-1.570	0.117
	F KOCKÁZAT Az éves jövedelmem 5%-át egy magaskockázatú befektetésbe fektetni. 3	0.156	0.069	0.129	2.282	0.023
	F KOCKÁZAT Egy napi jövedelmet feltenni egy sportmérkőzésre. 3	-0.033	0.077	-0.029	-0.429	0.668
	F KOCKÁZAT Az éves jövedelmem 10%-át egy új üzleti lehetőségbe fektetni. 3	0.104	0.073	0.083	1.430	0.154
	H KOCKÁZAT Túl sok alkoholt fogyasztani egy társadalmi eseményen, például egy esküvőn. 3	-0.015	0.057	-0.014	-0.263	0.793
	H KOCKÁZAT Biztonságiöv viselése nélkül vezetni. 3	0.010	0.076	0.009	0.138	0.891
	H KOCKÁZAT Bukósisak nélkül motorozni.3	-0.050	0.086	-0.038	-0.581	0.561
	H KOCKÁZAT Naptej nélkül napozni. 3	-0.013	0.061	-0.011	-0.215	0.830
	H KOCKÁZAT Hazasétálni egyedül egy nem biztonságos városrészben. 3	0.130	0.070	0.103	1.853	0.065
	R KOCKÁZAT Olyan sípályán lesiklani, ami meghaladja a képességeim. 3	-0.122	0.071	-0.099	-1.714	0.087
	R KOCKÁZAT Vadvízi evezésre menni tavasszal, nagy vízállás esetén.3	0.021	0.069	0.018	0.299	0.765
	R KOCKÁZAT Ejtőernyőzni.3	0.123	0.070	0.114	1.751	0.081
	R KOCKÁZAT Bungeejumpingozni egy magas hídról. 3	-0.009	0.072	-0.009	-0.128	0.898
	R KOCKÁZAT Kis repülőgépet vezetni. 3	0.003	0.064	0.002	0.042	0.967
	S KOCKÁZAT Beismerni egy barátomnak, hogy az ízlésem különbözik az övétől.3	-0.044	0.064	-0.036	-0.687	0.493
	S KOCKÁZAT Egy hatósági személlyel összekülönbözni.3	0.032	0.075	0.025	0.422	0.673
	S KOCKÁZAT Izgalmasabb karrierbe kezdeni egy biztosabb karrirer helyett. 2	-0.044	0.089	-0.028	-0.492	0.623
	S KOCKÁZAT Egy kellemetlen témáról beszélni egy munkahelyi megbeszélésen. 2	0.208	0.076	0.157	2.730	0.007
	S KOCKÁZAT A családtól és a rokonoktól távolra költözni. 3	-0.031	0.068	-0.025	-0.454	0.650
	S KOCKÁZAT Harmincötévesen új karrierbe kezdeni. 2	0.012	0.083	0.008	0.141	0.888

Figure 7.

Age distribution in the sample

(source: own composition based on the sample)

A weak positive relationship was found between the question "copying work data, documents to phone" and the question "write questionable expenses on tax return".

Overall, contrary to my assumptions, no significant correlation was generally found between IT security issues and risk appetite for other issues in the sample.

Conclusions

My results suggest that the original DOSPERT questions in the sample study were not in themselves able to predict responses to IT security questions, and no clear, strong, regression relationship could be demonstrated between them.

On this basis, my hypothesis that the DOSPERT questionnaire alone can predict IT risk appetite is rejected. Thus, the application of this questionnaire alone cannot be used to assess the IT security risk-taking propensity of young adults, a new security awareness survey instrument is needed to help assess the IT risk-taking behaviour of prospective and current employees and thus increase the level of IT security in the company.

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E-document, or the human factor in the security of electronic storage of personal documents

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Abstract: In today's hectic world, we can often feel that a little help would be nice. The proliferation of smartphones and the invasion of online space into more and more areas of our lives has changed the way we live. There are pros and cons, opportunities and threats. In this article we explore the possibilities of whether an app that stores our personal documents could help us in our daily lives. In this context, we present the present and future possibilities of electronic personal identifiers. We will also carry out a short questionnaire to assess whether our respondents would trust and use a phone app to replace their personal documents. We will also examine the security issues of this use.

Keywords: eID, Safetyconsciousness, Smart devices

1 Introduction

The development of portable IT devices in the 2000s brought with it the development of the information society. Almost 15 years after the first iPhone and the first Android phones, smartphones have become part of our lives at a societal level.

In 2018, Huawei conducted a large sample survey of nearly 6,000 users to find out what the company's customers use their devices for. They wanted to know how much respondents use their phones in a day. They were also asked, among other things, what impact the use of these devices has on their social lives and their networking.

We can choose from a wide range of apps for almost every part of our lives. We can find everything from simple calendar apps to complex banking solutions for managing our entire personal finances, to software that can connect to a corporate management information system and support almost full-fledged work.

It's no wonder that 93% of survey respondents said they find their smartphone helpful (Márton, 2018).

A large sample representative survey conducted by Budapest Bank in October 2018 showed that 40% of respondents use some kind of banking application. Surprisingly, usage patterns showed no correlation with age, only with education, financial situation and place of residence (hvg, 2018).

2 Primary research

The aim of the research was to ask young people (mainly Generastion Z) about their opinion of storing their ID-s, driving licences and other documents in an application.

The first question of the questionnaire asked whether the respondent, in his/her own opinion, is open to technological development? Almost 100% of respondents said yes to this question, with only 15 people saying no. This question is also important for our topic because in order to store our identities electronically, we need technologies that have not been used or are not used yet.

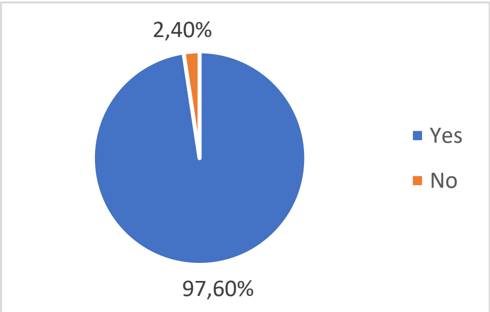

Figure 1
Are you open to new technologies?

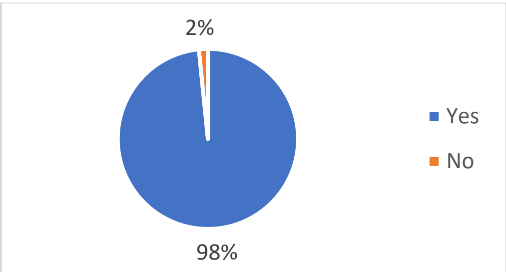

Figure 2
Do you have a smartphone?

The second question in the survey is related to the first question at some level. In 2016, Kantar TNS, commissioned by Google, produced a report based on data from 40 countries, which found that people no longer see their smartphone as a secondary device, but are increasingly using it for personal business (TNS, 2017). The results of this survey supports this. 680 responses showed that 98.4% of people have a smartphone, while only 1.6% do not. In addition, they may use a phone and then this percentage would be even lower, but as there are laggards in the development of technology, there are also laggards in mobile phone use. You may have a phone that you use only for voice calls or texting and not be classified as a smartphone, or it may simply not have the screen and features that a smartphone should have. Since this research is based on a phone application, this data supports the assumption and favours the assumptions.

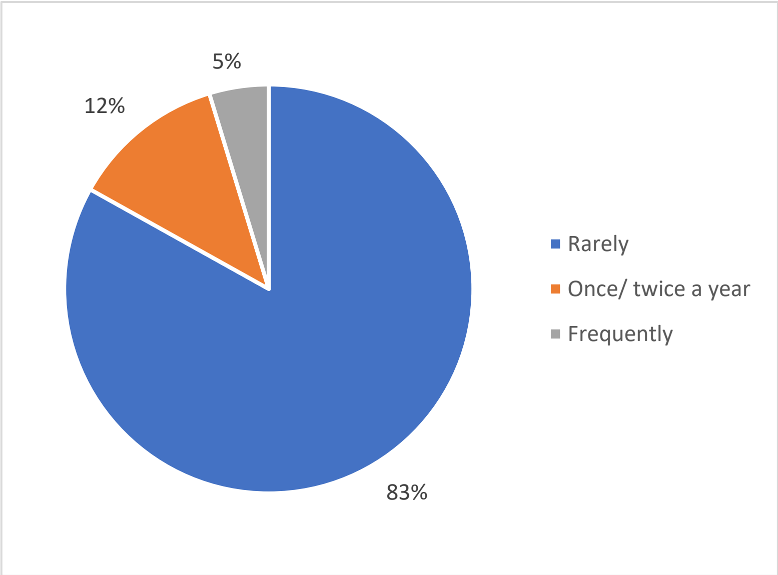

Figure 3
Do you often lose your documents?

For the third question, I assess how well people look after their documents, how often they leave them. If you don't have a separate document holder, even if your wallet is stolen with it, the cost of replacing your documents can be higher than the amount of money stolen, as you can pay up to 20,000 for them, depending on the document. The replacement of these documents, which have been destroyed or lost, is possible at the document offices in the cities. The cost of these documents at the time of the survey was as follows: identity card: 1500 (or 3000), address card: 1000, registration card: 4000 (or 8000), driving licence: 4000, tax card: 2200, tax card: 2200. The fee is covered by a 2200 HUF stamp. The county health insurance fund also had to pay HUF 2200 for issuing a lost or damaged tax card (BEOL, 2007).

But those who lose their documents do not only have to face financial costs. In big cities, queues run out by mid-morning, so they can wait hours to get in line and submit their claim. This is why many people go to smaller towns to do their business there, at even greater expense. 83.1% of the respondents to my questionnaire rarely leave their files, 12.2% once or twice a year and 4.7% often. This suggests that a large proportion of people have already gone through the lengthy process of applying for a new document, and have lost considerable amounts of money and time in the process, instead of doing other more useful activities. So, with my app, most people would save time, money and energy, both for themselves and for the staff at the document offices.

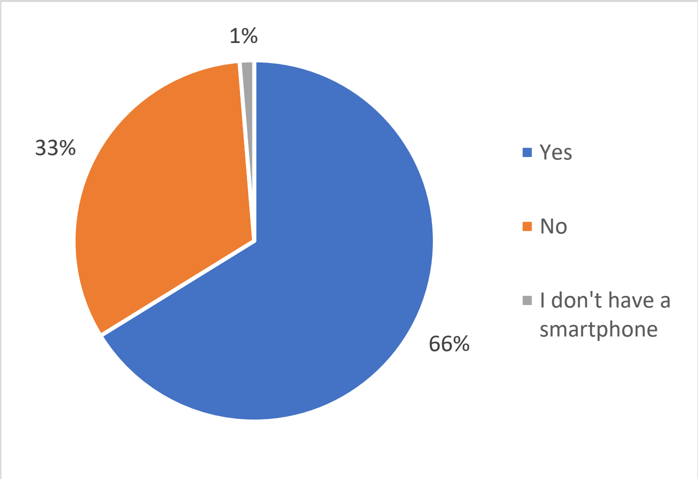

Figure 4
Do you use an online bank on your smartphone?

The fourth question is also related to the second one, as only people who already have a smartphone and have downloaded the netbank app could answer yes to this question. (Magyar Nemzeti Bank, 2014) The netbanks have roughly the same functions, they can be used for general operations: transfers, deposits, bank card operations, investments (securities), group direct debit orders, all kinds of information retrieval, search from different aspects, etc... 66.2% of the respondents to my questionnaire trust the banks' applications and provide the data they need to manage their money. However, 32.5% of respondents do not use a netbank, so it can be assumed that they either do not have a bank card at all or are simply reluctant to entrust their data and money to an app or bank. To protect their applications, banks are constantly improving their services and building multi-layered protection systems, a basic requirement for electronic payment security. They also provide their customers with a range of advice to keep their data secure. It is worth following these tips to avoid phishing, viruses and data copying. My application also takes its cue from the e-banking security system for data protection, storage and management. My assumption is that anyone who does not entrust their personal data or money to the e-banking system will not entrust it to my application either, because there they will have to decide not only about sharing their account data, but also about the information and data needed to store their personal documents. Of course, this does not exclude the possibility that they will still try my application to make their lives easier and faster and to prevent damage, but I would give them a lower probability compared to those who have already entrusted their data to the e-banking system.

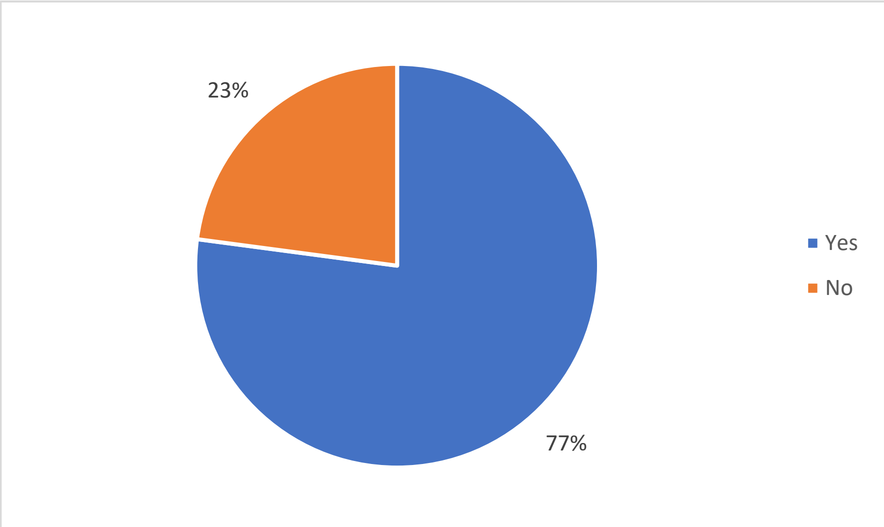

Figure 5

Would you be willing to trust an app that stores your personal documents?

The fifth question of my questionnaire is related to the fourth question, as I mentioned above that a small percentage of users do not trust their e-banking system with their data. My fifth question shows, however, that a higher percentage of respondents would entrust their personal data to an application than to their e-banking system. 77.1% of my respondents would trust an application to store their personal documents, which goes back to my third question, as it also suggests that they would rather entrust their data to an application for ease of use and loss prevention than lose it, followed by a long wait and financial loss. A negative answer of 22.9% is the expected result. As technology evolves, with the advent of online applications, we must expect a layer of people who will be left behind and will not follow the innovations. For them, the traditional physical filing system will be the most reliable, as many of them, and I am thinking here of the older generation, cannot imagine that an app can take care of their personal documents as securely as they themselves have kept them over the years. All in all, the (rounded) 77-23 ratio is very favourable for the creation of a new app and shows that there is a demand for it, that it would be worth investing money in an innovation that is the first in the world to be able to store and keep safe the personal documents and data of downloaders and users.

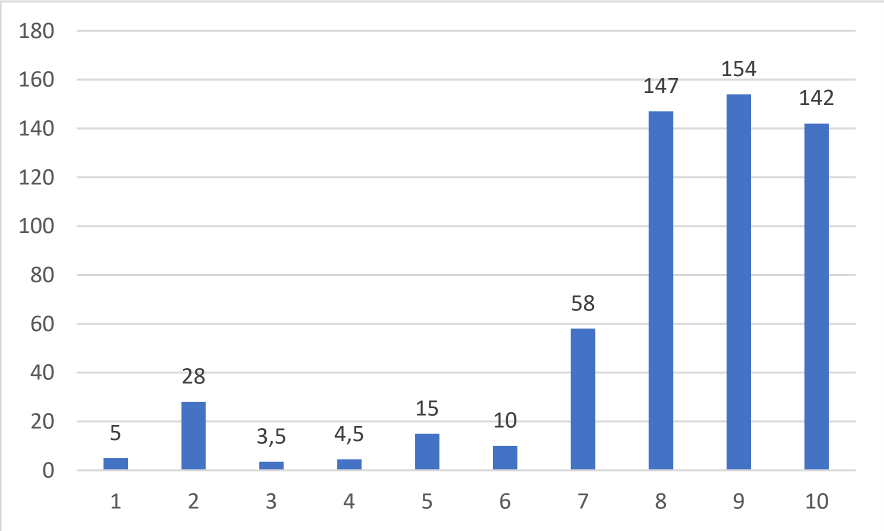

Figure 6

On a scale of 1 to 10, how likely would you be to download the app from a trusted, government-controlled site?

With the sixth question of my questionnaire, I specifically ask about people's willingness to download the app, but only if it is under continuous control on a platform under continuous control by the government (in Hungary: magyarorszag.hu). In today's modern world, many people have a client portal and do their business (for example: their tax returns) through it. Nowadays, this is not only available from a computer, but an application called OkmányApp (magyarorszag.hu, 2014) has been developed, which can be downloaded to your Android or IOS phone. This application has not yet gained popularity, but more and more people are using it for administrative purposes. It can also be downloaded from a platform constantly monitored by the government (magyarorszag.hu).

In the results of my questionnaire, I have only shown separately on the chart the numbers that appear under the outlier charts, as the primary downloaders would be these customers. On a scale of 10, the number of 7,8,9,10 scorers rose above the other scattered results. 58 out of 669 completions gave a score of 7. This data indicates to me that they will be the ones who will wait for others to try the app and if they hear good reviews about it, they will be willing to download and use it. But it's also possible that they might not like it and find it more complicated, so they might not be sure to download it. Out of 669 completions, a further 147 respondents gave 8 points. This number gives a high probability that they would download the app if they liked its use. A score of 9 was given by 154 respondents, which is the highest score in the last question of the questionnaire. These prospective users are open to change and would be willing to trust and use such an application. 142 out of 669 gave a score of 10, which is also not a small number, and they are the ones who see the greatest value in the app, being 100% sure that they would download and use it. They are confident in technology and new developments, they already have a number of apps that have given them a positive experience, so it is easier for them to imagine adding one of these apps to their list to make their everyday life even easier. As with any product, there are those who are positive about it and those who are either wary of it or, based on previous negative experiences, are afraid to take the plunge again, no longer trusting the developments in IT software protection. It may be a negative experience for Hungarians, as they have lost their valuables many times in our history, so it is obvious that they feel safest if they store their personal documents and therefore their data themselves, rather than an application. The Invalid Response Chart columns usually contain completions where not only a number was written in the fill-in box, but also text, and so the program could not sort them into the same column as the other results. Such texts were for example: ten, seven, not sure, would download etc.

Conclusions

In summary, the data contributors see a rationale for creating such an application. The young people of Generation Z are born into the continuous technological development and are willing to use further innovations that make their lives easier and faster. 98.3% of respondents have a smartphone, which they see as more than a secondary device, and more and more of them use it for personal transactions. The majority of my respondents rarely or twice a year leave their documents behind, resulting in long waits and financial loss. 66.6% of my respondents trust banks' apps, entrusting them with their data and money. The 77-23 ratio shows that there would be a demand, they would trust an application that stores their personal documents and data, preventing loss of time and money. Out of the 669 respondents, 501 gave a 7,8,9,10 on a probability scale of 1-10 that they would download the application if it was available for download from a platform controlled by the government (e.g.: magyarorszag.hu).

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Project management maturity in a highly innovative and technologically intense context

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Abstract: Project management maturity can be of utmost importance for companies since their project management process can be improved to a great extent. An effective and efficient project management process can be the key to survival and/or achieving competitive advantage (c.f. Cleland, 1994; Deutsch et al., 2020). Researchers were focusing on identifying the best-suited models (see e.g. Cooke-Davies – Arzymanov, 2003; Kerzner, 2019), but the majority of these models do not consider the specialties and the nature of the different industries. Thus, the aim of this paper is to define a project management maturity approach based on these models, which consider the highly innovative and technologically intense context.

Keywords: project management; project management maturity, innovative project management, innovative maturity models

1 Introduction

1.1 Project and project management

Projects can be considered as unique tasks, temporary organizations, and strategic building blocks (Görög, 2013; Shenhar – Dvir, 2007; Project Management Institute, 1996; 2017; 2021). Considering this, the definition of Fekete and Dobreff (2003, p. 9.) for projects can be appropriate, and sounds as follows:

"…we consider those tasks as projects that are:

- well-defined and help to achieve significant (strategic) goals,
- require the integration of many organizations due to the demand for complex professional knowledge,
- not to be organized into the activities of those departments that operate based on the classic responsibility limitations,
- finished in a well-defined time frame,
- operating in-between properly set budget boundaries,
- unique and novel, because projects are always risky
- requiring dynamic fulfillment (conditions can change throughout the processes)."

Considering these definitions, projects are implemented in the course of a well-defined process consisting of certain phases, activities, and tasks. Project Management Institute (2017) identifies four phases besides the pre-project phase:

- initiation,
- planning,
- execution,
- closing.

Although agile project management methodology changed the order and content of these processes to some/great extent (see e.g Klimkó, 2014; Wysocki, 2019), the integration of planning, execution (including control), and acceptance are valid in any type of project (see e.g. Blaskovics, 2014).

Parallel with the process of the projects, authors also focus on identifying those circumstances which might have an impact on the project process or projects in general, and in this way, they can enhance it. The list of factors can be considered to be abundant, some of them are focusing on the competencies and tasks required to manage the project effectively (see e.g. Blaskovics, 2014; Fortune – White, 2006; Horváth, 2018; Fekete, 2020), some of them on the macroeconomic environment (see e.g. Fortune – White, 2006), and some on the organizational features (see e.g. Görög, 2013; Kerzner, 2019). The latter encapsulates those elements which can help project managers (and other stakeholders) to increase the efficiency of project management by means of for example standardising the processes, and tasks or providing the required education. The effective and efficient project management office, availability of resources, well-defined, stable, balanced business case, and project management maturity can be such factors (see e.g. Berlinger – Váradi, 2015; Friesz – Muratov-Szabó – Prepuk – Váradi, 2021; Hamza et al., 2022; Garai, Szemere – Csiszárik-Kocsir, 2022; Görög, 2013). Authors also pointed out that, one critical success factor can have an impact on other factors as well, thus increasing directly and indirectly the chance of achieving project success (see e.g. Fortune – White, 2006; Judgev – Müller, 2005; Cserháti – Szabó, 2013). This further increases the need for managing such organisational factors.

1.2 Project management maturity

Project management maturity – according to Kerzner (2019) – encompasses those standard methodologies and the associated processes which help to achieve repeating project success. Numerous authors pointed out the importance of project management maturity, and its positive impact on project success (see e.g. Görög, 2013; Nenni – Arnone – Boccerdelli – Napolitano; Sanchez – Bonjour – Michelli – Monticolo, 2020). It is worth considering, maturity in itself cannot guarantee high-level project management (see e.g. Judgev – Thomas, 2002). However, the authors pointed out that, in order to achieve the highest effectiveness, there is a need to consider and manage project programs and portfolios as well (see e.g. Project Management Institute, 2017; Sebestyén, 2020; Verzuh, 2021). In this way, the scope of project management maturity can be fourfold:

- project focused,
- project program focused,
- project portfolio focused,
- the combination of these.

Gareis and Huemann (2007) highlighted, maturity can have a project team or project manager focus as well, but due to the competency orientation of this model, authors exclude this aspect.

In accordance with the importance of the maturity models, nowadays numerous exist (Görög, 2013). However, there are similarities and major differences between them. It is common that, maturity is measured in terms of a five-point-scale (c.f. Demir – Kocabaş, 2010; Pennypacker – Grant, 2003), and the centre of these models are usually those processes and elements which are strongly related to the management of the project. In this way, the supporting environment and the features related to the project result are usually neglected (c.f. Cooke-Davies – Arzymanov, 2003; Görög, 2013).

2 2 Elements of a maturity model capable of assessing companies in highly innovative and technologically intense contexts.

2.1 Description and analysis of maturity models

Görög (2013) identifies two kinds of maturity models, ladder-based and spider web-based models. The previous originated from the Capability Maturity Mode, in this way, they are using an evaluation scale similar to it, i.e. ranging from the ad hoc to az continuously improving process (see e.g. Souza – Gomes, 2015), and are usually relied on standards. Most of them are based on the ten knowledge areas of the PMBoK (see e.g. Kerzner, 2019), and which are as follows (Project Management Insitute, 2017):

- Project integration management.
- Project scope management.
- Project time management.
- Project cost management.
- Project quality management.
- Project resource management.
- Project communications management.
- Project risk management.

These are focusing on the project processes, and not only the organisational features are neglected, but the innovation content of the potential industry also. Spider web-based models provide a bigger degree of freedom, however, the definite processes representing project management,t, and evaluation could be more subjective (c.f. Görög, 2013). This also results that the comparison of the evaluations, or defining the potential next step can be complicated. However, these models could contain a supportive environment as well. Spider web-based models have more foci as mentioned above, but they usually integrate project, program, and portfolio levels (see e.g. Gareis – Huemann, 2007). In some cases, it is worth separating the foci in order to maximize the accuracy of evaluation (see e.g. Görög, 2013). Cooke-Davies and Arzymanov (2003) can be a good base for evaluation (see e.g. Blaskovics, 2021), their criteria are encapsulated in Figure 1:

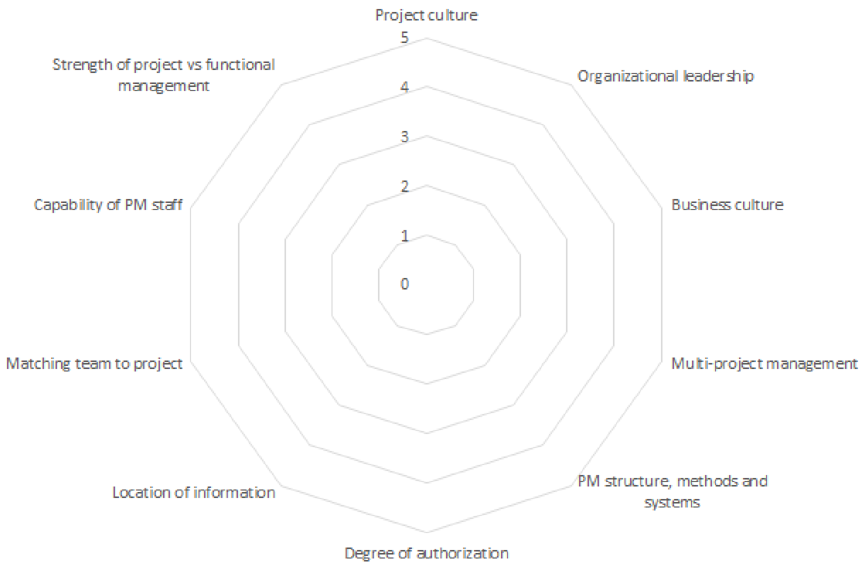

Figure 1
Spider web-based model of Cooke-Davies and Arzymanov

Source: Cooke-Davies – Arzymanoc (2003, pp. 474-475)

As can be seen, these integrate both organizational, and project management features. However, the product-related features are missing by the nature and the needs of this type of maturity model.

2.2 Potential elements of a maturity model in an innovative and technologically intense context

The need for a maturity model in a technologically intense environment is also inevitable (c.f. Görög, 2013), and the five-point scale is suitable for evaluation (see e.g. Shaygan – Daim, 2021). But the content of it can be different. Deutsch et al. (2020) highlight the need for considering the technological aspect in such circumstances. Moehrle et al. (2017) point out that there is to add elements to the model which represent the capability of making a comprehensive strategy (including the potential benefits of the product), and the ability to evaluate the potential market. Shaygan and Daim (2021) state that, there is a need to consider the ability to design and create the project result (in accordance with the aforementioned features). Thus, a potential evaluation model is encapsulated in the following figure:

Figure 2
The aspects of the maturity model focusing on the innovative and technologically intense context

Source: own compilation

Conclusions

Project management maturity models are vital for organizations initiating high numbers of projects. There are numerous maturity models with different format and focus, but the nature of the industry is usually neglected. Thus, in order to provide a comprehensive maturity model suitable for innovative and technological contexts, there is a need to consider elements beyond project management, such as the product and market features. In this way, the model should be enhanced by strategic and innovation-related features.

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Quality of evidence assessment of direct and indirect digital biomarkers

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Abstract: Wearable, portable, implanted, or ingestible digital devices are used to gather objective, quantifiable, physiological, and behavioral parameters known as digital biomarkers. Meta-analyses of digital biomarkers have increased in recent years, causing the need for evaluating evidence quality. This study evaluated the quality of direct and indirect digital biomarker evidence. Using the definition of digital biomarkers, a search of PubMed and the Cochrane Library was undertaken for articles published in 2019 and 2020. English meta-analyses comparing the clinical effects of therapies using digital biomarkers to those using non-digital biomarker-based interventions were considered. The GRADE technique was used to evaluate the quality of the evidence synthesis in the meta-analyses. The final analysis comprised 26 articles with 95 reported outcomes (26/95, 27.4% direct and 69/95, 72.6% indirect digital biomarkers). There was moderate quality evidence for most indirect digital biomarkers (64/69, 92.8%) and the quality of evidence was low for five outcomes (7.2%). Direct digital biomarkers generated 23.1% (6/26) high-quality evidence and 76.9% (20/26) moderate-quality evidence. Most direct and indirect digital biomarkers provided moderate quality evidence, however, direct biomarkers, because they influence physiological indicators, generate higher evidence.

Keywords: Digital biomarkers; wearable; implantable; quality of evidence; GRADE

1 Introduction

New sensor-based gadgets and wearables have revolutionized the way clinical data is measured, collected, and stored, which has far-reaching implications for medical judgment (Hutchison, 2019). In the medical world, digital biomarkers are a relatively recent notion. They are objective, quantitative, physiological and behavioral data gathered by portable, wearable, implantable, or digestible digital devices (Babrak et al., 2019). By remotely and continuously measuring reliable clinical data and facilitating continuous monitoring and evaluation, digital biomarkers can increase the diagnostic and therapeutic precision of the current healthcare system (Lipsmeier et al., 2018; Robb et al., 2016). Utilization of digital biomarkers outside of a clinical setting is feasible thanks to the availability of ingestible, implantable, and wearable devices and sensors that can collect data (Byrom et al., 2018).

Consistent with this concept, digital devices collect two different types of data: physiological data and behavioral data, commonly known as direct and indirect interventions. Direct interventions have a direct effect on the physiological characteristics of a patient group, whereas indirect interventions only measure and display the behavioral characteristics of a population (Meerwijk et al., 2016). For instance, the complex electronic devices known as implantable cardioverter defibrillators (ICDs) are used to detect and treat cardiac arrhythmias (Mahdi Abid et al., 2022). The ability of these devices to provide demand-controlled pacing makes it conceivable that they can be used as both emergency defibrillators and backup pacemakers. They continuously monitor the patients' heart rhythm. When the heart rhythm gets out of balance, the pulse generator sends out some shocks to regulate the balance of the heartbeat. In fact, they directly influence and change the physiological data of the patients (Ammannaya, 2020), while physical activity trackers only measure and monitor people's behavioral data; they do not directly influence or change users' physiological characteristics (Shin et al., 2019).

It is getting more challenging for doctors to review and assess all available data in a medical sector because of the steady stream of new medical research being published. In evidence-based medicine, the meta-analysis is considered being the "gold standard" since it provides a more accurate and less biased evaluation of a clinical condition (Lee, 2018). Because of its superiority over subjective judgment as a standard approach for summarizing the findings of several studies, meta-analysis has grown in prominence as a research tool in recent years. While meta-analyses offer significant advantages for scientific research in medicine, they also have some disadvantages. The validity of a meta-analysis can be questioned for several reasons(Lee, 2018). To evaluate the quality of meta-analysis findings, there is a reliable instrument called GRADE (quality of evidence). Thus, it is crucial that all measures be taken to improve the quality of evidence, for which high-quality evidence is necessary. GRADE Quality of evidence (QOE) is defined by the Grading of Recommendations Assessment, Development, and Evaluation Working Group as the level of assurance that the stated impact estimates are reliable and sufficiently competent to warrant the suggestion in question (Guyatt, Oxman, Kunz, et al., 2008). Recently, there has been a rise in the number of published meta-analyses and systematic reviews of digital biomarkers. However, direct and indirect digital biomarkers must be compared to determine which produces the higher evidence. Therefore, this research aims to evaluate the quality of evidence produced by direct and indirect digital biomarkers to determine which form of digital biomarkers create the highest quality evidence.

2 Methods

Included were meta-analyses of systematic reviews that compared the clinical efficacy of digital biomarker-based interventions to that of non-digital biomarker-based alternatives. In particular, we looked at meta-analyses that aggregated data from DBM research in human populations across all diseases, ages, and sexes. Consideration was given to all initiatives that use DBMs for diagnosing patients, monitoring results, or affecting a therapeutic intervention. As long as the control group didn't use DBMs for the aforementioned goals, the choice of comparator was unrestricted. This review particularly omitted systematic studies that assessed the measurement characteristics or other technical or usage features of DBMs that did not result in a change in the health status of the participants. Full-text publications published in English between January 1, 2019, and December 31, 2020, in peer-reviewed journals were examined. Between 2019 and 2020, we conducted a targeted literature search in PubMed and the Cochrane Library. Also, we searched through the citations of related systematic reviews. The literature search included the terms "digital biomarker," "wearable," "implantable," "portable," and "digestible" in relation to digital biomarkers (Hossein Motahari-Nezhad et al., 2021). After deleting duplicates, the article titles/abstracts and full-texts were evaluated based on the inclusion criteria. After identifying the final qualifying meta-analyses, direct and indirect digital biomarkers were distinguished, as previously showed. Using the GRADE method, the strength of the evidence was evaluated for each outcome (Guyatt, Oxman, Vist, et al., 2008; Schünemann et al., 2013). According to the number of downgrades in each criterion, this tool rates the quality of the evidence as high, moderate, low, or very low, based on five separate factors, including risk of bias, inconsistency, imprecision, publication bias, and indirectness.

If seventy-five percent or more of the included studies matched the criteria for low risk of bias, no downgrading was given to the outcome. If less than 75% of the listed studies had a low risk of bias or if the risk of bias was not specified, a downgrade was given (Pollock et al., 2016). According to the stated heterogeneity for each outcome, inconsistency was evaluated. If the I^2 statistic was less or equal to 75%, there was no downgrade. If the I^2 value exceeded 75% or was not reported, a downgrading was applied. If just one research was considered for the outcome, there was no downgrading (Pollock et al., 2016). The imprecision was determined by analyzing the sample size (Zhang et al., 2019). The weight of the evidence was not downgraded if the combined sample size surpassed 2,000(Schünemann et al., 2013). If the total sample size was less than 200, we degraded the rating by one point. Using STATA 16, we examined the optimum information size (OIS) for sample sizes between 200 and 2000 using power analysis. If the result of the power analysis exceeded the stated number of participants in the outcome, one downgrade was given; otherwise, no downgrade was implemented. Regarding publication bias, the trim and fill technique was used (Duval & Tweedie, 2000). Differences between the included studies and the meta-analysis's question were considered when determining indirectness for each outcome.

3 Results

There were 389 studies found while searching PubMed and the Cochrane Library. 375 studies met the criteria for title/abstract screening after removing duplicates. Full-text screening included 199 studies. In all, 175 full-text articles were disqualified because they did not meet the criterion. Two more systematic reviews that satisfied the inclusion criteria were discovered by checking the reference lists of the eligible papers. Therefore, 26 systematic reviews were accounted for in the results. There were a total of 26 reviews included for this study, including 95 outcomes in the reviews, with five of them being considered to be of low quality (5%), eighty-four being considered being of moderate quality (89%), and six being considered to be of high quality (6%). Most outcomes had some risk of bias (89/95, 94%), followed by inconsistency (27/95, 28%), and imprecision (27/95, 28%), when compared to the GRADE criteria. Only two out of ninety-five outcomes (2%) showed evidence of publication bias. However, the outcomes did demonstrate any indirectness. Furthermore, 70 outcomes (74% of total) did not have publication bias checked because there were not enough studies meeting the inclusion criteria. There were additional three outcomes (3%) that could not be checked for inconsistency since just one research met the inclusion criteria.

It was found that most outcomes (69/95, 73%) were identified as indirect digital biomarkers, whereas only 26/95 (27%), were categorized as direct digital biomarkers. The majority of indirect digital biomarkers were classified as having moderate evidence quality (64/69, 93%), whereas the number of indirect digital biomarkers with low evidence quality was found to be 5 (7%). No indirect digital biomarkers with high-quality evidence were identified. Regarding direct digital biomarkers, most of the evidence was of moderate quality (20/26, 77%), whereas no direct digital biomarkers were classified as having evidence of low quality. In addition, 23% (6/26) of direct digital biomarkers were classified as having high-quality evidence.

4 Discussion

In this research, direct and indirect digital biomarkers' evidence quality was evaluated using the GRADE instrument. A thorough search was undertaken in PubMed and the Cochrane Library electronic databases to identify systematic reviews, including meta-analyses evaluating the influence of digital biomarkers on health outcomes relative to non-digital biomarker comparators. Finally, 26 systematic reviews with 95 outcomes were discovered and included. No indirect digital biomarkers with high evidence quality were discovered, however, 23% of direct digital biomarkers were evaluated as having high evidence quality. The results suggested that the influence of an implantable cardiac defibrillator as a direct digital biomarker on all-cause mortality was validated by high-quality data for ICDs implanted both before and after CF-LVAD placement. In addition, based on the analysis, we have a very high level of confidence on the influence that the implantable cardiac defibrillator as a direct digital biomarker has on the likelihood of receiving a transplant, the rate at which atrial arrhythmias are detected, and the occurrence of strokes. The influence of indirect digital biomarkers, such as wearable activity monitors, on steps in chronic pulmonary disease, as well as steps in obese and sedentary older individuals, was assessed to have low-quality evidence. According to the findings, direct digital biomarkers provide evidence of a higher quality than indirect digital biomarkers. Physical activity trackers, the most common form of indirect digital biomarkers (H Motahari-Nezhad et al., 2022), are extensively used by the general population (Macridis et al., 2018), particularly to increase physical activity levels (Bentley et al., 2020). Over the course of the last decade, there has been a substantial growth in the market for wearable activity trackers all over the globe. Between the years 2014 and 2020, the number of shipments of wearable activity trackers around the globe skyrocketed (Statista, 2022). Despite their initial promise, there is substantial skepticism in the scientific, medical, and public communities over the efficacy of wearable activity monitors (Lieberman, 2015). Indirect digital biomarkers have a large market and user base, and as a result, they must deliver more reliable level of evidence; otherwise, their usefulness should be questioned (Ferguson et al., 2022). To ensure the success of digital health technologies in improving the health of its users, it is essential that managers, engineers, and healthcare experts and physicians work together to develop these tools (Gondi et al., 2022).

Conclusion

In general, the evidence provided by digital biomarkers is of a moderate quality. When comparing the evidence provided by direct and indirect digital biomarkers, the findings suggest that direct digital biomarkers give a greater evidence.

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