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Contents

Research Articles

Research Articles

INNOVATION PERFORMANCE OF CZECH AND FINNISH MANUFACTURING ENTERPRISES AND THEIR POSITION IN THE EU

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Abstract

The aim of this article is to assess the innovation performance of innovative small, medium-sized, and large enterprises operating in the manufacturing industry in two European countries – the Czech Republic (CR) and Finland, and to determine their position within the EU based on a comparison with average values of created Fictitious EU Country (FEUC). The FEUC includes the indicators and population of the EU member countries whose data were available. The performed analysis is based on the use of selected key performance indicators (related mainly to inputs that are expected to contribute to innovations) evaluating the enterprises´ innovation performance. The conducted research tries to identify the most significant drivers of innovation performance with regard to the size group of enterprises. Moreover, the achieved results are further compared within the innovation environment of the CR and Finland as well as the EU as a whole. It is worth highlighting the innovation resources of Finnish mainly small but partly also medium-sized enterprises, which in some monitored indicators occupy a much more significant share than in the case of the CR. This fact can indicate a particular signal, which size group of enterprises should become a target group of public support aiming to boost innovation performance.

Keywords

Innovation; Innovation performance; Manufacturing industry; Czech Republic; Finland; EU.

Introduction

Innovation is one of the busiest words today. In the macroeconomic climate, e.g., Feldman [1] considers innovations essential for economic growth and development. Innovation's role as a key driver of economic growth has been confirmed by multiple studies following early seminal works of economists such as Schumpeter [2] and, more recently, Arrow [3] or Aghion and Howitt [4].

Moreover, at microeconomic level, many enterprises are placing increasing emphasis on their innovation activities which are then reflected in their innovation performance. That is why the authors decided to focus on the assessment of the innovation performance. This issue will be analyzed on three size groups of manufacturing enterprises using selected key performance indicators (KPIs) that will be further compared in an international context.

Previous research by Blaschke and Demel [5] dealing with the degree of enterprises' involvement in innovation activities within the Liberec Region did not confirm that the ownership (domestic nor foreign) plays a crucial role in terms of innovation performance. Also, it cannot be clearly stated that important innovation impulses and movements occur mainly in large foreign-owned enterprises that are presented in the region. This ambiguous result initiated new research dealing with innovation performance in enterprises of various sizes (small, medium-sized, and large). The key concepts in this research will be the innovative activity of the enterprise, innovation performance, and the size of the enterprise (with respect to the number of employees). The comparison will be made between the CR, Finland, and the EU benchmark. This article is based on and further develops a conference paper of the authors [6].

According to Guan and Zuo [7] a large amount of literature, both theoretical and empirical, confirms the important role that technological change plays in achieving sustainable economic growth. In recent years, the world, especially Western authors, have argued that the real drivers of major innovation movements are not large but medium-sized or even small enterprises, even though they have more limited (not only) financial resources. Klewitz and Hansen [8] summarize the research of others into the assertion that innovative outputs can be identified in small and medium-sized enterprises (SMEs), especially at the level of product, process, and organizational innovations, and that these enterprises are the main contributors to sustainable development of national economies. In smaller countries, they have even become the economic backbone, as exemplified by the innovation results of SMEs in Finland [9].

According to Monhen et al. [10] industrial countries have reached a stage of economic development that many describe as 'the knowledge-based economy'. Also, as Tödtling and Kaufmann [11] noted more than twenty years ago, innovation is taking place interactively between firms and knowledge providers and is increasingly supported by policy institutions, technology transfer agencies, and education. It is apparent that the universities of the twenty-first century, which are the engines of the knowledge-based economy, have a unique opportunity to gain substantial funding from the industry that is suffering from the insufficient number of experts and research in the industry to support innovation performance [12].

The OECD [13] considers as innovation activities all development, financial, and business activities carried out by an enterprise that aims to lead to the creation of innovations. According to Walcher and Wöhrl [14] or Birchall et al. [15], innovation is one of the most important strategic tools to help an enterprise gain a significant competitive advantage in a volatile and competitive economic environment.

Sawang [16] points out enterprises often assume that investing in innovation will automatically lead to increased productivity, but investment alone does not guarantee its successful implementation. However, the successful implementation of innovations is associated with realistic goal setting, proper planning of individual activities, constant monitoring, and measurement of results [17]. The sum of these enterprise activities enables timely response to problems and corrective measures [18].

In order to correctly manage innovations, it is essential to monitor innovation performance adequately. Birchall et al. [15] define innovation performance as the development of the overall innovative capabilities of the enterprise. According to Ahmad et al. [19], innovation performance includes using new ideas or creativity to lead to innovative performance, which leads to the improvement of existing products (services) or to increased efficiency of current procedures and processes.

Almeida and Sequeira [20] view innovation performance as the successes and results of established innovations. In the same spirit, Dima [21] also perceives innovation performance

as outputs – i.e., outcomes and benefits that the enterprise derives from a successful innovation process. A more comprehensive view of innovation performance is offered, for example, by Thomas and Murphy [22], who describe it as the enterprise's ability to transform innovative inputs into marketable and successful outputs.

Bloch [23] considers the share of innovative enterprises, i.e., enterprises that have introduced product or process innovations, on the total number of enterprises in a given economy to be a very widely used simple KPI related to monitoring or measuring innovation performance. However, according to Arundel [24], this KPI provides an incomplete picture of the innovative performance of an enterprise, a specific sector or the country as a whole, and can be misleading in international comparisons. That is why more detailed indicators need to be examined at the microeconomic level in terms of the research goal. However, Amaratunga et al. [25] argues that there is no such indicator that would be able to capture innovation performance comprehensively. Therefore, it is necessary to use more indicators (relevant inputs and outputs). A well-arranged overview of 82 indicators and factors evaluating innovations can be found, e.g., in Dziallas and Blind [26].

1 Methodology

Within this research, the innovation performance of enterprises operating in the manufacturing industry was assessed and compared not only among individual size groups of the enterprises (small, medium-sized, and large ones) but also within the international environment between two European countries – the CR and Finland. Moreover, the values of the indicators related to the innovation performance of the analyzed countries were compared with the average values of EU member countries to determine their position in the field of innovations within the EU.

The manufacturing industry covers a wide range of activities listed in section „C" of the European Industry-standard classification system NACE (Nomenclature of Economic Activities) designed by the EU. It contains the physical or chemical transformation of (raw) materials (i.e., products of agriculture, forestry, fishing, mining, or quarrying and products of other manufacturing activities), substances, or components [27].

The authors decided to analyze and compare the innovation performance of the Czech enterprises with Finland and the EU because Finland is today ranked among the most innovative economies in the world and claims the leadership in creativeness, innovations and sustainability [28], [29], [30]. On the other hand, the CR is a small open landlocked economy in the middle of Europe appreciably dependent on the manufacturing industry.

1.1 Set of Enterprises

The enterprises of the manufacturing industry in the CR and Finland were divided into three categories according to the number of employees: small (10–49), medium-sized (50–249), and large (250 and more employees) ones. These categories reflect the definition of small and medium-sized enterprises based on the European Commission [31].

Internationality was not considered in this research, i.e., each category includes both domestic and foreign-controlled enterprises. Based on the presented views, the innovation performance was explored from two perspectives – inputs (resources) that are expected to contribute to innovations and outputs of innovation activities. Therefore, four key performance indicators (KPIs) related to finance were set. They are listed in Tab. 1 – three of them related to inputs (KPI 1–3) and one representing innovation outputs (KPI 4). Using these indicators, the innovation performance of enterprises was evaluated.

Tab. 1: *Overview of monitored key performance indicators*

No.	In/Output	Description
KPI 1	Input	Expenditure on innovation (including R&D)
KPI 2	Input	Expenditure on R&D performed in-house
KPI 3	Input	Expenditure on R&D contracted out
KPI 4	Output	Turnover from new or significantly improved products

Source: Own

The research was focused on innovative and product innovative enterprises. According to Eurostat [13], an enterprise with successfully implemented product or process innovation in the observed period is considered innovative. Product innovative enterprises, then, are only the ones with product innovation (regardless of any other type of innovation).

1.2 Source of Data

The research used publicly available aggregated data from the internal database of Eurostat [32] that collects the data on science, technology, and innovation within the Community Innovation Survey. These data are primarily collected by individual national statistical offices and have also been verified with these sources. The data outputs will be presented in more detail in the next chapter of this article.

1.3 Comparison

The manufacturing industry environment and innovations stemming from this sector of economy as well as values of aforementioned KPIs were firstly compared between the CR and Finland. Besides the KPIs, also number of innovative enterprises in the manufacturing industry was compared.

Moreover, the values of the CR and Finland were then further compared with the benchmark of the EU. When analyzing the number of manufacturing innovative and product innovative enterprises, the benchmark was set as the average value of the EU member countries, see formula 1. This EU benchmark was obtained as the sum of values of individual indicators reported for every single member country of the EU (reported by Eurostat) divided by the total number of EU countries.

$$EU\ (27) = \frac{Number\ of\ enterprises\ in\ EU\ member\ countries}{Number\ of\ EU\ member\ countries} \tag{1}$$

Since the KPIs are affected by the number of enterprises which is dependent, among other factors, on the size of the economy – it is possible to expect that the bigger the economy (country) is, the more enterprises can be found there, the authors decided to take into consideration the population of each country. Therefore, the Finnish values of KPIs were transformed to eliminate the different population of each country. In other words, the values of Finland were recalculated to the population of the CR, see formula 2. By performing this operation, it was found out what values would Finland achieved if it had the same population as the CR maintaining the same density of the indicator.

$$KPI_{FIN-adjusted} = KPI_{FIN}\frac{Population_{CZE}}{Population_{FIN}} \tag{2}$$

The same approach was applied to the comparison with the EU average where the population of the EU includes population of all member countries for which the data related to the

analyzed KPIs were available, see formula 3. Therefore, a Fictitious European Union Country (FEUC), which includes the population of most EU member countries, was set. Countries whose population was not taken into account are mentioned in research limitations.

$$KPI_{FEUC} = KPI_{FEUC} \frac{Population_{CZE}}{Population_{FEUC}} \quad (3)$$

1.4 Research Limitations

Due to the unavailability of data at a lower level, all KPIs were monitored on the set of all enterprises operating in the manufacturing industry (i.e., both innovative and non-innovative enterprises are included). However, the authors believe that innovative enterprises make up the majority share by the logic of the matter. For non-innovative enterprises (i.e., enterprises that did not implement any innovation), it can be assumed that they invest in innovations or R&D only in sporadic cases. The same is true in outputs – non-innovative enterprises logically cannot have revenues from innovated (i.e., new or significantly improved) products.

Tab. 2 presents countries that were excluded from the research due to the lack of data – data on the analysed KPIs were not available for the mentioned size group of enterprises, so these countries were left out from constructing the EU benchmark as well as their population were not taken into account.

Tab. 2: *Countries excluded from constructing the EU benchmark*

KPI 1			**KPI 2**		
Small	**Medium**	**Large**	**Small**	**Medium**	**Large**
Luxembourg	Luxembourg	Netherlands	Bulgaria	Bulgaria	Bulgaria
Netherlands	Netherlands		Luxembourg	Luxembourg	Luxembourg
			Netherlands	Netherlands	Netherlands
				Slovenia	Slovenia
KPI 3			**KPI 4**		
Small	**Medium**	**Large**	**Small**	**Medium**	**Large**
Bulgaria	Bulgaria	Bulgaria	Luxembourg	Bulgaria	Bulgaria
Luxembourg	Luxembourg	Netherlands	Netherlands	Luxembourg	Netherlands
Netherlands	Netherlands	Slovenia		Netherlands	
Romania	Romania				
	Slovenia				

Source: Own

Although all data used in this research come from 2018 when the United Kingdom (UK) was a member country of the EU, it was not taken into account in the calculations as well – the EU values were obtained regardless of the UK. If all the data were available, the benchmark would have included 27 countries.

2 Results of Research

In this part of the article, the results of the empirical research are presented and commented in more detail. This chapter was divided into two sections – first part includes the comparison between the CR and Finland, following by the second part in which the comparison with the EU was made.

2.1 Czech Republic vs. Finland

In this part, basic situational overview of the manufacturing industry environment was analyzed – number of enterprises in the Czech Republic (CZE) and Finland (FIN) was compared. The data in Tab. 3 are presented at three levels – total number of enterprises, innovative enterprises, and product innovative enterprises.

Tab. 3: *Overview of manufacturing industry*

Size	Total number of enterprises				Innovative enterprises				Product innovative enterprises			
	CZE	%	FIN	%	CZE	%	FIN	%	CZE	%	FIN	%
S	8,252	68	2,353	70	3,611	58	1,399	63	1,984	53	775	56
M	3,054	25	816	24	1,909	31	657	29	1,197	32	454	33
L	888	7	192	6	691	11	179	8	536	14	160	12
∑	12,194	100	3,361	100	6,211	100	2,235	100	3,717	100	1,389	100

Source: Own based on [32]

Looking at the number of innovative enterprises operating in the manufacturing industry, the data show that compared to Finland, the CR has a certain quantitative advantage – there are almost three times more innovative enterprises – the most striking difference between the two countries is the representation of large enterprises – the CR having almost four times more than Finland.

Finland (with half the population of the CR) has fewer enterprises in the manufacturing industry (3.6 times). However, both countries have similar parameters for their division into large, medium-sized, and small ones. There are 4.6 times more large Czech enterprises, 3.7 times more medium-sized enterprises, and 3.3 times more small ones than in the case of Finland. Therefore, it can be stated that the manufacturing industry is more important for the CR and its economy than for Finland. If we switch to innovative enterprises, it is 2.7 times more for all these size groups of enterprises (3.8 times more large enterprises; 2.9 times more medium-sized enterprises, and only 2.6 more small ones). And finally, for product innovative enterprises, there are 2.7 times more (all sized groups), 3.4 times (large), 2.6 times more (medium-sized and small) in the CR than in Finland. Overall, it can be said that a significant part of especially large Czech enterprises, which are often foreign-owned, can be considered innovative or even product innovative.

Tab. 4 presents the monitored KPIs. Based on the performed literature research, the monitored KPIs consist of three indicators related to sources of innovation performance (inputs) and one which includes outputs of innovation activities. KPI 1 – expenditure on innovation – includes, in addition to R&D expenditures both performed in-house and contracted out, also other spending related to the successful implementation of innovation – e.g., acquisition of buildings, machinery, equipment, software, fees related to intellectual property rights, labour costs of internal and external employees involved in the innovation process, etc. KPI 2 and KPI 3 then focus exclusively on the area of R&D financing which is monitored internally within the enterprise (KPI 2), but also externally in cooperation with other partners such as suppliers, universities, commercial labs, government, public or private research institutes and others (KPI 3). KPI 4 deals with sales, either from new or improved products. This indicates the turnover of product innovative enterprises.

Tab. 4: *Key performance indicators in mil. EUR (2018)*

Size	KPI 1				KPI 2			
	Input				Input			
	Expenditure on innovation (including R&D)				Expenditure on R&D performed in-house			
	CZE	%	FIN	%	CZE	%	FIN	%
S	342.1	8	332.5	9	68.7	8	183.9	7
M	1,008.4	24	696.8	19	185.9	21	398.9	14
L	2,839.1	68	2,677.0	72	627.9	71	2,169.8	79
∑	4,189.5	100	3,706.3	100	882.4	100	2,752.6	100
Size	**KPI 3**				**KPI 4**			
	Input				**Output**			
	Expenditure on R&D contracted out				**Turnover from new or improved products**			
	CZE	**%**	**FIN**	**%**	**CZE**	**%**	**FIN**	**%**
S	15.1	3	48.8	14	1,289.1	4	1,659.6	8
M	76.4	16	147.4	42	4,007.6	12	3,248.5	16
L	391.5	81	158.1	45	27,037	84	15,193	76
∑	483.0	100	354.3	100	33,333	100	20,102	100

Source: Own based on [32]

At the first sight, a significant difference can be seen in the financial resources that enterprises invest in innovation activities. In absolute terms, the amounts are quite balanced. However, considering the number of enterprises (see Tab. 3), it is clear that Finnish enterprises have significantly more resources which are invested into R&D. Interestingly, large Finnish enterprises make extensive use of their own resources.

For KPI 1, the CR reports only 1.1 times higher expenditures of all enterprises on innovation including R&D. Compared to Finland, large and small Czech enterprises show essentially the same level of expenditures, medium-sized Czech enterprises 1.4 times higher than the Finnish ones. If we again consider the different number of enterprises (see Tab. 3), the Finnish invested resources are up to three times higher.

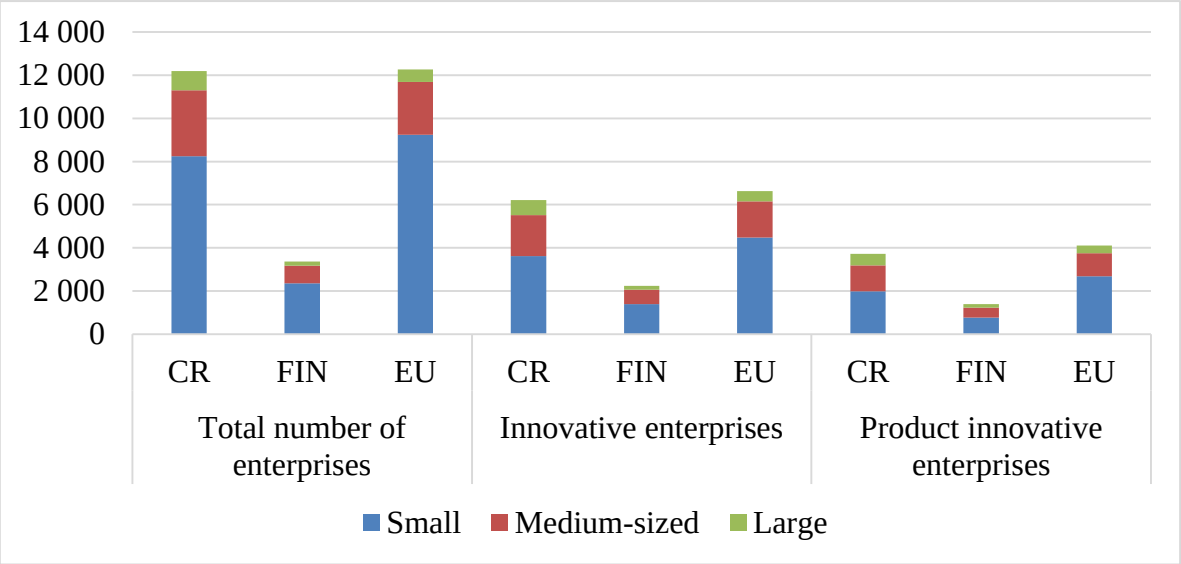
From their own resources (KPI 2), all Finnish enterprises invest three times more in R&D than the Czech ones. For large enterprises, it is almost 3.5 times; for medium-sized enterprises, it is more than twice; for small enterprises, it is 2.7 times more. The contribution of large Finnish enterprises to innovation "from their own resources" is very significant here.

From external sources (KPI 3), all monitored Finnish enterprises invest 1.2 times less than the Czech ones, 2.5 times less for large enterprises, 1.9 more for medium-sized enterprises, and 3.2 times more for the small ones. It is obvious that in Finland, external support is mainly targeted at small enterprises.

KPI 4: The CR has 1.6 times higher turnover from innovated products than Finland. For large enterprises, it is 1.8 times higher; for medium-sized enterprises, 1.2 times; for small enterprises, there is 1.3 times higher turnover in favour of Finnish enterprises. It means that especially small Finnish enterprises can monetize their innovative products significantly better than the Czech small enterprises.

2.2 Czech Republic and Finland in the EU

In this part, the results of the Czech and Finnish manufacturing enterprises are further compared with the EU benchmark. Fig. 1 provides a comparison of the number of individual size groups of enterprises in the CR and Finland. However, this comparison is complemented by the EU benchmark to demonstrate the position of both countries within the EU.



Source: Own based on [32]

Fig. 1: *Number of enterprises in the manufacturing industry*

From Fig. 1, it is possible to conclude that the CR is much closer to the EU average regarding the absolute numbers – there are much fewer manufacturing enterprises in Finland. The CR is one of the most industrial countries in Europe – it is above the EU average in the case of both large and medium-sized enterprises. But the closer it goes to the innovative area, the smaller the difference between the CR and Finland is, especially in the groups of medium-sized enterprises. However, as far as the share of individual size groups is concerned, the situation is practically identical in all analyzed samples. It is necessary to emphasize the share of SMEs in the total number of manufacturing enterprises, which in the CR, Finland as well as the EU is around 90%. Carvalho and Yordanova [33] even state that SMEs represent the largest number of enterprises in the EU (99% of all registered enterprises) being the major source of economic growth [34], [35].

In Tab. 5 to Tab. 8 the Czech values of KPIs are compared with the Finnish ones as well with the EU benchmark. For comparison, and as a benchmark, a Fictitious European Union Country (FEUC) with an average population of the EU was created here, and adjusted KPI numbers were derived from EU-wide data. Moreover, the amount of EU member countries included in calculating the population of the FEUC (see the numbers in brackets) varies due to the lack of data on the analyzed KPIs in the given size group of enterprises.

Tab. 5: *Comparison of KPI 1 – Expenditure on innovation (including R&D)*

KPI 1	Country	Invested (mil. EUR)	Population (mil.)	Adjusted (mil. EUR)	%
Small	**CZE**	342	10.61	342	100 %
	FIN	333	5.51	640	187 %
	FEUC (25)	17,002	428.69	421	123 %
Medium	**CZE**	1,008	10.61	1,008	100 %
	FIN	697	5.51	1,341	133 %
	FEUC (25)	26,753	428.69	662	66 %
Large	**CZE**	2,839	10.61	2,839	100 %
	FIN	2,677	5.51	5,152	181 %
	FEUC (26)	199,232	429.29	4,924	173 %

Source: Own based on [32], [36]

For KPI 1 the figures for Finland, the CR, and the EU are relatively similar, although even here it is in favor of Finland.

This means that the total Expenditure on innovation (including R&D) is the largest in Finland at all companies, regardless of their size. CR is very close to the European average at small companies and is above it at medium-sized companies, which is quite surprising.

Tab. 6: *Comparison of KPI 2 – Expenditure on R&D performed in-house*

KPI 2	Country	Invested (mil. EUR)	Population (mil.)	Adjusted (mil. EUR)	%
Small	**CZE**	69	10.61	69	100 %
	FIN	184	5.51	354	515 %
	FEUC (24)	6,095	421.64	153	223 %
Medium	**CZE**	186	10.61	186	100 %
	FIN	399	5.51	768	413 %
	FEUC (23)	13,099	419.57	331	178 %
Large	**CZE**	628	10.61	628	100 %
	FIN	2,170	5.51	4,176	665 %
	FEUC (23)	111,523	419.57	2,820	449 %

Source: Own based on [32], [36]

For KPI 2 the difference between Finland, CR, and EU is much more significant. At medium-sized companies, the Expenditure on R&D performed in-house CR is close to the EU, at small companies it is less so, at large companies the differences are already abysmal. Finnish numbers are already several times higher. However, it should be borne in mind that the number of large companies in the Finnish manufacturing industry is relatively low.

Tab. 7: *Comparison of KPI 3 – Expenditure on R&D contracted out*

KPI 3	Country	Invested (mil. EUR)	Population (mil.)	Adjusted (mil. EUR)	%
Small	**CZE**	15	10.61	15	100 %
	FIN	76	5.51	147	974 %
	FEUC (23)	1,418	402.12	37	248 %
Medium	**CZE**	76	10.61	76	100 %
	FIN	147	5.51	284	371 %
	FEUC (22)	2,655	400.05	70	92 %
Large	**CZE**	392	10.61	392	100 %
	FIN	158	5.51	304	78 %
	FEUC (24)	29,856	421.64	751	192 %

Source: Own based on [32], [36]

For KPI 3 the largest difference between Finland and the CR is recorded, namely at small companies. This shows that Finnish small businesses are succeeding in raising significant funds from outside. At medium-sized Finnish companies, this also applies to a lesser extent, Czech companies are again above the imaginary European average in this indicator. On the contrary, it turned out at large companies, where both Finland (the lowest) and the CR show below-average values of the selected indicator.

Tab. 8: *Comparison of KPI 4 – Turnover from new or significantly improved products*

KPI 4	Country	Turnover (mil. EUR)	Population (mil.)	Adjusted (mil. EUR)	%
Small	**CZE**	1,289	10.61	1,289	100 %
	FIN	1,660	5.51	3,195	248 %
	FEUC (25)	77,183	428.69	1,910	148 %
Medium	**CZE**	4,008	10.61	4,008	100 %
	FIN	3,249	5.51	6,253	156 %
	FEUC (24)	159,735	421.64	4,020	100 %
Large	**CZE**	27,037	10.61	27,037	100 %
	FIN	15,193	5.51	29,239	108 %
	FEUC (25)	964,123	422.24	24,226	90 %

Source: Own based on [32], [36]

The Turnover from new or significantly improved products was chosen as the only one, but very crucial output KPI. Here, too, the value of the indicator is highest at small companies in Finland, and to a lesser extent at medium-sized companies. The values are very balanced at large companies, where both Finland and the CR are above the European average. The CR is below the European average at small companies for the selected indicator, the result is balanced at medium-sized companies.

Conclusion

The objective of this article was to assess the innovation performance of three size groups of innovative enterprises (small, medium-sized, large) operating in the manufacturing industry and compare it in an international environment among the Czech Republic and Finland, and then, due to the methodology described in the article, a derived European average.

Based on the performed analysis, it is impossible to unambiguously identify the size group of enterprises that is the essential carrier of innovation performance. However, considering the frequent claims about the limited resources of small and medium-sized enterprises, it is evident that their outputs, observed in this article, show in selected indicators at least comparable innovation performance of small, medium and large companies. This is especially obvious at Finnish small and medium-sized enterprises that show considerably higher innovation performance than Czech small enterprises.

Finnish small and medium-sized enterprises can draw external financial resources for their own innovation activities very well. The same model of public support use would probably be applicable in the Czech conditions as well – this may motivate further research of the authors. Still, it would mean a stronger involvement of other fundamental pillars of innovation activities, such as an adapted education system (especially higher education) and support of start-ups.

As far as the Czech Republic is concerned, it can be said that at small and medium-sized companies the values of indicators sometimes very significantly did not reach the Finnish values, while for large companies the opposite was the case. However, it should be taken into account here that there are only a few large companies in the Finnish manufacturing industry and most of the large companies in the Czech manufacturing industry are in foreign hands. In comparison with the European average, it can be said that the Czech Republic, for selected KPIs, oscillated around this average.

The identification and analysis of other indicators related to innovation activities and their development over time will be subject to further research of the authors. Moreover, the authors will focus more on the analysis of the relationship between selected innovation inputs and outputs trying to answer the research question if the higher amount of innovation inputs is reflected also in the amount of innovation outputs.

Literature

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INOVAČNÍ VÝKONNOST ČESKÝCH A FINSKÝCH VÝROBNÍCH SPOLEČNOSTÍ A JEJICH POSTAVENÍ V RÁMCI EU

Cílem tohoto článku je zhodnotit inovační výkonnost malých, středních a velkých inovačních podniků působících ve zpracovatelském průmyslu ve dvou evropských zemích – České republice a Finsku – a určit jejich postavení v rámci EU na základě srovnání s průměrnými hodnotami vytvořené fiktivní země EU. Ta zahrnuje ukazatele a populaci členských zemí EU, jejichž data byla k dispozici. Provedená analýza je založena na využití vybraných klíčových ukazatelů výkonnosti (vztahujících se především ke vstupům, které mají přispět k inovacím) hodnotících inovační výkonnost podniků. Provedený výzkum se snaží identifikovat nejvýznamnější faktory inovační výkonnosti s ohledem na velikostní skupinu podniků. Dosažené výsledky jsou navíc dále porovnávány v rámci inovačního prostředí ČR a Finska i EU jako celku. Za pozornost stojí inovační zdroje finských, zejména malých, částečně i středních podniků, které v některých sledovaných ukazatelích zaujímají mnohem významnější podíl než v případě ČR. Tato skutečnost může být určitým signálem, která velikostní skupina podniků by se měla stát cílovou skupinou veřejné podpory zaměřené na zvýšení inovační výkonnosti.

INNOVATIVE LEISTUNGSFÄHIGKEIT VON PRODUKTIONSUNTERNEHMEN UND DEREN STELLUNG IM RAHMEN DER EU

Das Ziel dieses Artikels besteht in der Bewertung kleiner, mittlerer und großer innovativer Bertriebe, welche in zwei Ländern, Tschechien und Finnland, in der verarbeitenden Industrie tätig sind, darin, und deren Position innerhalb der EU auf der Grundlage des Vergleichs mit den Durchschnittswerten eines künstlich erschaffenen EU-Landes zu bestimmen. Dieses umfasst die Indikatoren und die Population der Mitgliedsländer der EU, deren Daten zur Verfügung standen. Die durchgeführte Analyse beruhte auf der Nutzung ausgewählter Schlüsselindikatoren der Leistungsfähigkeit, welche sich vor allem auf die Eingaben der Daten beziehen, die zu den Innovationen beitragen sollen, und die Innovationsfähigkeit der Betriebe bewerten. Die durchgeführte Untersuchung ist bemüht, die bedeutendsten Faktoren der innovativen Leistungsfähigkeit unter Berücksichtigung auf die Größengruppen der Betriebe zu identifizieren. Die erzielten Ergebnisse werden darüber hinaus im Rahmen des innovativen Umfeldes der Tschechischen Republik und Finnlands sowie der EU als Ganzer verglichen. Aufmerksamkeit verdienen auch die Innovationsquellen finnischer, besonders kleiner, teilweise auch mittlerer Betriebe, welche in einigen betrachteten Indikatoren einen weitaus bedeutenderen Anteil einnehmen als im Falle der Tschechischen Republik. Diese Tatsache kann als ein bestimmtes Signal gewertet werden, welche Größengruppe der Betriebe zur Zielgruppe öffentlicher, auf die Steigerung innovativer Leistungsfähigkeit gerichteter Unterstützung werden sollte.

WYDAJNOŚĆ INNOWACYJNA CZESKICH I FIŃSKICH SPÓŁEK PRODUKCYJNYCH I ICH POZYCJA W RAMACH UE

Celem niniejszego artykułu jest ocena wydajności innowacyjnej małych, średnich i dużych przedsiębiorstw innowacyjnych działających w przemyśle przetwórczym w dwóch krajach europejskich – Republice Czeskiej i Finlandii – oraz określenie ich pozycji w ramach UE na bazie porównania z przeciętnymi wartościami fikcyjnie stworzonego państwa UE. Obejmuje ona wskaźniki oraz populację krajów członkowskich UE, których dane były dostępne. Przeprowadzona analiza bazuje na wykorzystaniu wybranych kluczowych wskaźników wydajności (odnoszących się przede wszystkim do elementów na wejściu, które mają przyczynić się do innowacji) oceniających innowacyjną wydajność przedsiębiorstw. W ramach przeprowadzonych badań podjęto próbę zidentyfikowania najważniejszych czynników wydajności innowacyjnej przy uwzględnieniu grupy wielkościowej przedsiębiorstw. Ponadto otrzymane wyniki porównano na tle otoczenia innowacyjnego Czech i Finlandii oraz całej UE. Warte uwagi są innowacyjne zasoby fińskich, w szczególności małych, częściowo też średnich przedsiębiorstw, które w niektórych badanych wskaźnikach mają o wiele większy udział niż w przypadku Czech. Fakt ten może być pewną wskazówką, która grupa wielkościowa przedsiębiorstw powinna zostać grupą docelową pomocy publicznej skierowanej na podniesienie wydajności innowacyjnej.

COMPARISON OF WAGES IN ICT BY MAJOR CATEGORIES, THEIR RELATIONS TO GDP AND THE DIFFERENCES BETWEEN SALARIES OF MEN AND WOMEN

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Abstract

The article examines wages in the field of information and communication technologies (ICT). Based on the so-called ISPV data (adjusted for inflation), CZSO and Eurostat data, several analyses were performed. The main conclusions are: (1) The number of ICT workers grew faster, their share in total employment increased from 2.2% to 3.9%. (2) From 2008 to 2013, the overall trend in wages is declining and they have been growing significantly since 2014 (influenced by both economic growth and falling inflation). (3) Wages of ICT specialists (CZ ISCO 25) grew considerably faster than those of ICT technicians (CZ ISCO 35). 4) Wages for the entire ICT and for the CZ-ISCO 25 category grew faster than GDP. (5) The gender pay gap in the Czech Republic is among the highest among the countries surveyed, although in 2019 it decreased compared to 2008. (6) Within the Czech Republic, the differences between the salaries of men and women in ICT are smaller than for the entire economy.

Keywords

ICT; ICT wages; Wages – GDP ratio; ICT specialists; ICT technicians; Gender pay gap.

Introduction

The basic macroeconomic relations include the relationship between labor productivity, wage growth and gross domestic product (GDP) growth. A number of articles deal with these relationships, see e.g. [1], [2], [3] or a new study for selected European countries [4]. In this article, we will therefore deal with the analysis of these relationships with a focus on workers in the field of information and communication technologies (ICT) in the Czech Republic.

There is no doubt that in recent years the dynamic development of ICT and its spread to virtually all professions and processes in companies, as well as into the daily personal life of most people, lead to what is referred to as *digitization of society* [5] or in case of manufacturing industries as *Industry 4.0* [6]. We can agree with many authors (see e.g. [3], [7], [8] or [9]) that the development of ICT and the increasing spread of these technologies significantly impact economic growth as well as the competitiveness of individual companies and entire countries. At the same time, ICT affects labor productivity in the whole economy, not just in one area [1], [10], [11], [12], as well as the volume and the quality of services.

Nevertheless, it can be assumed that now and especially in the future the impact of ICT on the whole environment, on the quality of human life, on education, on professional orientation

and many other areas is still not fully appreciated. Also, the concept of Industry 4.0 will lead to a fundamental change in the structure of employment [13]. It can be concluded that further digitization of society and the development of the Industry 4.0 concept will not be possible without a sufficient number of well-educated employees in the field of ICT. This is also one of the main reasons why ICT wage growth continues.

In the first part of the article, therefore, we will first perform a simple analysis of the development of the number of employees in the field of ICT and compare this trend with the development of the number of employees in the entire economy. We will also compare wage growth trends in the two main categories of jobs in this area: *ICT Specialists* and *ICT Technicians* (categories CZ-ISCO 25 and CZ-ISCO 35; these concepts are both further defined in the methodological part of the article). In this analysis, we will continue in the following subchapter where we will examine the relationship between the development of wages in ICT and GDP (considering inflation and the development of the CZK/EUR exchange rate, because of international comparison, wages are converted to EUR).

We will build on this analysis in the final part of the article by examining the differences in salaries in the Czech Republic in the field of ICT between men and women (the *gender pay gap* in ICT). This is a very important issue in the Czech Republic, in economic, political, and also social terms because these differences (for the entire economy) are among the largest in the European Union (see e.g. [14] or [15]).

A broader concept than *gender pay gap* is *gender equality*. This issue is also widely discussed in the EU and is part of various official statements and documents. One of them is The Gender Equality Strategy 2020–2025 in which Ursula von der Leyen stated *inter alia* that

> "*Gender equality is a core principle of the European Union, but it is not yet a reality. In business, politics, and society as a whole, we can only reach our full potential if we use all of our talent and diversity. Using only half of the population, half of the ideas or half of the energy is not good enough.*" [16, p. 1]

However, in this article, we will focus only on the abovementioned concept of gender pay gap in the narrower sense of the term, while in practice, it is a very complex one. Many authors deal with the issue of equal pay for equal work for women and men. These studies can be divided into two main areas. The first group analyzes and compares the situation and trends in different countries over a period of time. We can mention, for example, the abovementioned studies [14] or [15]. The study [17] compares Germany and Austria.

The second group focuses on a specific country and within that country, for example, on certain sectors or categories of employment. An example of a study for Slovakia is e.g. [18]. Studies that focused directly on the Czech Republic are [19] or [20].

Based on our analysis, we formulated the following research questions:

RQ1: Did the wages of ICT Specialists (CZ-ISCO 25) grow faster than the wages of ICT Technicians (CZ-ISCO 35) in the period 2008–2019?

RQ2: What was the trend of wage development in ICT in the observed period 2008–2019 in comparison with the trend of GDP development?

RQ3: What is the gender pay gap of the Czech Republic in international comparison and how did these differences develop over the period under review?

RQ4: What is the gender pay gap in ICT in the Czech Republic compared to the whole economy?

1 Methods of Research

To answer the abovementioned research questions, we analyzed the time series of indicators described below and performed a linear regression on these data. The methodology of our article can be divided into the following sections:

- Data source, their characteristics and structure.
- Basic ICT professions framework.
- Methods of analysis of the data.

1.1 Data Source, their Characteristics and Structure

We drew some data from the Czech Statistical Office (CZSO), and we also needed selected data from Eurostat to examine the gender pay gap. However, the basic data for our analysis come from a survey conducted annually by Trexima on the basis of a mandate from the Ministry of Labor and Social Affairs of the Czech Republic, the so-called *ISPV data*: Average Earnings Information System. This survey is part of the official statistical survey programs announced by the Czech Statistical Office in the Collection of Laws for the relevant calendar year. In addition, it is also governed by Act No. 89/1995 Coll., on the State Statistical Service [21].

ISPV respondents are active economic entities. Sampling is statistical for economic entities with up to 249 employees; the selection is random, based on the size of the entity, the region and the branch of economic activity. The survey covers all entities with 250 employees or more. If an organization is selected for the survey, it will receive a letter in which it is acquainted with the next steps and has a so-called reporting obligation on the basis of the above-mentioned Act on the State Statistical Service. In addition, these surveys are harmonized with the European Union's structural survey called the *Structure of Earnings Survey* [22].

The analyzed data are always for the second quarter of each year. This period was not chosen arbitrarily but for several reasons: the Czech Republic has the smallest number of public holidays in this quarter, workers usually do not take much leave during this period and, at the same time, the smallest number of extraordinary bonuses are usually paid during this period. The data for the second quarter are thus least affected by fluctuations in the number of working days for the period and at the same time there is the smallest share of non-claiming parts of wages or salaries.

The main monitored indicators in terms of earnings include *gross monthly wage (salary)* and *hourly earnings*. We also analyzed the basic structure of earnings, i.e. bonuses, extra pay, and reimbursements. The gross monthly wage was calculated as the average hourly earnings for the second quarter multiplied by the average number of working hours, these hours being rounded to the nearest whole number.

We also analyzed the number of work hours (e.g. overtime) and of non-work time (e.g. sickness and vacation). Data from the above-mentioned survey (Average Earnings Information System) also contain a comparison of wages according to individual regions of the Czech Republic.

1.2 Basic ICT Professions Framework

For the basic division of ICT professions, we used the *Classification of Employment of the Czech Statistical Office* (CZ-ISCO). CZ-ISCO is a national statistical classification of employment, prepared by the Czech Statistical Office in accordance with an international standard *ISCO-08: International Standard Classification of Occupations* [23]. This

classification divides all occupations into 10 major groups; two of them are important for the purposes of this article: Major group 2 – Professionals; Major group 3 – Technicians and associate professionals. And within these major groups, we are interested in two main subgroups:

- CZ-ISCO 25: ICT Specialists,
- CZ-ISCO 35: ICT Technicians.

These subgroups are further characterized in the classification as follows: [23]

ICT Specialists (CZ-ISCO 25) research, plan, design, create, test, provide consultations and improve IT systems, such as hardware, software, and related concepts for specific applications; process-related documentation, including principles, policies and procedures; design, develop, check, maintain and support databases and other information systems to ensure optimal performance and data integrity and security.

ICT Technicians (CZ-ISCO 35) support the regular operation of computer and communication systems and networks and perform technical tasks related to telecommunications and the transmission of image and sound and other types of telecommunication signals. They mostly perform routine technical activities.

1.3 Methods of Analysis of the Data

For the analysis, we mainly used the above-mentioned data from the survey on wages and salaries (so-called *ISPV data*); additionally, we used some data from the Czech Statistical Office and Eurostat. As the data cover a relatively long period of time, it was necessary to take into account *inflation* in individual years, and since wages (salaries) are given in EUR for better international comparison, we also present the development of the CZK/EUR *exchange rate*. Table 1 summarizes both.

Tab. 1: *Annual inflation rate and annual average CZK/EUR exchange rate*

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Infl. Rate	6.3%	1.0%	1.5%	1.9%	3.3%	1.4%	0.4%	0.3%	0.7%	2.5%	2.1%	2.8%
CZK/EUR	24.94	26.45	25.29	24.59	25.14	25.97	27.53	27.28	27.03	26.33	25.64	25.67

Source: [23]

We used the linear regression method to approximate the trend of wage development and GDP development. All regression analysis calculations are performed at the 5% confidence level. In processing our results, we used two statistical indicators: (arithmetic) mean and median. In the case of the examination of wages, the median is generally considered to be a more appropriate indicator because wages do not follow a normal distribution but a log-normal one. The arithmetic mean is more affected by extremely high wages of a relatively small number of individuals. [24]

This is especially true for wages in the field of ICT, where the average wage for both subgroups (CZ-ISCO 25 + CZ-ISCO 35) exceeds EUR 8000 per month; it is significantly higher than the average wage in the whole economy. At the same time, however, it is true that the wages of ordinary ICT workers do not reach these values by far. We therefore consider the median wage to be much more appropriate and more indicative than mean; however, in some other tables and figures, we present results for both median and mean.

2 Results and Discussion

2.1 Development of the Number of Employees in ICT

First, before examining in more detail the development of wages and salaries in ICT, we focused on a simple analysis of the development of the number of employees in the field of ICT and comparing the development of this number with the development in the entire economy. The results are summarized in Table 2. Absolute numbers are in the second line. To save space in the table, the row is marked only as "Thousands" = ICT Professionals in Thousands, i.e. the total number of people employed in ICT that is the sum of subgroups CZ-ISCO 25 + CZ-ISCO 35. Both from absolute numbers and from base and chain indices, it is obvious at first glance that the total number of employees in ICT increased throughout the period under review, except for 2016 and 2017, when it more or less stagnated.

However, it is still necessary to compare the development of the number of employees in the field of ICT with the total number of employees in the economy, which is the last row in the table, marked as "Ratio in %". This indicator rose throughout the period (of course, again except for 2016/2017) and during the period under review, this relative share almost doubled (from 2.2 to 3.9%).

Tab. 2: *Development of the number of employees in ICT and in the entire economy*

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Thousands	111	114	122	127	132	148	160	174	185	186	206
Base index	100	103	110	114	119	133	144	157	167	168	186
Chain index	x	103	107	104	104	112	108	109	106	101	111
Ratio in %	2.2	2.3	2.5	2.6	2.7	3.0	3.2	3.4	3.6	3.6	3.9

Source: Own, data from [21]

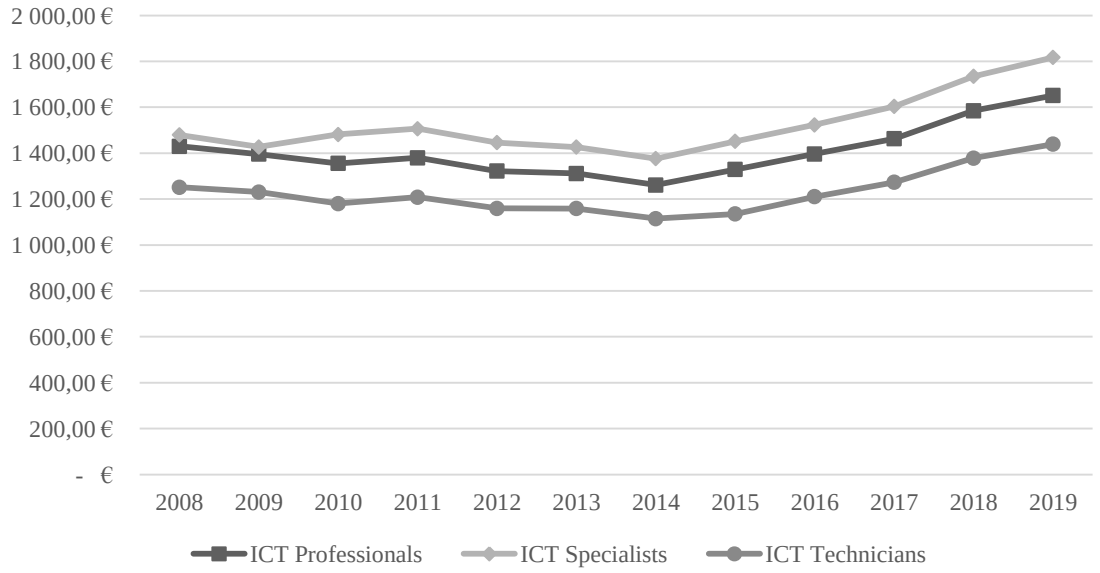
2.2 Comparison of Wages for Subgroups CZ-ISCO 25 and CZ-ISCO 35

We will now focus on the comparison of wages / salaries of these two main categories, i.e. on the research question *RQ1: Did the wages of ICT Specialists (CZ-ISCO 25) grow faster than the wages of ICT Technicians (CZ-ISCO 35) in the period 2008–2019?*

The data were recalculated according to the methodology described above (taking into account inflation, conversion to EUR). The results are summarized in the following two graphs (Figure 1 and Figure 2): both are for the same period and compiled in the same way. But in the first one, the arithmetic average of wages was used, while in the second, the median wage was chosen for the calculation. In the chapter devoted to methodology, we stated that the literature considers the median as a more suitable indicator for wages (due to the logarithmic-normal characteristics of wage distributions), however, it is clear from the graphs that the basic trend is practically the same.

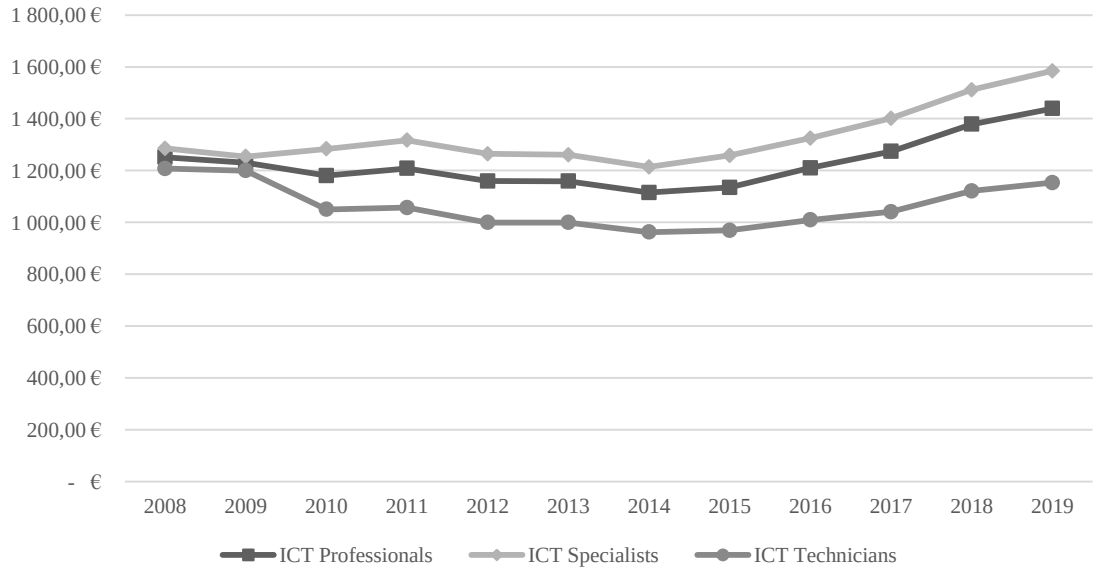
From 2008 to 2013, the overall trend is declining (with occasional very small year-on-year growth). This is a consequence of the crisis of 2008; but its effects in the Czech Republic lasted until 2013. After several years, when there was finally a more significant longer-term economic recovery and thus GDP growth and at the same time inflation fell significantly (2012 3.3%, 2013 1.4%, 2014 0.4%), wage growth (not only) in the field of ICT also started. As we present wages in EUR for reasons of international comparison, we must also take into account the development of the CZK/EUR exchange rate. But this growth in real wages in the area of ICT was so strong that it was not fundamentally affected by the devaluation of the Czech crown in 2014 and the subsequent relatively long-term interventions of the Czech National Bank to maintain this exchange rate.

Legend for both figures:
ICT Professionals = CZ-ISCO 25 + CZ-ISCO 35
ICT Specialists = CZ-ISCO 25
ICT Technicians = CZ-ISCO 35



Source: Own, data from [21]

Fig. 1: *Trend of the average of real gross wages of ICT Professionals (2008–2019)*



Source: Own, data from [21]

Fig. 2: *Trend of the median of real gross wages of ICT Professionals (2008–2019)*

Table 3 summarizes the result of the regression model for both the median and the (arithmetic) average, and for the reasons given above, the year 2014 was chosen as the basis for the calculation. ICT Specialist wages tend to grow faster than ICT Technicians wages, regardless of whether we choose the median (which we consider more appropriate) or the arithmetic mean as the basic indicator for the calculation. The exact values of the regression coefficients (mean versus median) are, of course, slightly different, but not significantly.

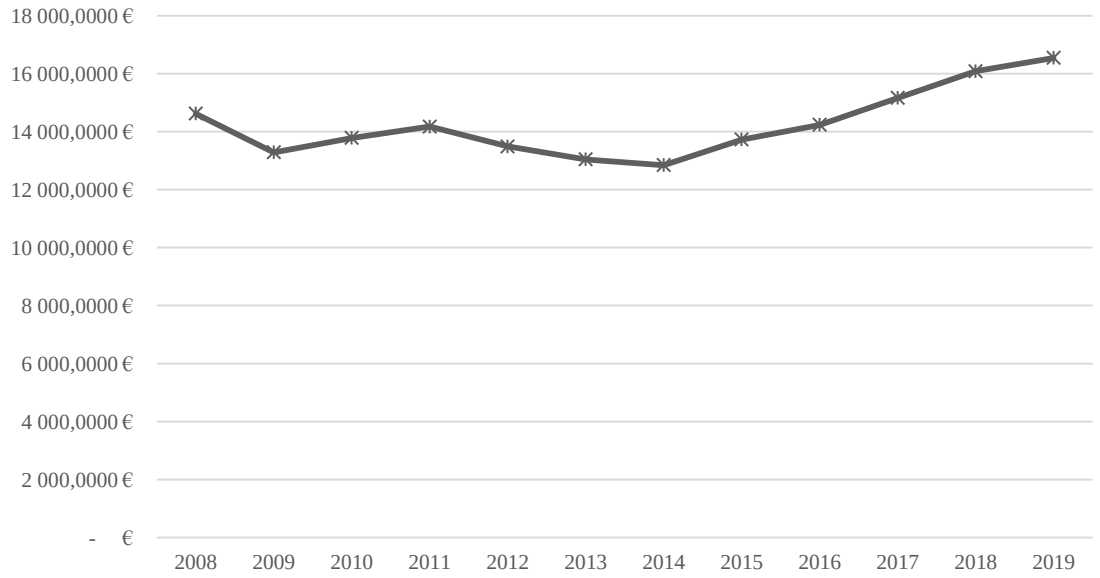
Tab. 3: *Trend Lines for 2014–2019*

Category	Indicator: Average		Indicator: Median	
ICT Specialists	$y = 0.0650x + 0.9237$	$R^2 = 0.9895$	$y = 0.0632x + 0.9174$	$R^2 = 0.9843$
ICT Technicians	$y = 0.0464x + 0.9467$	$R^2 = 0.9825$	$y = 0.0428x + 0.9338$	$R^2 = 0.9477$
ICT Total	$y = 0.0631x + 0.9269$	$R^2 = 0.9890$	$y = 0.0618x + 0.9121$	$R^2 = 0.9747$

Source: Own

2.3 Relation of Wage Development in ICT and GDP Development

First, let us consider the development of GDP per capita adjusted for inflation (Figure 3). It is clear that the trend in wages is copying the trend in GDP per capita. From 2008 to 2013, this indicator decreased overall, again with an occasional slight year-on-year increase, while it has been growing steadily since 2014 (however, after adjustment for inflation, it lasts till 2017 to be higher than in 2008).



Source: Own

Fig. 3: *Trend of the Czech Republic's GDP per capita (2008–2019)*

Similar to the wages, we will use the year 2014 as the base year for the regression model and determine the trend for the period 2014 to 2019. The resulting parameters of the regression model are summarized in Table 4.

Tab. 4: *GDP per capita (2014–2019)*

Trend line	R^2
$y = 0.0589x + 0.9435$	0.9921

Source: Own

If we compare the calculated values of the regression model for GDP per capita and compare them with the calculated values for individual categories of workers (for the same period 2014–2019), we come to the conclusions summarized in Table 5.

Tab. 5: *Comparison of the trend lines: GDP per capita versus wages (2014–2019)*

Category	Indicator: Average	Indicator: Median
ICT Specialists (CZ-ISCO 25)	Higher	Higher
ICT Technicians (CZ-ISCO 35)	Lower	Lower
ICT Total (CZ-ISCO 25 + 35)	Higher	Higher

Source: Own

Among other things, we see from the table that there is no difference in the results if we use the average or the median. Overall, we can say that (a) If we take all ICT employees or only the category of ICT Specialists (CZ-ISCO 25), then in both cases for the period 2014–2019, wages grew faster than GDP per capita.

But if we examine only the development of wages for the category of ICT Technicians (CZ-ISCO 35), then we see that these wages in the given period lagged somewhat behind the GDP growth rate. The explanation why overall wages in ICT grew faster anyway, although not for the CZ-ISCO 35 category, is quite simple and given two factors: (a) wages in the CZ-ISCO 25 category grew significantly faster (b) the CZ-ISCO 25 category account for about two-thirds of the total number of employees in ICT.

2.4 Gender Pay Gap

In the final subchapter, we will focus on the *gender pay gap* in the Czech Republic and consider it from two perspectives: *international comparison* and *industry comparison*. First, we will examine the problem defined in the research question *RQ3: What is the gender pay gap of the Czech Republic in an international comparison and how did these differences develop over the period under review?*

In the comparison we included the Visegrad group countries Austria and Slovenia, i.e. countries that are similar at least in some characteristics. But first, let us take a brief look at all EU member states, according to a 2019 Eurostat survey [14]. According to these statistics, the average gender pay gap in the EU Member States was 14.7% in 2019; the biggest gender pay gap was in Estonia (22.7%) and the smallest one in Romania (3.0%).

A more detailed analysis of the data for the monitored countries is summarized in Table 6, which compares the situation in 2009 and 2019 and the magnitude of the change that has taken place in individual countries over 10 years.

Tab. 6: *Gender pay gap at the beginning and the end of the analyzed period*

Country	Gender pay gap in 2009 in %	Gender pay gap in 2019 in %	Difference in percentage points
Austria	24.3	19.9	–4.4
Czech Republic	25.9	18.9	–7.0
Hungary	17.1	18.2	1.1
Poland	8.0	8.5	0.5
Slovakia	21.9	18.4	–3.5
Slovenia	–0.9	7.9	8.8

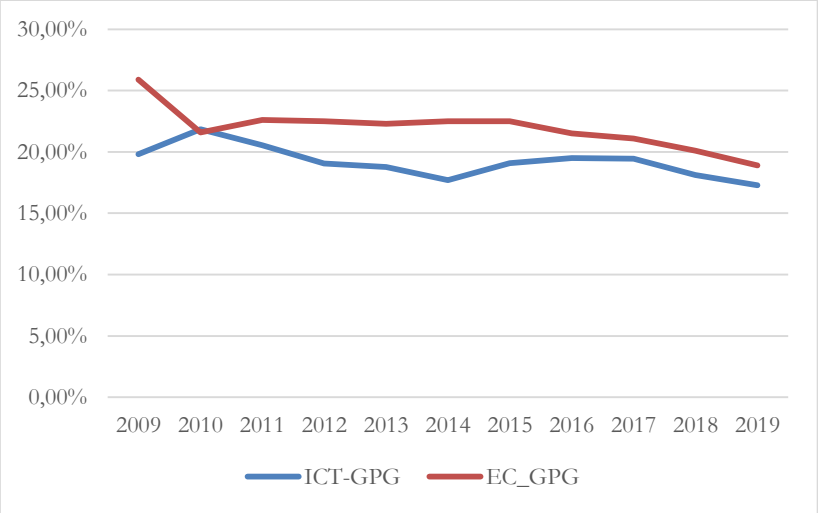
Source: Own, data from [14]

It is clear from the table above that a group of three countries (Austria, Czech Republic, and Slovakia) can be singled out. Countries in this group have undergone a similar development. In 2009, the gender pay gap was very high (over 20 % in all countries), narrowed by 2019 (but still considerably high and above the EU average) and converged to very similar values (19.9; 18.9; 18.4). The largest decrease from these countries (–7 percentage points) was in the Czech Republic.

The situation in the other three countries is quite diverse. In Hungary, this indicator was initially lower than in the three countries from the previous group, in the following years (not in the table) it decreased, but at the end of the observed period, it rose again to 18.2% in 2019, a value that is practically same as in Austria, Czech Republic and Slovakia.

If we compare the other two countries (Poland and Slovenia) only according to the values for 2019, it can be stated that they are practically the same (8.5 and 7.9) and significantly below the EU average. However, if we compare the year 2009, we see that the countries have undergone very different developments. While the situation in Poland has practically not changed, in 2009 women's wages in Slovenia were even slightly higher. This particular phenomenon would probably require a more detailed separate analysis of data from this country.

We will now focus on the comparison within the Czech Republic, i.e. on *RQ4: What is the gender pay gap in ICT in the Czech Republic in comparison with the entire economy?* The overall trend is shown in the graph in Figure 4 from which it is clear at first glance that practically throughout the period under review, the gender pay gap in ICT (marked as "ICT-GPG" in the graph) was smaller than the total value for the whole economy (marked as "EC_GPG" in the graph). An interesting phenomenon occurred in 2010 when the values of the indicator were practically the same for both categories. This phenomenon can be explained by the fact that there was a significant decline in wages in ICT this year, as a result of the ongoing crisis of 2008.



Source: Own, data from [21]

Fig. 4: *Comparison of the gender pay gap in the Czech Republic*

Conclusion

Based on data from the ISPV (Average Earnings Information System) survey, supplemented by data from the Czech Statistical Office and Eurostat, we can reach several conclusions. The total number of ICT Professionals (CZ-ISCO 25 + CZ-ISCO 35) grew throughout the period under review (except 2016/2017, when it more or less stagnated) and at the same time grew faster than in the whole economy, so the share of total employment increased significantly (from 2.2 to 3.9%).

This can be considered a positive trend, as a more significant growth in the number of ICT Professionals can be considered an important (but not sufficient) condition for the Czech Republic to maintain or even improve its competitiveness in international comparison and in the conditions of advancing digitization of the economy and Industry 4.0 development.

If we compare the wages of the two main categories of employment in ICT (research question *RQ1*), we come to the conclusion that the wages of ICT Specialists (CZ-ISCO 25) grew faster than those of ICT Technicians (CZ-ISCO 35). In our opinion, the explanation is relatively simple. If we look at the descriptions of these jobs (the basic description from the Czech

version of *ISCO-08: International Standard Classification of Occupations* is given in the text), it can be concluded that the activities performed by CZ-ISCO 25 workers are usually more creative, diverse and require more theoretical knowledge.

Comparing the growth of wages in ICT against the growth of GDP per capita (research question *RQ2*), we found that on average wages in ICT in the observed period grew faster than GDP per capita. This is positive on the one hand, as a number of studies have shown that the development of ICT and digitization contributes to economic growth. On the other hand, in some other sectors of the economy, wages are growing more slowly, which is causing an increase in the wage gap and in social inequalities. However, the difference between wage growth in ICT and GDP per capita growth is not dramatic, so these potential negative consequences will not be significant.

The analysis of time series of wage development, taking into account the influence of other factors, i.e. especially inflation and the development of the CZK/EUR exchange rate, showed that since 2014, wages in ICT have been growing continuously. Even the significant weakening of the CZK/EUR exchange rate in 2014 (as a result of CNB interventions) did not have a significant effect on the development of wages in ICT. After the end of these interventions in 2017, Czech crown strengthened again and inflation rose at the same time (from 0.7% in 2016 to 2.5% in 2017), but even this did not have a significant effect on the growth trend.

In an international comparison of the gender pay gap of the Czech Republic with a focus on the V4 countries Austria and Slovenia (research question *RQ3*) we came to the conclusion that three countries (Austria, Czech Republic, and Slovakia) underwent similar developments and the value of this indicator decreased during the period and at the same time converged to very similar values ranging from 18.4 to 19.9%. At the same time, it can be stated that the development in the Czech Republic is favorable (the largest decrease by 7 percentage points), but we remain well above the European Union average. It is therefore desirable to monitor the development of this indicator in the future. In the other three countries examined in more detail, developments have varied considerably.

When comparing the gender pay gap within the Czech Republic (research question *RQ4*), in almost all years the gender pay gap in ICT was less than the aggregate value of this indicator for the whole economy (except in 2010, when the values of the indicator were practically the same for both categories).

Acknowledgements

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SROVNÁNÍ MEZD V ICT PODLE HLAVNÍCH KATEGORIÍ, JEJICH RELACE K HDP A ROZDÍLY MEZI PLATY MUŽŮ A ŽEN

Článek zkoumá mzdy v oblasti informačních a komunikačních technologií (ICT). Na základě dat tzv. ISPV, ČSÚ a Eurostatu jsme provedli několik analýz. Data jsou od roku 2008 a proto bylo nutné zohlednit inflaci, pro mezinárodní srovnání jsou mzdy v EUR, takže důležitý je i kurz CZK/EUR. Hlavní závěry jsou: (1) Počty pracovníků v ICT rostly rychleji, jejich podíl na celkové zaměstnanosti vzrostl z 2,2 % na 3,9 %. (2) Od roku 2008 do roku 2013 je celkový trend vývoje mezd pokles, od roku 2014 výrazně rostly (ovlivněno jak ekonomickým růstem, tak poklesem inflace). (3) Mzdy ICT specialistů (CZ-ISCO 25) rostly značně rychleji než mzdy ICT techniků (CZ-ISCO 35). (4) Mzdy za celé ICT a za kategorii CZ-ISCO 25 rostly rychleji než HDP. (5) Rozdíl mezi platy muži/ženy v ČR patří k nejvyšším mezi zkoumanými zeměmi, i když v roce 2019 se oproti roku 2008 snížil. (6) V rámci ČR jsou rozdíly mezi platy mužů a žen v ICT menší než za celé národní hospodářství.

DER LOHNVERGLEICH IN ICT NACH HAUPTKATEGORIEN, IHRE BEZIEHUNG ZU DEM BIP UND UNTERSCHIEDE ZWISCHEN DEN MÄNNER- UND FRAUENLÖHNEN

Der Artikel untersucht die Löhne im Bereich der ICT. Aufgrund der sog. ISPV-Daten, des Tschechischen statistischen Amt (ČSÚ) und Eurostat Daten haben wir ein paar Analysen durchgeführt. Die Hauptschlussfolgerungen sind: (1) Die Anzahl der Mitarbeiter in ICT ist schneller gewachsen, ihr Anteil an der Gesamtbeschäftigung ist von 2,2 % auf 3,9 % gestiegen. (2) Von 2008 bis 2013 ist der gesamte Entwicklungstrend der Löhne der Rückgang, seit 2014 sind sie ausdrücklich gewachsen (beeinflusst sowohl durch das Wirtschaftswachstum als auch durch den Inflationsrückgang). (3) Die Löhne der IT-Spezialisten (CZ-ISCO 25) sind bedeutend schneller gewachsen als die Löhne der ICT-Techniker (CZ-ISCO 35). (4) Die Löhne für ganze ICT und für die Kategorie CZ-ISCO 25 sind schneller gewachsen als das BIP. (5) Der Unterschied zwischen den Männer- und Frauenlöhnen in der ČR gehört unter den untersuchten Ländern zu den höchsten, obwohl er im J. 2019 gegenüber dem J. 2008 gesenkt wurde. (6) Im Rahmen der ČR sind die Lohnunterschiede zwischen Männern und Frauen in ICT geringer als in der ganzen Volkswirtschaft.

PORÓWNANIE WYNAGRODZEŃ W BRANŻY TIK WEDŁUG GŁÓWNYCH KATEGORII, ICH STOSUNEK DO PKB ORAZ RÓŻNICE MIĘDZY WYNAGRODZENIEM MĘŻCZYZN I KOBIET

Artykuł bada wynagrodzenia w branży technologii informacyjno-komunikacyjnych (TIK). Na podstawie danych pochodzących z systemu informacyjnego nt. przeciętnych zarobków, danych Czeskiego Urzędu Statystycznego oraz Eurostatu przeprowadziliśmy kilka analiz. Dane są od 2008 roku, w związku z czym należało uwzględnić inflację. Dla porównania w skali międzynarodowej wynagrodzenia wyrażone są w EUR, a więc ważny jest też kurs CZK/EUR. Główne wnioski są następujące: (1) Liczby pracowników w branży TIK rosły szybciej, ich udział w ogólnym zatrudnieniu wzrósł z 2,2 % do 3,9 %. (2) Od 2008 do 2013 roku ogólny trend rozwoju wynagrodzeń jest malejący, od 2014 roku wyraźnie rosły (wpływ na to miał nie tylko wzrost gospodarczy, ale również spadek inflacji). (3) Wynagrodzenia specjalistów TIK (CZ-ISCO 25) rosły szybciej niż pensje techników TIK (CZ-ISCO 35). (4) Wynagrodzenia za całą branżę TIK oraz za kategorię CZ-ISCO 25 rosły szybciej niż PKB. (5) Różnica między wynagrodzeniami mężczyzn a kobiet w Czechach należy do najwyższych pośród badanych krajów, aczkolwiek w 2019 roku w porównaniu z 2008 r. się zmniejszyła. (6) W ramach RCz różnice między zarobkami mężczyzn i kobiet w branży TIK są mniejsze niż w całej gospodarce narodowej.

DIGITAL CUSTOMER SERVICE TRENDS: CHALLENGES AND OPPORTUNITIES

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Abstract

Customer service is an essential part of many companies and their product and service portfolio. In the current times, customer service has shifted more towards its digital forms. In previous research four digital customer service trends have been identified: virtual assistants, customer service personalization, mobile technologies, and opinion mining. This article aims to compare these findings with reality by employing a focus group discussion with professionals and point out the opportunities and challenges that the companies implementing these trends are faced with. The results show that the findings correspond with academic literature.

Keywords

Customer service; Virtual assistant; Personalization; Mobile technologies; Opinion mining.

Introduction

Due to the global pandemic, the digital form of customer service has become more important and is widely used. Even the companies that did not use the digital services available to connect with customers have become savvier in this matter. They must adapt to current customer needs and standards, which are rapidly changing. Based on the literature research that the author of this article has conducted to map current digital trends in customer service, four areas of interest were selected. These areas in digital customer service are virtual assistants, customer service personalization, mobile technologies, and opinion mining (also called sentiment analysis).

This article focuses on synthesizing literature findings and findings from focus group discussion focused on the four digital customer service trends listed above. The first section describes used research methods, describing the approach to focus group discussion. In the main section of this article the main results of this research are presented.

1 Methods of Research

Based on author's previous research, where he reviewed current digital trends from different perspectives, the trends are now analyzed to point out the challenges and opportunities. To achieve this, the current statistics collected from current literature on this topic and from relevant data sources were synthesized. In order to confirm the results from the literature research, a focus group to gather qualitative data on this matter was created. The focus group comprised 15 professionals in the field of customer service. The participants were employees of companies local to the Czech Republic; however, some also operated on the international market or were part of international concern.

The main topic of the focus group was the challenges and opportunities in digital customer service, specifically in the four areas of current trends. Following are the leading ten questions that the moderator asked during the discussion:

1. How do you perceive the usage of virtual assistants (or chatbots) in your company?
2. What are the main drawbacks of using virtual assistants?
3. Where do you see the opportunities for virtual assistants?
4. What forms of personalization of your customer service do you use?
5. From the service provider's point, where do you see drawbacks of using customer service personalization techniques?
6. In which directions do you see opportunities in customer service personalization?
7. How do you use mobile technologies in your services for customers?
8. What drawbacks and opportunities do you see in implementing mobile solutions in your customer service?
9. What is your experience with opinion mining techniques?
10. Where do you see opportunities for such technology? What are the drawbacks?

Write-up of notes taken during the focus group interview was repeatedly discussed afterward with the participants to ensure no important information was left out.

2 Results and Discussion

The following chapter discusses the results obtained during focus group discussion and compares them with academic literature findings.

2.1 Virtual Assistant Technologies

Into this category, both text-based and speech-based virtual assistants are included. A text-based virtual assistant can be a chatbot or a dialogue system. A speech-based assistant can be a virtual personal assistant (e.g., Siri, Alexa) or intelligent/smart agent [1]. According to Eurostat [2], only 2% of European companies use a chatbot in a use case, where the chatbot communicates with customers. The top three countries that use this technology the most are Denmark with 5% of its companies, Spain and France with 3%. The statistic is concerned with enterprises with more than ten employees.

Customer services supported by artificial intelligence are generally more accepted among customers with prior AI knowledge and who are not hesitant to share personal information [3]. Dubiel et al. [4] investigated the usage of virtual agents (VA), and the results show the following:

- Users use the VA technology mostly at home or in a car during driving.
- Both frequent users and infrequent users are concerned on a similar level about the privacy aspects of using such technology; however, the frequent users are more comfortable using VA in front of family members.
- Most of the users use VA for fact-checking, updates on weather, and playing music.
- Users are most concerned about the VA misunderstanding them or struggling to correctly recognize speech with an accent.

Research by Tulshan and Dhage [5] shows that among the four most used virtual assistants (specifically voice assistants: Google Assistant, Siri, Cortana, and Alexa), the Google Assistant has the best performance in voice-based recognition and human free interaction; while the Siri assistant found in Apple devices is on the second place. Their results show that all four assistants could answer up to 17.35% of daily questions; however, the Google Assistant was found to be the most efficient with 59.80%. According to [5], the main challenge for voice recognition technologies is that the voices of people vary, and they speak in different ways. This also corresponds with the results of [4], specifically, that people are concerned the most with VA technology not understanding them correctly.

The first three questions laid out in the Methods of Research section were thematically connected with the topic of this section. The discussion showed that the perception of virtual assistant technology in enterprises is overall positive. The focus group participants pointed out that employing chatbot solutions in their customer service increased the quality and availability of their service, which led to higher customer satisfaction. This very well corresponds with a statistic from [6] showing that 69% of customers prefer chatbots because they can provide quick replies to simple questions. According to [7], 56% of customers prefer to message a business rather than make a phone call to customer service. Based on the feedback the focus group participants received from their customers, it is evident they are more inclined to use the chatbot technology when their inquiry or request is of a simple kind (e.g., inquiry about the order status or a software feature).

When discussing the main drawbacks of implementing the VA technology in the participant's companies, they pointed out some interesting remarks. The participants collectively agreed that the main drawback of implantation chatbot technology in their company was that it was very time-consuming. The process comprises, e.g., the preparation (initial project planning, selecting the suitable supplier of the technology, carefully selecting the use cases), implementation, and continuous adjustments based on feedback. Few of the participants also pointed out that the implementation costs are quite high.

The question regarding what the participants perceive as opportunities in using VA brought out interesting points and subsequent discussion. One of the discussed topics was the payment process through a virtual assistant. Only two of the professionals in the focus group had direct experience with implementing a payment feature into their VA. The conversation showed an interesting and promising feature for companies whose business model allows payment through VA. Another great opportunity, as perceived by the focus group participants, is the ability to automate a large number of repetitive tasks and, in the case of chatbots, use some rich formats as videos and pictures to support the communication.

2.2 Customer Service Personalization

According to [8], more than 50% of customers are willing to share the information about the product they like to get personalized discounts, and 83% of customers are willing to share their data to create a more personalized service for them. The core of customer service personalization is gathering data about the customers and creating a so-called user model. The services and contents are tailored to specific users and customers.

Personalization of customer service is a powerful tool for building long-term rapport and relationships with a company's customers [9]. It greatly impacts the quality of the company-customer relationship and how the customer perceives the company. Therefore, customers are more likely to shop at companies that provide personalized recommendations and a more personal shopping experience [8].

Discussion of this topic in the focus group resulted in some interesting remarks. The participant agreed that as people are more open to new technologies, they are also willing to share their data and information about their buying habits. Therefore, it is quite easy to implement personalized service practices. As the difficulty of implementation is quite low, they identified this as the main opportunity from the customer's point of view. From the company's point of view, the main opportunity lies in developing useful skills in market and customer research and knowledge discovery in the user data.

The participants of the focus group also discussed some drawbacks and challenges that their companies are faced with when implementing and using service personalization. According to the majority of the participants, the most challenging aspect is security and data handling. It is very important to keep user and customer data safe and eliminate all security risks resulting in data leakage or, worse, publication of customer data on malicious websites and databases. Few participants also noted that many of their customers are not willing to share their data. The discussion showed that this might be age-related, as the younger age groups are more susceptible to data collection and consequent tailored services. The majority of customers of the few participants are customers of higher age – as this is their target group of customers.

2.3 Mobile Technologies

There are several tools and methods that companies can use in order to upgrade and modernize their customer service. One of them is to employ mobile technologies in their processes. It can be as simple as creating a mobile-friendly layout or version of the company website or e-shop. These steps radically upgrade the accessibility of services to the target customers.

In current times the mobile devices are a vital part of life for many people. It is an instrument for connecting them with their friends. Mobile devices provide people with entertainment and a sense of community through social media apps. In the last years, mobile devices also gained a very important role in the business environment, and therefore it becomes vital in the work environment. Many businesses and companies took advantage of that and customized their business model to accommodate the modern requirements of their customers.

The focus group participants seemed to have discussed this topic the most, as there are numerous ways to take advantage of mobile technologies available to us. They were asked about the ways their businesses and companies used mobile technologies. Tab. 1: shows the main areas of use cases where the mobile technologies are used in customer services the participants offer.

Tab. 1: *Areas of use cases of mobile technologies*

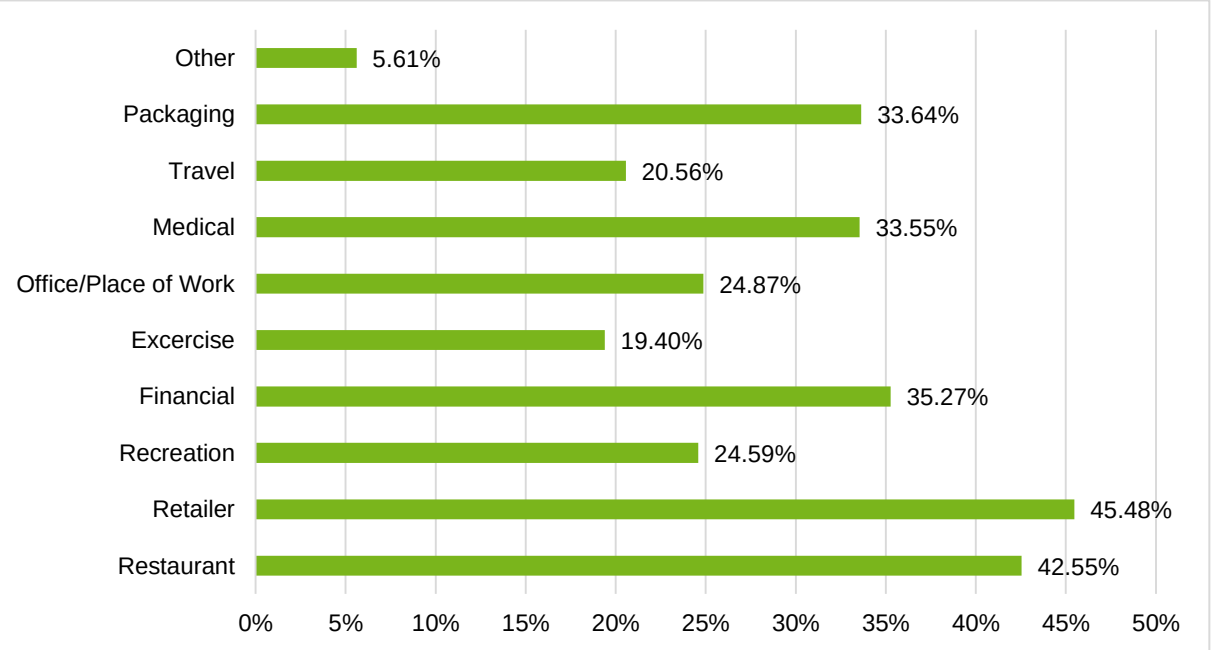
Area of use cases	Description
Product marketing	Use of product catalogs in the form of mobile apps; ability to view and add product reviews
Advertisement	Use of QR codes in promotional materials (both in print and online)
Customer support	Use of mobile application or mobile web page to connect with customer support department, possible usage of chatbot technology.
Sales	Product catalogs in mobile apps or web pages with embedded e-commerce capabilities. Mobile applications for discounts.

Source: Own

The discussion led to a collective agreement that implementing mobile technologies as an upgrade to customer service is the easiest in terms of solutions available to companies. The participants agreed that the basic usage of mobile technologies is the development of web pages that are compatible with mobile devices (meaning they are optimized for viewing and browsing on small devices) and touch devices such as tablets or laptops with touch displays.

More than half of the focus group participants stated that they use or plan on implementing the QR code technology. According to them and the literature, e.g., [10], this technology is quite popular among their customers. In order to be able to use the QR codes, the customers only need to have either a special application installed on their mobile device or if they have a recent model of mobile devices, they do not have to install any application as the ability to read QR codes is embedded the camera app. Eventually, the needed application may already be installed on their devices as it is quite a commonly used feature.

As one of the possible drawbacks of using QR codes, the participants identified the fear of customers regarding the security of the QR codes. It is important for the customer where the QR code is located. A statistic [11] regarding the place where the customers feel most secure scanning the QR codes showed that customers feel safe using this technology at retailers (such as supermarkets, shops) the most with 45.48 %. In the second place, there are bars and restaurants with 42.55 %. The rest of the places deemed as secure by the customers is shown in Fig. 1.

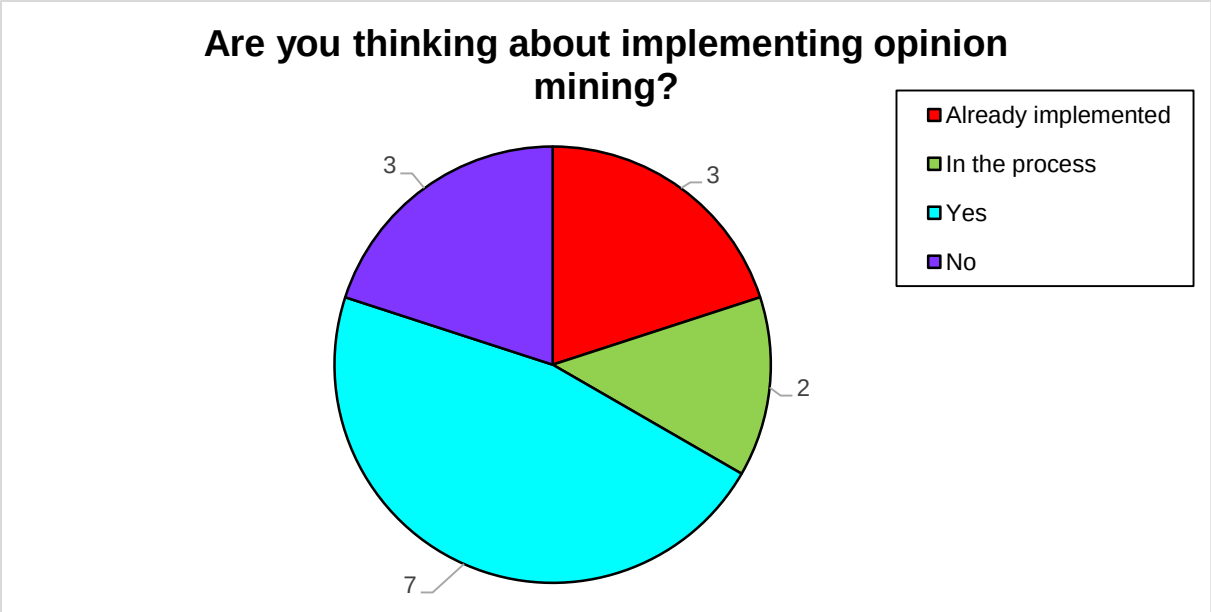


Source: Own adapted from [11]

Fig. 1: *Secure locations for scanning QR codes*

2.4 Opinion Mining

Among the focus group participants, opinion mining was extensively discussed; however, not many participants have their own experience with the technology. When the participants were asked question #9 regarding their experience with opinion mining, their responses inclined more towards the theoretical level, meaning that many of them did some sort of research of this customer service tool; however, they did not decide to implement it yet. When asked about their reasoning behind this decision, a number of the participants agreed on the current inability of the systems to work with the Czech language, as some of the participants work mostly with Czech customers.



Source: Own

Fig. 2: *Number of answers of focus group participants when discussing the intentions to implement opinion mining*

One of the remarks recorded throughout the discussion was that smaller local companies do not find the customer opinion mining technology useful to them at this time. On the other hand, the participants from companies that are part of international concerns or have stakeholders from bigger firms stated that this part of customer service is of big interest for their future service improvement.

The participants were also asked what they perceive as opportunities and drawbacks of using the opinion mining technology. The biggest opportunity of employing opinion mining into the customer service process is to gain useful information about the customer's satisfaction with the product or service provided. This way, the company can adjust its customer service strategies to improve the rate of happy, loyal, and returning customers. Participants widely discussed the possible use cases they would see fit. Mentioned were product reviews from customers, real-time sentiment analysis of customers during calls or chats with customer support, post-call analysis of the transcript of customer-operator communication, analysis of the comment/discussion board on their e-shop product pages. This well corresponds with academic literature [12, 13].

There were three participants (see Fig. 2) whose firms and enterprises already use the opinion mining capabilities. They described their use cases and some of their best practices from implementing them. According to them, the biggest advantage in using such technology is in the amount of data about the satisfaction of their customers as they can quickly customize and alter their services to fit the needs of their customers. There were also two participants who were in the process of implementing the opinion mining technology. Seven participants were thinking about applying this technology, and three did not plan to implement opinion mining.

Many of the professionals participating in the focus group stated that the cost of implementation is one of the biggest drawbacks in adopting this technology in their businesses. In this sense, the implementation of opinion mining features is more interesting to companies that can use the potential to the fullest, generate some viable outcomes but mainly afford it in the long run. Many participants concluded that opinion mining is very interesting and, when used efficiently, a powerful tool.

Conclusion

In this article the opportunities and challenges of current digital customer service trends identified in author's previous work were analyzed. A focus group was formed comprising several professionals who discussed those trends. The findings were compared with literature and corresponding statistics. Tab. 2 summarizes the main opportunities and challenges identified by the focus group participants, and therefore the results of this research.

Tab. 2: *Summary of main opportunities and challenges when implementing digital customer service trends*

Trend	Opportunities	Challenges
Virtual Assistants	Payment through VA. Automation of repetitive tasks.	Time-consuming implementation. Implementation costs.
Personalization	Knowledge discovery in user data.	Security. Data handling. Consent for data sharing.
Mobile Technologies	QR codes. Mobile applications.	Possible security issues (QR code scams)
Opinion Mining	Useful customer satisfaction data.	Cost of implementation.

Source: Own

Acknowledgments

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TRENDY DIGITÁLNÍCH ZÁKAZNICKÝCH SLUŽEB: VÝZVY A PŘÍLEŽITOSTI

Služby zákazníkům jsou velmi důležitou součástí mnoha firem a jejich portfolia produktů a služeb. V současnosti se služby zákazníkům zaměřují především na jejich digitální podobu. V rámci provedeného předchozího výzkumu byly identifikovány čtyři současné trendy v digitálních službách zákazníkům: virtuální asistenti, personalizace služeb, mobilní technologie a opinion mining. Cílem tohoto článku je porovnat tato zjištění s realitou, a to pomocí diskuse s odborníky v rámci uspořádané focus group a též vyzdvihnout hlavní příležitosti a výzvy při implementaci těchto technologií. Výsledky korespondují se zjištěními v akademické literatuře.

TRENDS IM DIGITALEN KUNDENSERVICE: HERAUSFORDERUNGEN UND MÖGLICHKEITEN

Kundenservice ist ein sehr wichtiger Bestandteil vieler Unternehmen und ihres Produkt- und Dienstleistungsportfolios. In der aktuellen Zeit hat sich der Kundenservice mehr in Richtung seiner digitalen Formen verlagert. In meiner vorherigen Forschung wurden vier digitale Kundenservice-Trends identifiziert: virtuelle Assistenten, Kundenservice-Personalisierung, mobile Technologien und Meinungsforschung. Das Ziel dieses Papiers ist es, diese Ergebnisse mit der Realität zu vergleichen, indem eine Fokusgruppendiskussion mit Fachleuten durchgeführt wird, und zeigen die Chancen und Herausforderungen auf, mit denen die Unternehmen konfrontiert sind, die diese Trends umsetzen. Die Ergebnisse zeigen, dass die Ergebnisse mit der wissenschaftlichen Literatur übereinstimmen.

TRENDY W CYFROWEJ OBSŁUDZE KLIENTA: WYZWANIA I SZANSE

Obsługa klienta jest istotnym elementem wielu firm i ich portfela produktów i usług. W obecnych czasach obsługa klienta skupia się przede wszystkim na jej cyfrowej formie. Moje poprzednie badania zidentyfikowały cztery aktualne trendy w cyfrowej obsłudze klienta: wirtualni asystenci, personalizacja usług, technologie mobilne oraz eksploracja opinii. Niniejszy artykuł ma na celu porównanie tych ustaleń z rzeczywistością poprzez zastosowanie dyskusji w grupie fokusowej z udziałem specjalistów oraz wskazanie podstawowych szans i wyzwań, przed którymi stoją firmy wdrażające te technologie. Wnioski są zgodne z literaturą naukową.

FINANCIAL IMPACT OF MENTAL ILLNESS AND HOW TO MEASURE THE CONSEQUENCES

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Abstract

This article shows the economic impact of mental illness, as well as various cost-estimating approaches. To assess the burden of mental diseases, there are three different ways: the human capital, the economic growth and the value of statistical life approach. The first focuses on indirect and direct costs. Moreover, the effect of mental illness on economic development can only be approximated implicitly. Thus, the lack of production is primary estimated for somatic conditions compared to their corresponding quantity of disability-adjusted life years (DALYs). The total economic productivity drop associated with mental illnesses between 2011 and 2030 is rated to be US$16.3 trillion globally. Furthermore, the value of statistical life (VSL) method suggests that trade-offs between risks and capital should be used to assess the probability of injury or death due to psychiatric illness. This computation is equivalent to that of cardiovascular disease and bigger than that of cancer. However, greater activism is required to better the existing condition.

Keywords

Economic costs; Economic growth; Human capital; Mental illness; Value of statistical life.

Introduction

Burnout has been characterized in a variety of ways [1] [2], but most scholars prefer a multifaceted concept that includes different features: emotional exhaustion, depersonalization, and diminished individual achievement [3]. The extent of emotional exhaustion applies to emotions of feeling jaded, over-extended, or the sense of being fatigued. Depersonalization corresponds to pessimistic and jaundiced behavior toward one's clients, colleagues or generally work. The shortened understanding of individual success includes furthermore pessimistic self-assessment of one's work with others or in general efficacy of the employment [4]. While there is often an association with burnout and other mental health problems, such as solicitude or depression, evidence further reinforces the fact that burnout differs from several mental ailments [5]. Nevertheless, the relationship and proximity to related research areas is given and partly blurred. Due to the lack of explicit literature on distinct macroeconomic consequences of burnout and also mental illness, the following article gives a general insight in the economic and social consequences of mental illness.

1 Research Objectives

The main aim of the article is to approach the economic impact of mental illness and to provide an overview of common methods of capturing economic consequences due to mental illness. Moreover, this article starts with an outline of previous figures and characteristics of mental illness and its economic impact. Further, different methods for determining and estimating the economic costs of mental illness are presented. In addition, the article

addresses missed economic opportunities, the lack of current activity and improvement in the field of mental illness. Additionally, it comes to an evaluation of factors to be changed as well as a necessary paradigm shift in the attitude towards mentally ill people. It concludes with possible suggestions for improving the current situation.

2 Mental Illnesses – An Underestimated Problem

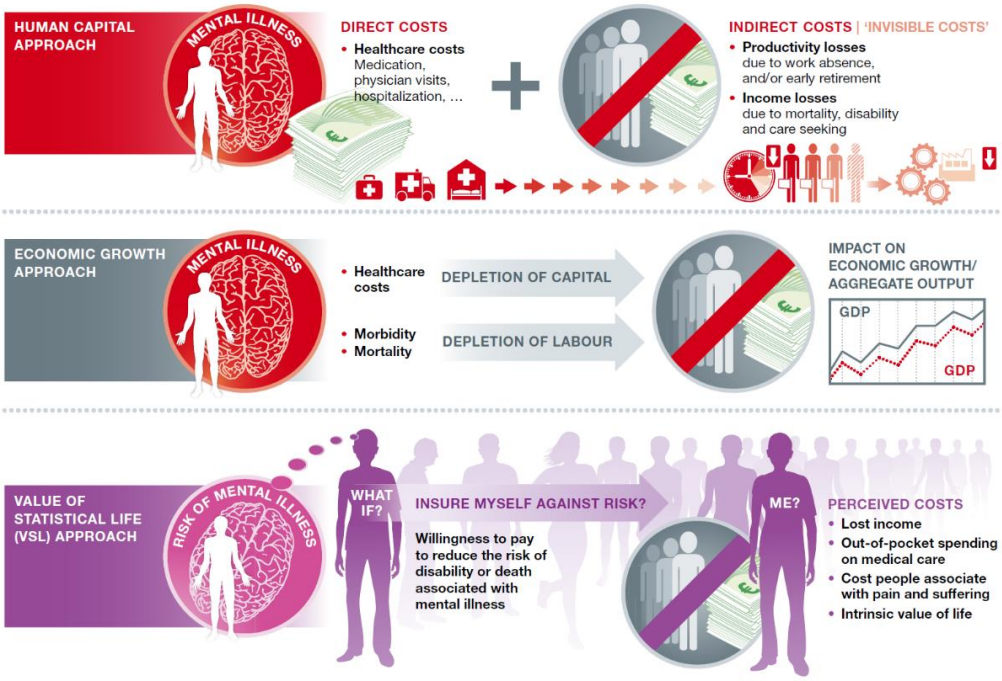
Every year about 165 million people in the European Union are affected by mental illnesses, mainly anxiety, mood, and drug use disorders [6], [7]. Altogether, 50 percent or more of people living in mid- and upper-income nations are troubled with not less than one psychiatric illness in their lifetime [8].

What do mental illnesses, for example, cost a nation? Healthcare expenses are perceived to be one of the biggest obstacles, for example, in U.S. public policy [9]. In 2006, healthcare expenses amounted to 16 percent from the nation's gross domestic product and a further increase was expected in the following years [10]. In 2019 the share of the health spending accounted for 17.7 percent of nation gross domestic product [11]. Studies of the Organisation for Economic Co-operation and Development (OECD) also valued the entire expenses of mental ill-health with approximately EUR600 billion in total or in percentage terms more than 4.0 percent of the gross domestic product (GDP) in each of the 28 EU countries in 2018. For example, the cost of mental problems in Germany is estimated at 4.8 percent of GDP [12].

Mental illnesses are also by no way restricted to a limited number of predisposed people but are a massive public health issue with important societal implications. They refer to extreme depression and functional disability, which are, in effect, mandatory medical conditions that could cause drastic effects not just for affected individuals. Even their families and their social and occupational surroundings get to feel the consequences [13]. 2010, psychiatric as well as substance use disorders accounted for 10.4 percent from worldwide strains of illness and were the main source of years of disabilities in all disease categories [7], [14]. More recent studies suggest that mental illnesses account for one-third of global sickness [15]. Furthermore, due to population trends and rising expectancy of life, the long-run incidence from mental illness is also projected to rise [13].

Patients and their social life are not limited to such consequences. They impact the whole social structure, in particular by economic costs. Appropriate calculation of these costs is complicated and difficult to render due to insufficient statistics. In addition, economic cost analyses differ substantially due to flaws in the description of diseases, demographics or tests analyzed, sources of cost and use of resources, methodological framework and inadequate cost descriptions due to lack of evidence and distinctions [16]. Even so, enhanced observational and financial approaches and patterns, along with greater detailed epidemiological evidence over the last 20 years, enable for an accumulation of more detailed and accurate data that gives us a better understanding of the extent of the economic effects of mental disorders. Although the majority of people believes that taking medicine, staying in a hospital or a clinical residence is a significant financial challenge of illness, in reality the hardship of illness – and especially of mental disorders – actually extends much deeper than these "direct" costs of diagnosis and care.

The World Economic Forum (WEF) identified three separate methods to assess the burden of economic diseases to understand more than just the "hidden costs" of illnesses. It is also about their effect on financial development within the macroeconomic scale [17].



Source: [17]

Fig. 1: *Various methods used to measure the economic effects of mental illness*

3 Human Capital Costs and Depressions

The human capital approach is by far the widely applied measure for the financial effects of mental illnesses as well as diseases in general. It varies amongst indirect and direct costs. Direct costs are often referred to as the "visible costs" of care and recovery within the public health sector: medicine, doctor appointments, psychotherapy services, hospital stays, so forth. Indirect costs apply to the "invisible costs" correlated with loss of revenue because of death, injury and treatment, which includes the loss of productivity as a result of lack of employment or premature retirement [17], [18]. Another form of indirect cost is attributed to the large incidence of psychiatric intricacies linked with severe mental disorders, resulting in high levels of emergency room consultations, a large predominance of lung disease, so for example do individuals suffering severe mental problems consume 44 percent of the total cigarettes in the United States of America, and premature death, which is a reduction of 13 to 32 years of age. Furthermore, there are expenses associated with other effects, such as prison or homelessness, that are worth to be taken into account [19].

Thus, unlike most psychiatric ailments, the cost of psychiatric illnesses is "indirect" rather than "direct". Although indirect expenses were difficult to measure, they are crucial to influencing public policy. When the major elements of the economic impact of psychiatric illnesses are measured, more educated debates should be undertaken about what needs to be done in the prevention and care of these diseases [20].

It is assumed that the indirect effects and the effects of poverty on labor and thus on national production in terms of costs are 23 times greater compared to the charges that fall on the medical sector. Which is a major "hidden" influence, nevertheless it is hypothetically underestimated. A relevant review was delimited to adults and linked solitary to individuals who had been identified with depression and excluded social care and social security expenses. Otherwise, the review uses a human capital approach for pricing the lost employment, acknowledged to create fairly high forecasts from what is believed to be tough economic effects of value. Even after these nearly obvious limits, some reports not only

include specific details of the cost effects of health services but also serve to point out that the consequences of depression are much more far-reaching [21]. Further research raises more intelligence on the relationship between depression and labor. So, anxiety and self-reported depression are the leading sources of absence from work in the United Kingdom [22]. Moreover, hidden effects of depression on decreased output at the workplace are an influence that cannot be accurately assessed by absenteeism figures [23]. Thirdly, a proof can be seen that relapses of depressive indications affect the employ status faster than use of health services [24]. Even though frequently debated in terms of reduced nation-wide output, the consequences of depression on employment are usually instantly felt by individuals suffering these diseases. Like for the majority, an employment is not just their primary foundation of earnings as well as retirement welfare benefits and, maybe, numerous marginal benefits, nevertheless, it also creates confidence, provides personal uniqueness, and widens social networks [25].

In addition, some studies concentrated particularly on a single cause of indirect costs: expenses of reduction of income. The research is founded on National Comorbidity Replication Surveys (NCS-R), a resident-based epidemiological investigation of psychiatric illnesses. In this study, results from approximately 5,000 persons had been utilized to measure the lost income by matching earnings in the prior twelve months of individuals with mental illnesses with twelve-month incomes of people with no mental issues. The research centered on people suffering from extreme mental disorders. The findings from [26], built on a universalized linear model examination, show a medium decrease in income of $16,306 for people suffering from extreme psychiatric ailments, mutually without and with incomes, and also that around 75 percent from the overall decrease in earnings originated from people with any earnings the previous year relative to persons who had no incomes at all. In trying to extrapolate these distinct outcomes to the wider populace, the writers reported that severe psychiatric disorder is interrelated with a yearly harm in incomes amounting to $193.2 billion. In addition, there remain many noticeable features in this article. Most of them is the gender gap in salaries: As the incomes of male individuals with extreme mental disorders fell to $28,070 relative to men with no suffering from serious mental illness, those earnings were still higher than those of women without severe mental ailments. This finding cannot be clarified through a significant quantity of females external the workforce, since the study of those themes receiving good incomes showed just the similar significant gender-based income differences. The second unusual result is that earnings reductions are not solely a function of chronic unemployment [26]. Finally, as these findings are applied to the general public, the economic loss is significantly higher than the prior figures, which seem to be justified only marginally by inflationary factors [27].

To further approach this issue with a specific country: The existence of extreme anxiety and depression disorders has been linked with an annual substantial drop in income for both working and unemployed South African individuals. In person expense models, the total projected loss of revenue connected with extreme depression and anxiety disorders was $4,798 per person per year, adjusted for age, ethnicity, drug misuse, occupation, family status, and household size at that time. Forecasts of the gross annual loss to South Africans coping with these diseases of missed revenue, generalized from the study, amounted to $3.6 billion in that period [28].

Basically, two types of figures are required to measure the indirect and direct costs of the disease: epidemiological statistics on the occurrence of the condition, health treatment, related death, injury and, in some instances, incarceration and per patient expense of the disorder on the basis of economic statistics. Epidemiological information is usually relying on significant samples that notify prevalence ratios in given people and cohort investigations that relate the

findings mentioned already. Price figures are typically extracted from experienced estimates, like mean hospital bed expense per night for emergency or mental institutions and are afterwards compounded by related epidemiological data [8].

Basing on figures by 2010, the worldwide indirect and direct financial costs of mental illness were evaluated at US$2.5 trillion. Relevantly, the indirect costs of US$1.7 trillion are far greater than the direct costs of US$0.8 trillion, which contrasts with other primary illness classes, such as cardiovascular disease and cancer. The direct and indirect expenses have been calculated at EUR798 billion for the European Union, an area with highly advanced healthcare systems [18]. The direct and indirect expenses of psychiatric illness are anticipated to geminate by the year of 2030 [17]. Mentioned should be that these computations don't contain expenses allied with mental illnesses detached from the public health service, like legal expenses due to illegal substance exploitation [8].

4 Missed Chances in Economic Expansion

From a macro-economic viewpoint, the expense of mental illnesses in a given society can be enumerated as a reduction of economic production by calculating the potential effect of psychiatric conditions on the GDP [8]. The core concept behind this policy is that economic development relies on labor and financial resources, all of which may be adversely impacted by sickness. Capital is being decimated by health care spending and labor is being depleted by injury and death. Capital depreciation is measured on the basis of the savings rate data, care costs and the ratio of therapy expenses financed from personal savings. The effect on labor is calculated by contrasting the GDP to a counter-actual setup that implies no disease demises in contradiction of the predicted deaths´ sickness. These rates of reduction of economic production are often estimated for corporal conditions and seldom for psychiatric disorders. Nevertheless, the effect of mental illness on economic development can only be approximated implicitly. Thus, the lack of economic production is primary estimated for somatic conditions compared to their corresponding quantity of disability-adjusted life years (DALYs). In the subsequent phase, the reduction of economic production for psychiatric illnesses is calculated based on the relative scale of the related DALYs for other illnesses [17]. There are studies which estimate the total economic production decline connected with mental conditions between 2011 and the year 2030 to be US$16.3 trillion globally. This relates the economic productivity damage assimilable with psychiatric disorders equal to those of cardiovascular issues and greater than that of cancer, diabetes, and chronic respiratory diseases [8].

5 Evaluation by Value of Statistical Life

The value of statistical life (VSL) method is the widest technique used to measure the economic effects of mental illness. This approach suggests that trade-offs between risks and capital should be used to assess the probability of injury or death due to psychiatric illness. This quantification study reveals trade-offs or theoretical expectations, such as results from polls, which questioned people what they'll be willing to spend to escape a specific hazard, as well as how much funding they would actually require taking on that threat [17]. The VSL is then determined on the basis of these arbitrary risk-value ratios. Suppose, for instance, that the overall lifetime chance of deceasing from depressive illness is 15 in 1,000. Assume, however, that there are steps that might decrease that chance to 5 in 1,000.

If citizens of a particular demographic are able to pay a mean of US$50,000 on these steps, the estimated VLS will be US$5 million for that population to be reproduced with the calculation (1).

$$\text{US\$50,000} / [(15 - 5) / 1{,}000] \quad (1)$$

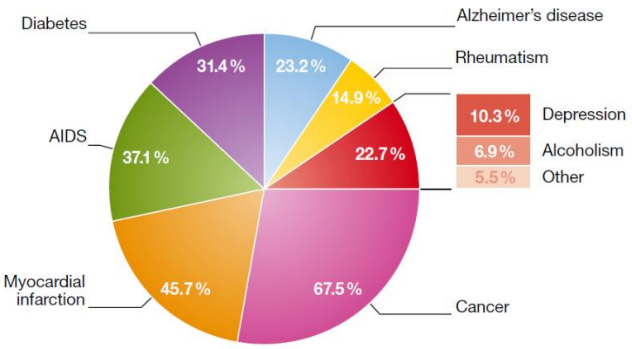
A similar reasoning can likewise be used by considering the ability to sacrifice monetarily to no longer struggle with a particular illness. As a consequence, the VSL strategy not just accounts for missed revenue and expenditure on information, prescriptions and treatment, but also for the expenses associated with injury and suffering. Applying the VSL method, the worldwide financial cost of mental illness was calculated to be US$8.5 trillion in 2010. Alike the economic increase effect, this calculation is equal to that of cardiovascular ailments and greater than that of chronic respiratory issues, cancer, and diabetes. The economic pressure is also projected to nearly duplicate by 2030 [17]. In brief, mental illnesses inflict immense monetary costs, directly through comparatively low treatment costs, and indirectly through proportionately high productivity reductions and commercial growth impacts. This sample of comparatively little direct against considerably large indirect costs varies from nearly all other disability classes, although the entire spectrum of psychiatric illnesses has rarely been taken into consideration. As this estimated scale of economic losses relies on the analytical method, available figures from year 2010 suggest that the burden of psychiatric illnesses can be calculated at US$2.5 trillion by means of the conventional human capital method, or US$8.5 trillion using a willingness to pay approach, recognizing that global health investment in 2009 was around US$5 trillion [8] [17]. Mental illnesses therefore cost more than chronic somatic conditions, such as diabetes and cancer, and the expenses are predicted to rise exponentially by 2030 [8].

6 Missing Activity

The previous overview of the worldwide economic burdens of mental illness is substantiated by various national surveys and an EU-wide report by the European Brain Council [18]. Questionable here is how these studies have been interpreted and why the legislation has modified the amount of support for prevention, diagnosis, and care. Nevertheless, psychiatric and substance use issues are frequently not part of existing medical care programs [29]. Although these methods are considered universal health services, they restrict psychiatric or drug use conditions. These circumstances continue even as the respective health interferences at the populace level, such as the disposability of alcohol, the community rate, such as school life skills instruction and the level of health services, are successful and can be properly enforced. Furthermore, their adoption is mostly cost-effective, but the care deficit for psychiatric and substantive use problems is greater than in any other health field. Ability to psychiatric health care is typically minimal due to limited staff and facilities, and appropriate evidence-based services are not offered. Crucially, there is nearly no particular prevention, with many high-income countries having no exception. This brings up the question as to the causes for these extraordinary disparities and the apparent lack of political engagement to fix the issue. Firstly, it should be recognized that the advancement and application of reliable and successful diagnosis and recovery strategies for mental wellbeing is only at a comparatively early level, and so numerous evidence-based therapies and treatments have just been accessible in the last 30 years. Capacity building regarding manpower, facilities and other services is also well behind other illness fields. Above all, there might be a speculation that stigmatization and misbelief about both psychiatric and addiction problems continue to be a significant part. This is not just non-professionals who tend to think that mental and drug use conditions are not actual illnesses, that they cannot be cured adequately, and that those suffering are at any rate partially liable. As a result, cultures are likely to invest far more on somatic ailments than on psychiatric illnesses, even if the mortality and economic effects are in minimum as high as those incurred by somatic problems [8]. For instance, research reveals the existing public opinion on the distribution of capital. Relying on a survey from the general population of Germany, adolescents were allowed to pick three out of nine medical problems for which they would choose services not to be decreased if broad reductions in the health

budget were required. Around two-thirds of participants listed cancer as a medical disorder that has to be protected from decreases, accompanied by AIDS, diabetes, and myocardial infarction. Just a limited number of participants related to psychiatric illnesses, such as depression and schizophrenia [30].

Beyond the influence of public sentiment, financing policies in certain cultures remain centered on lethality and life expectancy, and although psychiatric illnesses not directly lead to a high degree of fatalities, they seldom feature on mortality data. In the end, it does not appear to be widely understood that mental illnesses are overwhelmingly contributing to so-called high-cost consumers of our medical scheme [8].



Source: [30]

Fig. 2: *In the event of general cutbacks within the healthcare budget, medical problems on which services should not be cut. Results are in percentages, multiple responses were allowed.*

7 Need for Improvement and Required Changes

Owing to the aforementioned factors, the ongoing lack of funding in mental health services is likely to continue without reconsidering the expense of mental illness, the cost savings of medication and prevention treatments, and the necessity for a substantive improvement of stigmatization [8]. While signs of large-scale interventions to change this condition have begun to appear [31], culture, policymakers and stakeholders must be continuously and repeatedly educated about the actual rate of mental illness, such as personal strains and the full spectrum of future economic consequences. Yet another priority must be on the efficacy, viability and affordability of interventions to reduce that strain. If these steps persist, people will potentially be more likely to agree that investing resources on prevention and treatment of mental illnesses is a reasonable expenditure [8].

Frequently fundamental non-health expenditures are not superficial ornaments in extensive scholarly research. Nor are the analysts' plots expected to cost. These are the current strains on capabilities that must be endured by individuals or members of society. Productiveness losses for the economy had exceeded a relative scale, but the resulting lack of profits for individuals with depression may have suffered serious harm. More focus should be given to the first step in the study of transition, which shows us the full scale and extent of the economic effects of these diseases. In addition, there is a demand for cost-effectiveness and related assessments that team expenses with information on the effects. The concern, though, is that so many analyses are very limited in their costing and sometimes performance. In reality, medical providers actually consider some non-health implications of psychiatric disease, such as the motivation of a client to return to work before making decisions. Nevertheless, as achievement evaluation not only becomes more widespread, but also brings benefits and fines, it will get more and more difficult for such practitioners to make choices

that preserve someone else's resources, particularly patients, at the expense of the assets of their own department. Child and youth mental health providers can do what they can to handle mental disabilities regarding their limited funds. This is at the heart of the matter. Studies can only explain that care providers and their managers could only do as much as their resources and success evaluation systems enable. Efficient steps can mostly be done at the federal level in general, which also implies at the point of particular government facilities fixing incentives that otherwise discourage organizations from doing what is better for patients at the rate that is more cost-effective for society. Politicians have, in turn, to consider the distributional effects of diverse mental health policies in real life. Quite broadly, whether mental disease is more common in low-income communities and whether concealed individual and family consequences are overlooked as policy – or implementation adjustments are made – or whether possible new innovations are rejected, the question arises if this would not contribute to the socioeconomic isolation of already disadvantaged groups. Moreover, individuals with mental health issues also have a wide variety of requirements. In conclusion, it is essential that the expense of their treatment is broadly similar if policy and procedure are to develop either their efficacy and their distributional implications [25].

Conclusion

On the basis that every year a large number of people suffer from mental illness, the preceding article shows, that these diseases are a heavily public health issue that has significant societal implications. Three different ways were described to assess the economic impact of mental illness on society: the human capital approach, the economic growth approach and the value of statistical life approach use different ways of estimating economic consequences. The first deals with the direct and indirect costs of mental illness, while the second takes a closer look at the depletion of capital and the depletion of labor. Finally, the latter tries to analyze the willingness to pay, which deals with the perceived investment that people would be willing to make in order to avoid, for example, a mental illness. To improve the current situation, however, increased activism is needed. A mindset away from the stigmatization of the mentally sufferers must become established. After all, it is not only lay people who condemn mental disease. So, this is one reason why the resources for dealing with mental problems are still severely limited. Due to the fact that studies have recognized the still insufficient awareness of the urgency in the broader society for psychiatric issues, it is in conclusion important to note that changes must also be initiated and supported by governments in particular in order to achieve sustainable and effective improvements. For it is likely that mental health services will continue to be underfunded without deeper consideration of cost savings in medications, the cost of mental illness in general, and preventive treatments. Because always it should be the main aim to preventively counteract mental illnesses, to minimize the suffering of individuals with psychiatric disorders and even to be able to cure them – with possibly even positive consequences for further economic growth.

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FINANČNÍ DOPAD DUŠEVNÍCH CHOROB A JAKÝM ZPŮSOBEM MĚŘIT JEJICH NÁSLEDKY

Tento článek ukazuje ekonomický dopad duševních onemocnění a také různé přístupy k odhadu nákladů. K posouzení zátěže duševních chorob existují tři různé způsoby: lidský kapitál, ekonomický růst a hodnota statistického přístupu k životu. První se zaměřuje na nepřímé a přímé náklady. Navíc vliv duševních chorob na ekonomický rozvoj lze pouze implicitně přiblížit. Nedostatek produkce se tedy primárně odhaduje pro somatické stavy ve srovnání s jejich odpovídajícím počtem let života upravených na zdravotní postižení (DALY). Celkový pokles ekonomické produktivity spojený s duševními chorobami mezi lety 2011 a 2030 je celosvětově ohodnocen na 16,3 bilionu USD. Metoda hodnoty statistického života (VSL) dále naznačuje, že k posouzení pravděpodobnosti zranění nebo úmrtí v důsledku psychiatrického onemocnění by měly být použity kompromisy mezi riziky a kapitálem. Tento výpočet je ekvivalentní výpočtu kardiovaskulárního onemocnění a je větší než výpočet rakoviny. Ke zlepšení stávajícího stavu je však zapotřebí většího aktivismu.

FINANZIELLE AUSWIRKUNG AUF GEISTESKRANKHEITEN UND WEGE, DIE KONSEQUENZEN ZU MESSEN

Dieser Artikel legt die ökonomische Auswirkung von Geisteskrankheiten sowie die verschiedenen Ansätze zur Kostenrechnungen dar. Um die Belastung von Geisteskrankheiten zu beurteilen, gibt es verschiedene Wege: das menschliche Kapital, das ökonomische Wachstum und der Wert und die statistische Lebensdauer. Der erste Weg zielt auf die direkten und die indirekten Kosten. Darüber hinaus kann die Auswirkung von Geisteskrankheiten auf die wirtschaftliche Entwicklung nur annäherungsweise erschlossen werden. Daher wird das Fehlen von Produktion als ausschlaggebend für die somatischen Gegebenheiten betrachtet. Diese werden mit ihrer entsprechenden Quantität von behinderungsgerechten Lebensjahren verglichen (DALYs). Der Abfall der totalen ökonomischen Produktivität wird unter Heranziehung von Geisteskrankheiten zwischen 2011 und 2030 auf 13,3 Billionen US-Dollar veranschlagt. Weiter legt der Wert der statischen Lebensdauer nahe, dass ein Ausgleich zwischen Risiko und Kapital zur Beurteilung der Wahrscheinlichkeit von Verletzungen oder Todesfällen auf Grund von Geisteskrankheiten angewendet werden sollte. Diese Berechnung entspricht derjenigen einer kardiovaskularen Krankheit und noch mehr einer Krebserkrankung. Gleichwohl ist ein größerer Aktivismus erforderlich, um eine Besserung der bestehenden Bedingungen herbeizuführen.

WPŁYW FINANSOWY CHORÓB PSYCHICZNYCH I SPOSÓB POMIARU ICH SKUTKÓW

W niniejszym artykule przedstawiono ekonomiczny wpływ chorób psychicznych, a także różne podejścia do szacowania kosztów. Istnieją trzy różne sposoby, by ocenić obciążenie chorobami psychicznymi: kapitał ludzki, wzrost gospodarczy i wartość statystycznego życia. Pierwszy skupia się na kosztach pośrednich i bezpośrednich. Ponadto wpływ chorób psychicznych na rozwój gospodarczy można określić jedynie w sposób domniemany. Dlatego też brak produkcji jest szacowany przede wszystkim dla schorzeń somatycznych w porównaniu z odpowiadającą im liczbą lat życia skorygowanych niepełnosprawnością (DALY). Całkowity spadek wydajności ekonomicznej związany z chorobami psychicznymi w latach 2011-2030 szacuje się na 16,3 biliona USD w skali globalnej. Ponadto, metoda wartości statystycznego życia (VSL) sugeruje, że do oceny prawdopodobieństwa urazu lub śmierci z powodu choroby psychicznej należy stosować kompromisy między ryzykiem a kapitałem. Obliczenia te są równoważne z obliczeniami dotyczącymi chorób sercowo-naczyniowych i są większe niż w przypadku nowotworów. Jednakże, aby poprawić istniejący stan, konieczna jest większa aktywizacja.

HOW ISO QUALITY MANAGEMENT STANDARDS CHANGE THE COMPANY LEVEL OF EXCELLENCE? STUDY CONDUCTED ON TWO COMPANIES OF POLISH DNA SEQUENCING INDUSTRY USING THE BUSINESS IMPROVEMENT MATRIX

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Abstract

This study examines the level of excellence of two companies, using Business Improvement Matrix (BIM), which is based on European Foundation of Quality Management's Model of Excellence. It compares those organizations and shows how their quality management systems make an effect on BIM results. The researched companies are genXone S.A., which is in the process of implementing a quality management system compliant with ISO 13485: 2016, and Centrum Genetyki Medycznej GENESIS Sp. z o.o., certified with ISO 9001: 2015 since 2018. Both of them belong to sequencing industry in Poland, using new generation sequencing. This study shows that the company that has implemented its quality management system and has fully adopted its standards achieved a higher level of excellence than the company that just started the process of implementation of their quality management system.

Keywords

Business improvement matrix; Quality management; Continuous improvement; Level of excellence.

Introduction

This study presents the results of Business Improvement Matrix (BIM) for two organizations at different stages of their quality management systems: genXone S.A., a company in the process of implementing a quality management system compliant with the ISO 13485: 2016 standard, and Centrum Genetyki Medycznej GENESIS Sp. z o.o., ISO 9001: 2015 certified since 2018. The BIM allows for the assessment and comparison of their achieved "level of excellence" [1]. It has been shown that ISO quality standards influence the results of BIM assessment.

There are different studies presenting the relationship between ISO quality standards and EFQM model. In general, the conclusions say that there is a positive correlation between ISO 9001 certification maturity and EFQM business excellence model results [2], but these studies have been purely theoretical. There was also a study conducting the analysis and comparison of impact on the communication system and external relations at schools that implemented EFQM model versus the ones that implemented ISO certificates [3], but it did not measure how the ISO standards changed the EFQM model results. There have not been any studies done to compare two similar companies that differ in their quality management systems maturity stages to evaluate how ISO quality standards, such as ISO 9001:2015 and ISO 13485:2016, affected the results of the Business Improvement Matrix. These are important studies not only for scientific research purposes, but also for practical use, for all organizations seeking comprehensive improvement of their management systems, as well as

for all companies currently having a management system compliant with ISO standards and wanting to find a tool to measure their progress on the path of continuous improvement.

1 Quality Management

In ISO 9000, quality is defined as the degree to which a set of inherent characteristics of an object fulfils requirements [4]. Taking this into account, quality management is the act of managing processes that allow us to obtain a given degree of meeting these requirements. It can also be defined as "act of overseeing all activities and tasks needed to maintain a desired level of excellence", as stated by Adam Barone [5]. The best-known systems for quality management are standards issued by International Organization for Standardization, also known as ISO [6].

1.1 ISO Quality Standards

ISO 9000 family of quality management systems are one of the most used QMS tools today [6]. Not only do companies by their own decide to start implying ISO quality standards, but also the customers, investors and other third parties may demand them to be certified by ISO. It is worth mentioning that ISO 9000 family is not the only quality management system provided by ISO organization: there are different sector-specific versions of it, one of which is ISO 13485:2016, which is a comprehensive management system specifically for the manufacture of medical devices [7].

1.2 European Foundation of Quality Management and its Model of Excellence

EFQM is a non-profit membership foundation in Brussels, established in 1989 to increase the competitiveness of the European economy. They invented an EFQM model [8]. This model provides a framework allowing organizations to determine their current "level of excellence" and where they need to improve their efforts. The model also helps to ensure that business decisions incorporate the needs of all stakeholders and are aligned with the organization's objectives. It consists of 9 areas, as listed below [1]:

1. Leadership (how management and all managers behave and act to inspire and drive culture change towards a quality orientation)
2. Policy and strategy (whether the policy and strategy are formulated, reviewed, and improved in line with the EFQM management concept)
3. People (how the company unleashes the full potential of its employees)
4. Resources and Partnership (how financial, information, material, and technology resources are effectively used to support corporate policies and strategies)
5. Processes (how critical processes are applied and controlled to ensure continuous improvement of the enterprise)
6. Customer oriented results (how the customer evaluates the quality of products and services)
7. Staff oriented results (how the employee assesses the benefits of employment in the enterprise and his own contribution to its development)
8. Society oriented results (what are the relationships of the company with the local community and the impact on the natural environment)
9. Key performance results (to what extent the company achieves the planned goals)

1.2.1 Business Improvement Matrix

Business Improvement Matrix (BIM) is a self-assessment tool designed by EFQM organization for companies to provide them with a tool for rating their current "level of excellence", getting the possibility of comparing oneself with competing enterprises and setting a further path to development [1].

a) The matrix consists of 9 sections (columns), where each section is assigned 10 criteria, reflecting the degree of excellence of a given organization within a given area. To fill the matrix, the company If no actions have been taken to develop or implement an action plan for a specific level – answer NO, the matrix field remains blank, the organization receives 0 points.

b) If an approach to the problem has been taken and / or documented and a record of each implementation is available, or in the case of the results section if the approach has been taken and is starting to deliver results – answer DURING IMPLEMENTATION, the matrix field is marked in yellow, corresponding to 0.5 points.

c) If the records show that the approach has been fully implemented and adopted by the company, or if the implemented approach is a complete success – answer YES, the field is marked in green, corresponding to 1 point. [1]

The points from each section are summed up and the result is obtained by the product of the sum of points and the weight of the section, according to the EFQM model [1]:

- Leadership: ×10
- Policy and strategy: ×8
- People: ×9
- Resources and Partnership: ×9
- Processes: ×14
- Customer oriented results: ×20
- Staff oriented results: ×9
- Society oriented results: ×6
- Key performance: ×15

Examples of criteria from Leadership section:

1) Managers develop their own awareness of Total Quality Management (TQM) and company improvement. This process is deeply rooted and can be sustained despite personnel changes.

2) Managers decide to take measures that increase quality awareness among employees. They assess and develop this awareness (e.g., by using leaflets, providing educational materials on quality).

Each criterium is becoming more complicated and harder to achieve with each level in the matrix, which means it is easiest to achieve criteria number one and hardest to achieve criteria number 10.

2 Research Subject and its Objective

The aim of the research is to examine the impact of ISO quality management standards on the company level of excellence, measured with Business Improvement Matrix assessment. The subject of the study are two companies: genXone S.A. and GENESIS Sp. z o.o. Both organizations belong to the genetic sequencing industry, however GENESIS Sp. z o.o. has

implemented the ISO 9001: 2015 management system since 2018, and genXone is only currently in the process of implementing ISO 13485: 2016.

3 Results

Comprehensive interviews were conducted with representatives of the surveyed companies. During the interviews, all the criteria of the matrix were discussed, and the interviewees presented the degree of fulfillment of the given requirements in their organizations. Based on their responses, the BIM fields were completed.

Tables 1 and 2 show the results of the BIM assessment for genXone S.A. and GENESIS Sp. z o.o. The companies scored 395 points, and GENESIS Sp. z o.o. scored 780 points correspondingly. Both organizations achieved a really high score for companies that did not implement EFQM model in their policy. The author of this article suggests that the high results were scored due to the industry of those companies, since laboratories and science-oriented enterprises need to conform to strict laws imposed by the government.

It would be worth considering for both organizations to take additional steps that they could take to improve their level of excellence as measured by the MDP matrix. Examples of paths towards continuous improvement would be, for example, starting activities influencing the local environment of the surveyed companies, working on improving customer satisfaction processes at GENESIS Sp. z o.o. or completing the processes under implementation at genXone S.A. in genXone S.A. additionally, it is suggested to repeat the tests after receiving the ISO 13485: 2016 certification in order to set new goals for continuous improvement.

Tab. 1: *Results of genXone S.A., company in the process of implying ISO 13485:2016 standards*

No.	Leadership	Policy and Strategy	People	Partnerships and Resources	Processes	Customer Oriented Results	Staff Oriented Results	Society Oriented Results	Key Performance Results
10.									
9.									
8.									
7.									
6.									
5.									
4.									
3.									
2.									
1.									
GREEN	4	6	3	6	0	3	0	0	2
YELLOW x0.5	2	1.5	2	0.5	2.5	0	2	1	1.5
SUM	60	60	45	58.5	35	60	18	6	52.5
genXone S.A.									395

Source: Own

Tab. 2: *Results of GENESIS Sp. z o.o., company certified with ISO 9001:2015 since 2018*

No.	Leadership	Policy and Strategy	People	Partnerships and Resources	Processes	Customer Oriented Results	Staff Oriented Results	Society Oriented Results	Key Performance Results
10.									
9.									
8.									
7.									
6.									
5.									
4.									
3.									
2.									
1.									
GREEN	10	9	8	10	9	6	9	0	6
YELLOW x0.5	0	0.5	0	0	0.5	0	0.5	1	0.5
SUM	100	76	72	90	133	120	85.5	6	97.5
GENESIS Sp. z o.o.									780

Source: Own

Conclusion

Based on the presented study, it can be concluded that the level of organizational excellence, measured with the Business Improvement Matrix is affected by implementation of the quality management system of ISO standards. It is evident not only by the very high result of GENESIS Sp. z o.o., but also due to the fact that genXone, which is in the process of implementing ISO standards, has a lot of answers "DURING IMPLEMENTATION". The company has a lot of room for development: the completion of the implementation of all the criteria marked in this way will increase its score to 531 points, i.e. by 34%. The results also highlight the differences between the two companies, their politics and structure, but the fact that GENESIS Sp. z o.o. holds up so well the developed QMS practically eclipsed all issues in which genXone has advantages over GENESIS Sp. z o.o. such as technology or fact being a joint stock company. This research shows how important conforming to the ISO quality standards is in the process of measuring the level of excellence with EFQM model and how much it can affect the end result.

The limitations of this study include a small sample size and limited scope of discussion: the author recommends conducting further studies with an increased number of analyzed companies at various stages of implementation of different quality systems. Future studies would be able to describe correlation between implementing ISO quality standards and achieving higher results from EFQM model more efficiently with more data gathered in practical research. Future studies could analyze a specific company in its implementation of ISO quality standards and measure its level of excellence, investigate how these standards operate in different industries, or compare companies that have not implemented ISO

standards but have implemented EFQM models on how their performance is changing during the implementation and certification of the ISO standard.

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JAK NORMY ŘÍZENÍ KVALITY ISO MĚNÍ ÚROVEŇ FIRMY? STUDIE PROVEDENÁ NA DVOU SPOLEČNOSTECH POLSKÉHO ODVĚTVÍ DNA SEKVENOVÁNÍ ZA POUŽITÍ MATICE PRO ZLEPŠENÍ PODNIKÁNÍ

Tato studie zkoumá úroveň excelence dvou společností pomocí Business Improvement Matrix (BIM), která je založena na modelu excelence Evropské nadace pro management kvality. Porovnává tyto organizace a ukazuje, jak jejich systémy managementu kvality ovlivňují výsledky BIM. Zkoumanými společnostmi jsou genXone S.A., která je v procesu implementace systému managementu kvality v souladu s ISO 13485: 2016, a Centrum Genetyki Medycznej GENESIS Sp. z o.o., certifikované podle ISO 9001: 2015 od roku 2018. Obě společnosti patří do odvětví sekvenování v Polsku s pomocí sekvenování nové generace. Tato studie ukazuje, že společnost, která zavedla svůj systém řízení kvality a plně přijala své standardy, dosáhla vyšší úrovně excelence než společnost, která proces implementace svého systému řízení kvality právě zahájila.

WIE VERÄNDERN DIE NORMEN DER QUALITÄTSTEUERUNG ISO DAS NIVEAU DER FIRMA? EINE STUDIE DURCHGEFÜHRT AN ZWEI FIRMEN DER POLNISCHEN DNA-SEQUENZIERUNG INDUSTRIE UNTER VERWENDUNG EINER MATRIX ZUR VERBESSERUNG DER GESCHÄFTSQUALITÄT

Diese Studie untersucht das Niveau der Exzellenz zweier Firmen mit Hilfe der „Business Improvement Matrix“ (BIM), welche auf dem Modell der Exzellenz der Europäischen Stiftung für Qualitätsmanagement basiert. Sie vergleicht diese Organisationen und legt dar, wie deren Systeme des Qualitätsmanagements die Ergebnisse der BIM beeinflussen. Bei den Zielfirmen handelt es sich um genXone S. A., welche sich im Prozess der Implementierung des Systems des Qualitätsmanagements in Übereinstimmung mit ISO 13485 befindet, und Centrum Genetyki Medycznej GENESIS Sp. Z o.o., welche seit dem Jahr 2018 nach ISO 9001: 2015 zertifiziert ist. Beide Firmen gehören in Polen zum Zweig der Sequenzierung mit Hilfe der Sequenzierung der neuen Generation. Diese Studie legt dar, dass die Firma, welche ihr System der Qualitätssteuerung eingeführt und ihre Standards voll angenommen hat, das höhere Exzellenzniveau erreicht hat als diejenige Firma, welche den Prozess der Implementierung ihrer System der Qualitätssteuerung erst begonnen hat.

JAK NORMY ZARZĄDZANIA JAKOŚCIĄ ISO ZMIENIAJĄ POZIOM DOSKONAŁOŚCI PRZEDSIĘBIORSTWA? BADANIA PRZEPROWADZONE NA DWÓCH FIRMACH POLSKIEJ BRANŻY SEKWENCJONOWANIA DNA Z WYKORZYSTANIEM MACIERZY DOSKONALENIA PRZEDSIĘBIORSTWA

W niniejszym opracowaniu zbadano poziom doskonałości dwóch firm przy użyciu Macierzy Doskonalenia Przedsiębiorstwa (MDP), opartej na Modelu Doskonałości Europejskiej Fundacji Zarządzania Jakością (EFQM). Porównano te organizacje i pokazano, jak ich systemy zarządzania jakością wpływają na wyniki MDP. Badane firmy to genXone S.A., która jest w trakcie wdrażania systemu zarządzania jakością zgodnego z normą ISO 13485:2016 oraz Centrum Genetyki Medycznej GENESIS Sp. z o.o., certyfikowane wg ISO 9001:2015 od 2018 roku. Obie firmy należą do branży sekwencjonowania w Polsce, wykorzystującej sekwencjonowanie nowej generacji. Badanie to pokazuje, że firma, która wdrożyła swój system zarządzania jakością i w pełni przyjęła swoje standardy, osiągnęła wyższy poziom doskonałości niż firma, która dopiero rozpoczęła proces wprowadzania swojego systemu zarządzania jakością.

TIME ALLOCATION AND FEELINGS OF HAPPINESS OF SELF-EMPLOYED PERSONS – A GENDERED PERSPECTIVE

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Abstract

This article focuses on the division of the daily activities of self-employed persons on entrepreneurial activities, unpaid work, leisure time and other activities, and their interconnection to the feelings of happiness (as part of subjective well-being). Modified Time Use Survey (TUS) methodology was used to gather data on division of time and to identify SWB. The 13 groups of activities and 161 self-employed persons were included in the analysis. The results suggest that both self-employed men and women dedicate more than 8 hours per day for paid work. Daily activities during which the highest part of self-employed men and women feel the happiest belong to leisure activities. Unpaid work activities bring the highest feeling of happiness to 12.5 % of self-employed women. Feelings of happiness of self-employed women are more fluctuating during the paid work than feelings of happiness of self-employed men. In the evening, the feelings of happiness of the self-employed women decrease significantly, which could be caused by double burden of self-employed women.

Keywords

Self-employed persons; Gender; Subjective well-being; Time allocation; Entrepreneurship; Daily activities.

Introduction

Increasing interest in the issue of quality of life, happiness or satisfaction has undergone an interesting and contradictory development, especially in terms of finding appropriate indicators and ways to measure them. The complexity of the issue is evidenced by the shift of theoretical reflections from the neoclassical welfare economy (Edgeworth, Marshall, Pigou), through a new welfare economy (Pareto, Hicks, Hotelling, Kaldor), towards the economy of happiness (Easterlin, Frey, Stutzer, Kahneman, Diener, Veenhoven). At the same time, there is as assumption that economic activity, the production of goods and services, is certainly not an end, but has value only if it contributes to human happiness [1]. This applies also to self-employed persons, individuals who have voluntarily decided to devote their skills, time, and energy to achieving selected goals that they can manage themselves. As self-employment is an important part of the Slovak economy, we decided to pay attention to this issue in connection with the research of subjective well-being (SWB).

1 Literature Review

Satisfaction of self-employed persons has been addressed in several foreign studies. Some focus on the purely cognitive component of SWB of self-employed, such as income, wealth,

or economic prosperity [2]. Cognitive well-being is also associated with the conditions of doing business, the organizational structure of the company, flexibility, or independence. Author of [3] examined the impact of working and family conditions on the career success and mental well-being (cognitive SWB) of 111 self-employed persons. The results of his study show that conditions in the work environment affect the time spent at work, while conditions in the family environment explain fluctuations in time spent in the home or with the family. Among SWB-related factors, he examined autonomy/independence, inflexibility of working hours, work overload, engagement at work, parental responsibilities, engagement in the family, time spent at paid work (business), conflict between work and private life, career satisfaction, family satisfaction, life stress, and other variables (especially size of business, length of business). He found that gender, work, and family characteristics (number of children, partner/spouse) significantly affect time spent at work and time spent in the family. Author of [4] extended the cognitive SWB of self-employed persons by other factors that are by nature linked to self-employment (entrepreneurship and independence, diversity of entrepreneurial activity, business life cycle, entrepreneurial health).

The affective and cognitive components of SWB are interdependent. In a sample of 122 self-employed persons, article [5] pointed out the connection between the hedonic (affective) and cognitive components of SWB. Authors of [6] on a sample of 135 elf-employed persons from the Netherlands elaborated a classification of four determinants of SWB, namely commitment to work, job satisfaction, exhaustion and workaholism, which also cover both dimensions of SWB. According to them, these are significantly influenced by such factors as the achieved turnover, profit, and number of employees (the higher the profit and the number of employees, the happier the self-employed persons are).

Several studies point to the interrelationship between business and national happiness. Based on an analysis of available resources on entrepreneurship and SWB, study [7] found that the use of opportunities in the form of entrepreneurship contributes to societal happiness in the initial stages of entrepreneurship (in the later stages of entrepreneurship, however, this effect decreases significantly). Authors of [8] examined the impact of SWB on business in 75 European cities using data from the Quality-of-life survey. Authors of [9] focused on the impact of entrepreneurship on life satisfaction and happiness, pointing to their close connection with “national culture”.

Gender is an important determinant of affective SWB of self-employed persons. Authors of [10] examined the impact of a positive emotional family background on business success in a sample of 253 entrepreneurs. They pointed out that self-employed women can combine entrepreneurship with their families and can benefit more from an emotionally positive family background better than male entrepreneurs do. Authors of [11] found those self-employed who are more educated, married and have children, are happier than other self-employed persons. They also pointed out that self-employed persons show a significantly higher average level of happiness than employees.

There are no relevant studies in Slovakia focusing on the SWB (especially affective part of SWB) of self-employed persons. We try to fulfil, at least partially, this gap.

2 Research Subjects and Research Objectives

This article focuses on the self-employed persons in Slovakia, their daily activities and subjective well-being expressed as the extreme (positive) emotion during the day. Self-employment as part of small and medium sized enterprises (SME) in Slovakia belongs to the entrepreneurship (act 513/1991 Coll. Business Code) and self-employed person is a person, who gain income from business activities (act 461/2003 Coll. On Social insurance). The most

common form of self-employment is a trade business, covering 53.75% of all economic subjects and 93.72% of self-employed persons in Slovakia (source: based on data from Statistical office SR,2020). Self-employed persons represent a specific group of respondents, mainly because the length of their paid work (entrepreneurship/business activity) is not limited by law. Self-employed persons are not under the legal protection of the Labour Code, and they can perform paid work (business activities) for any length of time on working days and even on weekends. This can have a significant effect on the amount of time spent in unpaid work and leisure activities, but also on the subjective perception of happiness.

The main objective of the article is to find out in which activities during the standard working day the self-employed men and women in Slovakia feel the happiest, it means that their affective SWB is the largest. Because of the specifics of self-employed men and self-employed women, we focus on the daily activities and extreme positive emotion of those particular groups of self-employed persons.

Based on literature review, observation, and experience from previous research, we formulated the following research assumptions:

A1: We assume that self-employed men spend more time in paid work (entrepreneurship) than self-employed women, while self-employed women dedicate more time to unpaid work than self-employed men.

A2: We assume that the activity in which most respondents feel happy are leisure activities.

A3: We assume that the self-employed women feel happier in performing activities of unpaid work during the working day than the self-employed men.

3 Research Methods

To obtain information on the use of time and the affective component of SWB of self-employed persons, we conducted an original research based on a modified TUS methodology. The survey consists of two parts, household questionnaire (concerning on socio-demographic data of households, characteristic of the household, preferences of individual members of the household), and individual time diary for every member of the household. Within the survey, we addressed 833 households in Slovakia and 1,767 individuals (household members, it means individuals were members of surveyed households).

We conducted the survey in the period of April - May 2017; with respondents reporting data for 2016 (the research was conducted as part of the VEGA project [12]). We processed the results of the survey in the second half of 2017; the first processed data were available at the beginning of 2018. To ensure the representativeness of the sample we used weights considering the population structure (based on the data from 2011 census). The dataset of households is representative according to the number of household members, and the proportion of households in the regions. Dataset of individuals is representative according to the gender and age category of the respondent.

For the purposes of this article, we further analyzed the database of individuals, specifically information about self-employed persons. Out of the total number of 1,767 respondents, there are 161 self-employed persons (9.1%), almost 55.5% employees (in the private sector and in the public sector), 2.6% on maternity or parental leave, 1.2% unemployed, 14.8% students, 14.6% pensioners, 1.3% partially or permanently disabled persons, and 0.5% other economically inactive persons. Due to the setting of weights for the total sample, it is not possible to automatically assume the representativeness of the subset of self-employed persons according to the above characteristics. However, the survey is so original and unique

(not only in terms of time, but also in terms of space) that we nevertheless dare to publish its results with attention to the above fact.

To find out the emotions during the performance of various activities during the day, we used one of the methods of measuring the affective component of SWB, namely the method of a time diary supplemented with the question focused on the extreme emotions. Using the question "during which activity did you feel happiest?", we were able to connect extreme (positive) emotion with a specific activity. The time diaries included 13 groups of activities belonging to the paid work, unpaid work, and leisure time, based on the HETUS 2008 classification [13]. In terms of the HETUS classification, we distinguish following activities: personal care (divided into sleeping and personal care), paid work (employment, entrepreneurial/business activity, including travelling to and from work), study and self-study, household care (divided into cleaning, childcare, and assistance to adult household members), volunteer work and social interaction, social life and entertainment, sports and other outdoor activities, leisure activities, mass media, travel and other unspecified use of time.

Table 1 shows the structure of the research sample (self-employed persons) by gender.

Tab. 1: *Structure of self-employed persons by gender*

Gender	Number	Percentage
Males	111	68.7
Females	50	31.3
Total	161	100.0

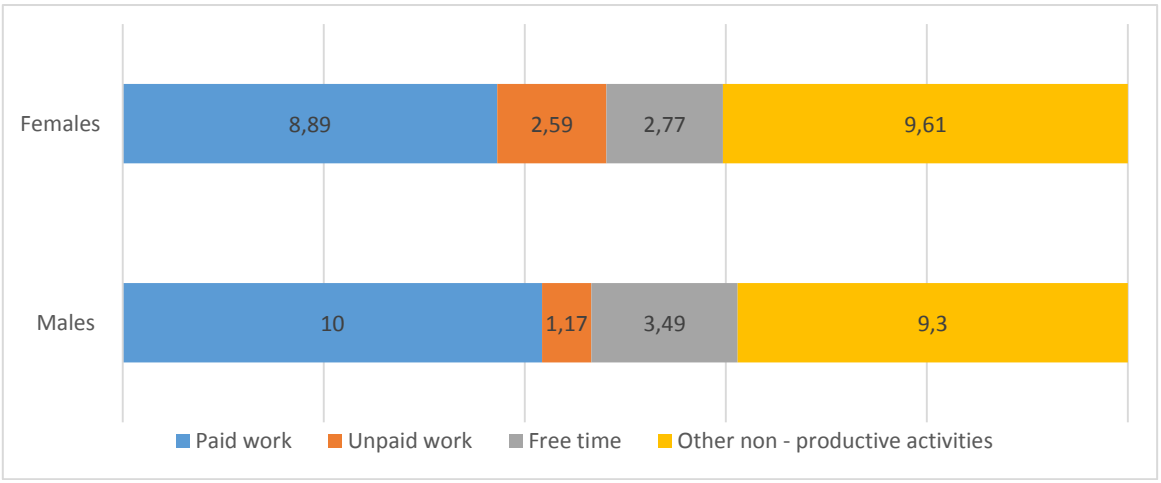
Source: Own calculations based on survey

To display information about extreme positive emotions (happiness) for 24 hours a day, we divided the day into 30-minute intervals. Even though these are relatively long intervals (a division of 10-15 minutes is used in case of official TUS [14], we consider this division to be sufficient.

4 Results of the Research and Discussion

Research assumption *A1* is based on the findings of previous research on unpaid work abroad and in Slovakia [10, 15]. This assumption points to the fact that women, despite their duties in paid work (in our case during the performance of entrepreneurial/business activity), manage to perform a larger extent of unpaid work than self-employed men do. On the other side, we assume that self-employed men spend more time in performing business activities. On the graph in Figure 1, there are data on daily activities (divided into paid work, it means entrepreneurship, unpaid work, free time and other non-productive activities.

Results show (and confirm assumption *A1*) that self-employed men perform more entrepreneurial activities than self-employed women (10 hours per day comparing to 8.89 hours per day). On the other hand, self-employed women perform more unpaid work activities (2.59 hours per day, comparing to 1.17 hours per day in case of men). Self-employed men have also more time for leisure activities (3.49 hours per day, comparing to 2.77 hours in case of women). Both men and women spend more time in paid work than is the maximum working time of employees (40 hours per week, it means 8 hours per day).



Source: Own

Fig. 1: *Daily activities of self-employed men and women during the working day (in hours)*

Experiencing feelings is subjective, and women and men tend to feel different during the same activities. It was confirmed also for self-employed persons in several studies [16], [17]. By using the question "during which activity did you feel happiest?", we collected information about happiest moments (linked with a particular activity) of self-employed persons in Slovakia. There is information on the number of self-employed men and number of self-employed women who experienced highest happiness during various daily activities in Table 2.

Tab. 2: *Daily activities and extreme feelings of happiness*

Men			
	Activity	**Frequency**	**Percent**
Valid	1	7	6.1
	2	3	2.6
	3	2	2.1
	4	17	15.5
	5	1	0.7
	6	2	1.4
	7	11	9.9
	8	0	0.0
	9	41	37.1
	10	6	5.7
	11	10	9.2
	12	6	5.4
	13	1	0.7
	Total	107	96.5
Missing	System	4	3.5
Total		111	100.0

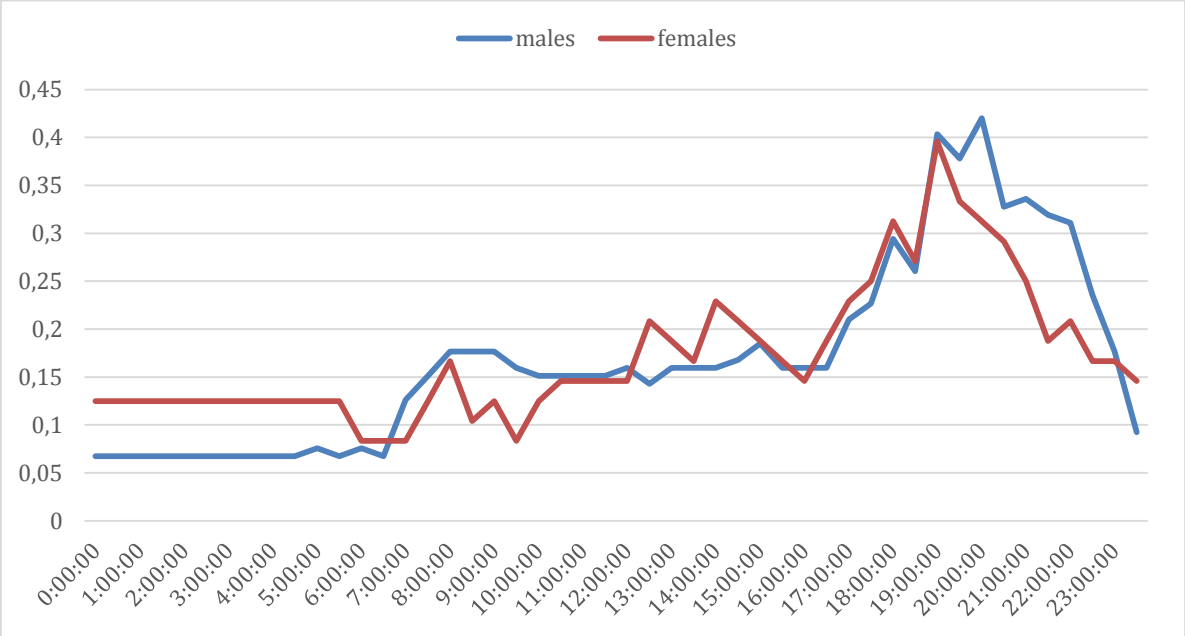
Women			
	Activity	**Frequency**	**Percent**
Valid	1	6	12.0
	2	2	3.2
	3	0	0.0
	4	5	9.5
	5	0	0.0
	6	6	12.5
	7	5	9.3
	8	0	0.0
	9	13	26.8
	10	4	7.8
	11	6	12.6
	12	1	1.6
	13	0	0.0
	Total	48	95.3
Missing	System	2	4.7
Total		50	100.0

Activities: 1 = sleeping, 2 = personal care, 3 = travelling, 4 = paid work, 5 = study and self-study, 6 = household care, 7 = childcare, 8 = adult care, 9 = free time - leisure activities, 10 = free time - cultural and social activities, 11 = free time – sport and physical activities, 12 = free time - usage of modern technologies, 13 = volunteer work

Source: Own

The results show that the daily activity during which the highest part of self-employed men and women feel the happiest are leisure activities (assumption A2 was confirmed). More than 37% of men and almost 27% of women feel the strongest emotion of happiness while performing leisure activities. These activities include rest, reading books and magazines, listening to music, watching TV. The paid work (entrepreneurship) is the second most numerous group of activities in case of self-employed men (15.5% of self-employed men feel the happiest while at paid work). Surprisingly, care for children brings the highest happiness only for less than 10% of self-employed men and self-employed women. Unpaid work activities (including food preparation, washing up, cleaning, doing the laundry, ironing, house/garden/car repair and maintenance, shopping, and dealing with authorities) brings the highest feeling of happiness to 12.5% of self-employed women, but only to 1.4% of self-employed men (assumption A3 was confirmed).

The so-called double burden of women is a part of their lives also in case of self-employed women. Besides knowing daily activities and feeling of happiness, we were also interested in the development of the feeling of happiness during the day. There is a development of feeling of happiness of self-employed men and self-employed women during the day in Figure 2. The figure shows time intervals on the x-axis (from 0:00 to 24:00, divided by 30 minutes). The *y*-axis shows the shares of those self-employed persons in the total number of self-employed (divided by gender) who feel extremely positive emotion (happiness) at a given time.



Source: Own elaboration

Fig. 2: *Extreme emotion of happiness of self-employed persons, divided by gender*

The graph in Figure 2 shows how the extremely positive emotions develop in different categories of self-employed persons during the day (24 hours). The results of the survey show that feeling of happiness of self-employed women is more fluctuating during the paid work (between the 7 am and 4 pm) than feeling of happiness of self-employed men at the same time. More self-employed men feel happiest in the morning (7:00 am till 12:00 midday) than self-employed women. It could indicate higher focus on the work, not interference by morning household routines. On the other hand, more self-employed women feel happiest in the early afternoon (12 till 3 pm), which is still time of the paid work. It could indicate higher enthusiasm for finishing the business activity and starting other daily activities. For both, men and women, the feeling of happiness is increasing in the late afternoon and early evening

(from 4:30 p.m. till 7 p.m.). After 7 p.m., the feelings of happiness of the self-employed women decrease significantly, compared to self-employed men (the share of self-employed women who feel extreme emotions of happiness at this time is lower than the share of self-employed men). During the evenings, there are mainly activities that fall into the category of home and family care and free time activities. It seems that the double burden of women is so exposed in the evening that their feeling of happiness is decreasing.

This finding contradicts the results, which apply to women and men employed in the private sector. In this group of respondents (employees in the private sector), female employees show a significantly higher share of extremely positive emotions than employees do [18]. It can be concluded (however, only implicitly) that entrepreneurship and the obligations associated with business activities, irregular working hours, diverse and non-routine work activities during the day, and overall energy demanding business activities cause greater emotional exhaustion and a faster decline in positive emotions of self-employed women than of employed women.

Conclusion

Doing business means undertaking voluntarily certain level of risk and it requires a lot of energy, strength, will, and endurance. Doing business is physically, mentally, and emotionally extremely demanding. Behind the high work commitment, there are both positive and negative emotions that naturally accompany business activities. Achieved success, good market position, successful coping with competition or innovation, all this help to fulfil feelings of happiness and satisfaction.

When examining the division of time on various daily activities and affective component of SWB of self-employed persons in Slovakia, we focused on the gender that in our opinion, significantly affects not only the time devoted for various activities, but also the SWB. Using the data from original research (based on modified Time Use Survey methodology), we confirmed the assumption that self-employed men spend more time in paid work (entrepreneurship) than self-employed women, while self-employed women dedicate more time to unpaid work than self-employed men. We also confirmed that that the daily activity during which the highest part of self-employed men and women feel the happiest are leisure activities (these activities include rest, reading books and magazines, listening to music, watching TV). Results also indicate that self-employed women feel happier in performing activities of unpaid work during the working day than the self-employed men.

The research also shows interesting findings regarding the emotional stamina and intensity of the emotions experienced by self-employed women. We found out that, during the whole working day, emotional feelings in case of women are more fluctuating than in the case of men. These emotional fluctuations can be explained by a more spontaneous involvement of self-employed women in managing work responsibilities and solving work problems, considerable personal responsibility, greater empathy, more intensive social interaction with co-workers, business partners or other entities. This is reflected in their exhaustion and relatively sharp drop in positive emotions in the evening compared to men. Entrepreneurship, therefore, from the point of view of gender, causes self-employed women greater emotional discomfort than men and reduces their affective component of SWB.

The research has several limitations. First of all, the sample of self-employed persons was not representative, and it is not possible to draw generally valid conclusions. Data were collected in 2017, in the period of expansion, without any influence of Covid-19 pandemic. Pandemic could have influence not only on the changes in the work performance (such as work from home also in case of self-employed persons), possibility to continue with the

entrepreneurship, but also subjective feelings associated to daily activities. In the future research, it is necessary to include also influence of the Covid-19 pandemic, to correlate daily activities and associated feelings with various characteristics of self-employed persons and Slovak economic environment.

Acknowledgements

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ALOKÁCIA ČASU A POCIT ŠŤASTIA SAMOSTATNE ZÁROBKOVO ČINNÝCH OSÔB Z HĽADISKA POHLAVIA

Príspevok sa zameriava na rozdelenie času samostatne zárobkovo činných osôb na platenú prácu (podnikanie), neplatenú prácu, voľný čas a ďalšie neprodukčné činnosti a ich prepojenie na pocity šťastia (ako súčasť subjektívneho wellbeingu – SWB). Na zber údajov o alokácii času a identifikáciu SWB bola použitá modifikovaná metodika Time Use Survey (TUS). Do analýzy bolo zaradených 13 skupín aktivít a 161 samostatne zárobkovo činných osôb. Výsledky naznačujú, že samostatne zárobkovo činní muži aj ženy venujú platenej práci (podnikaniu) viac ako 8 hodín denne. Medzi činnosti, počas ktorých sa najväčšia časť samostatne zárobkovo činných mužov a žien cíti najšťastnejšie, patria voľnočasové aktivity. Neplatená práca prináša najväčší pocit šťastia pre 12,5 % samostatne zárobkovo činných žien. Pocity šťastia samostatne zárobkovo činných žien vykazujú počas platenej práce väčšiu fluktuáciu ako pocity šťastia samostatne zárobkovo činných mužov. Vo večerných hodinách pocit šťastia samostatne zárobkovo činných žien výrazne klesá, čo môže byť spôsobené tzv. dvojitým bremenom žien.

ZEITVERTEILUNG UND GLÜCKSGEFÜHLE SELBSTSTÄNDIGER PERSONEN – EINE GESCHLECHTSPERSPEKTIVE

Der Beitrag konzentriert sich auf die zeitliche Einteilung von Selbstständigen in Erwerbstätigkeit (Unternehmertum), unbezahlter Arbeit, Freizeit und anderen nicht produktiven Tätigkeiten und deren Zusammenhang mit Glücksgefühlen (im Rahmen des subjektiven Wohlbefindens – SWB). Eine modifizierte Time-Use-Survey-Methodik (TUS) wurde verwendet, um Zeitzuweisungs- und SWB-Identifikationsdaten zu sammeln. In die Analyse wurden 13 Tätigkeitsgruppen und 161 Selbständige einbezogen. Die Ergebnisse deuten darauf hin, dass selbstständige Männer und Frauen sich mehr als 8 Stunden täglich einer bezahlten Arbeit widmen (Unternehmertum). Zu den Aktivitäten, bei denen sich die meisten selbstständigen Männer und Frauen am glücklichsten fühlen, zählen Freizeitaktivitäten. Unbezahlte Arbeit bringt für 12,5 % der selbstständigen Frauen das größte Glücksgefühl. Die Glücksgefühle selbstständiger Frauen zeigen eine stärkere Fluktuation während der Erwerbstätigkeit als die Glücksgefühle selbstständiger Männer. Abends lässt das Glücksgefühl selbstständiger Frauen deutlich nach, was durch die sogenannte Doppelbelastung der Frauen hervorgerufen werden kann.

ALOKACJA CZASU A POCZUCIE SZCZĘŚCIA OSÓB SAMOZATRUDNIONYCH – PERSPEKTYWA PŁCI

W artykule skupiono się na podziale czasu osób samozatrudnionych na pracę zarobkową (działalność gospodarcza), pracę nieodpłatną, czas wolny i inne czynności nieprodukcyjne oraz ich związek z poczuciem szczęścia (będącego elementem dobrostanu subiektywnego – SWB). Do gromadzenia danych dotyczących alokacji czasu i identyfikacji SWB wykorzystano zmodyfikowaną metodykę Time Use Survey (TUS). Analizą objęto 13 grup czynności oraz 161 osób pracujących na własny rachunek. Wyniki wskazują, że samozatrudnieni mężczyźni i kobiety poświęcają więcej niż 8 godzin dziennie na pracę zarobkową (działalność gospodarczą). Czynności, podczas których większość samozatrudnionych mężczyzn i kobiet czuje się najszczęśliwsza, obejmują zajęcia rekreacyjne. Praca nieodpłatna przynosi największe poczucie szczęścia 12,5% kobiet pracujących na własny rachunek. Poczucie szczęścia samozatrudnionych kobiet wykazuje większą zmienność podczas pracy zarobkowej niż poczucie szczęścia samozatrudnionych mężczyzn. W godzinach wieczornych poczucie szczęścia samozatrudnionych kobiet znacznie spada, co może być spowodowane tzw. podwójnym obciążeniem kobiet.

E-COMMERCE LIVE STREAMING – AN EMERGING INDUSTRY IN CHINA AND A POTENTIAL FUTURE TREND IN THE WORLD

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Abstract

With the widespread use of the Internet, many industries have developed rapidly. The economy based on the Internet poses a significant threat to the traditional economy. Live streaming plus e-commerce, which is acknowledged as the current global economic status, is the result of combing live streaming and various industries through the Internet.

E-commerce live streaming is one of the most essential types of online live streaming. In this article, it is defined as the live streaming of the e-commerce platform used by Key Opinion Leaders or product sellers through the built-in live streaming function of the platform to propagate goods, brands, events, etc. to achieve goals of brand exposure and product sales. Compared with the traditional economic model, the combined model of e-commerce and live streaming has its advantages and characteristics. This kind of marketing tool is now prevalent. However, there are many deficiencies in e-commerce live streaming that need to be improved since the development of e-commerce is immature and supervision of Internet use is ongoing.

Keywords

Consumer behavior; Digital and social media; E-commerce live streaming; New media marketing.

Introduction

Since the ‘90s, the emergence of e-commerce on a global scale has been changing the existing economic structure fast, as well as the traditional economic growth model and the operation mode. E-commerce, as a new economic model, has shown high potential and has become an essential indicator regarding the level of economic development and sustainability of each nation. Today, live streaming, as a new trend, is naturally known to everyone. It has been the topic of relish due to its trending popularity, various forms, and diverse platforms. Live streaming has all advantages of the network resources, such as fast speed, convenience, and interaction where global e-commerce has presented a colorful pattern. Audiences are involved hence they create interests, which satisfy their interests through using live streaming to advertise or report products. Surprisingly, the growing live streaming business combined with various industries operating through the Internet has developed rapidly worldwide, especially in China. They have formed a global economic phenomenon ‘live streaming plus economy’. Since the phenomenon of live streaming has been quite common, some online marketing agents begin to take full advantage of the broadcast to promote their sales. Compared with the

traditional marketing channels, live streaming has played a more and more critical role in marketing in the global market.

As an essential infrastructure for the new era of the 21st century, network construction has been attached with great importance in China. In the last six years when 4G was officially deployed and used, China's 4G Internet has reached the leading global level in terms of scale and coverage. The 2nd version of 'Completion of the leading indicators of the communications industry from January to May 2020' published by the Ministry of Industry and Information Technology of China, shows that the number of mobile phone users in China has reached 1.592 billion, of which 1.279 billion are 4G users, and the number of mobile Internet users has reached incredible 1.319 billion.

From the data point of view, China is indeed a country with veritable mobile Internet, and its network infrastructure is relatively complete. With the world's most significant number of network users and massive network resources, the 4G network in China, has covered 98% of the country's population [1].

With the extensive promotion and popularization of the 4G mobile Internet, the high penetration rate of the Wi-Fi wireless network, and the high ownership rate of mobile smart devices, China's e-commerce has transformed from the PC era to the mobile network era. With the help of technological development, e-commerce live streaming grew explosively in 2019, with a transaction volume of about 440 billion CNY (55 billion EUR) [2].

1 Research Objectives

The live streaming platform's earliest content fields are the showing and the gaming industry, and there is little involvement in other fields. With the development of mobile Internet and the popularization of smart hardware, users gradually get rid of time and space limitations and can use their mobile devices to live stream and watch the live streaming at any time. The live streaming platform's content also began to expand into education, finance, e-commerce, sports, automotive, and other industries, which indicates that it has entered the era of 'live streaming plus'.

Prior studies of e-commerce live streaming found out that the scale of e-commerce live streaming transactions in China would reach 961 billion CNY (120.125 billion EUR) in 2020 while the growth rate will reach 111% [3]. The number of live streaming content creators has also increased significantly. Post-90s and post-95s generations have become core users of live streaming platforms [4]. The online live streaming platform has subverted the traditional way of information dissemination and opened a new milestone for real-time interaction of disseminated information. This feature of online live streaming has gradually been sought after by e-commerce platforms. From a strategic point of view, live streaming is a means for e-commerce platforms to carry out branding and infrastructure construction. From the perspective of development trends, with the further spread of 5G, VR, and AI technology, e-commerce live streaming will be in a rapid development period in the next few years [5].

Although in just a few years, e-commerce live streaming, as an emerging industry, has developed extremely rapidly and successfully in China, there is currently a trend of slowing down, and the potential threats to its further development are also gradually revealed.

In this article, the authors will focus on China as the main object of discussion and Germany as the reference object, to better analyze the success factors of the smooth development of e-commerce live streaming in China and also the potential threats and obstacles for the future development. In the following, the article will be mainly divided into three main parts:

In the first part of the article, we are going to introduce and analyze the development of Chinese e-commerce live streaming from the following aspects:

1. Related theories which can explain the current situation of e-commerce live streaming,
2. The rising reasons for e-commerce live streaming in comparison with traditional e-commerce and
3. A survey which can further prove the analysis from consumers' perspective.

In the second part, the authors will analyze why e-commerce live streaming does not rise in Germany currently.

In the last part, the authors will list the current potential problems of e-commerce live streaming and corresponding development strategies and suggestions based on the survey results and related literature.

2 Related Theories

Before analyzing the characteristics of e-commerce live streaming in detail, the following related theories can help us better understand the principles of its success.

2.1 Agenda-Setting Theory

The theory shows that although the mass media cannot determine people's views on a specific event, they can influence people's attention by arranging issues and therefore decide what people should think at a particular time [6]. As a kind of mass media, the e-commerce live streaming platform also has the same agenda-setting function, at least it will decide which products people should pay attention to during online shopping carnivals such as Chinese Singles Day (11/11) and Double 12 Day (12/12) and during other brand activities. In essence, it is also a kind of agenda-setting that influences the products that people pay attention to at a specific time, rather than influencing the user's opinions on the product itself.

2.2 KOL Theory

KOL, the abbreviation of Key Opinion Leader, is a concept in marketing. It is usually defined as people or organizations with more accurate product information, whose opinions are accepted and trusted by a relevant group of people. They also have a significant influence on the group of people's purchasing behavior.

The theory believed that the mass media had an irresistible and overpowering force. The information it transmitted was like a bullet hitting the human body, which could influence people's attitudes and opinions. The audience was completely passive under this scenario. People discovered that there were two levels of communication in the process of information dissemination. The mass media do not directly pass the information to the audience but pass information in the way of the link of opinion leaders [7].

During e-commerce live streaming, the streamers act as opinion leaders to pass the information to the general audience. At the same time, they also act as gatekeepers who decide what kind of information should be passed to the audience. The information chosen by live streamers will affect the consumer's opinions on purchasing the product. It can explain why those top streamers have so many fans, enormous appeal, and amazing sales figures.

2.3 Spiral of Silence Theory

This concept describes the following phenomenon: When people express their ideas and opinions and find out that the opinions, they agreed with, are widely welcome, they will

actively participate, and such opinions will be more and more diffused; while when people find their opinions are not accepted by most of the people, they will remain silent even if they insist on this opinion. In this circumstance, their silence, in turn, increases the other party's strong insistence. In this cycle, one party's voice becomes more durable and more substantial, and the other party becomes weak [8].

During the e-commerce live streaming activity, live streamers always use this theory to lead the audience to make comments, most of the people will actively participate in obtaining corresponding benefits, a small number of people have different views, however, they eventually tend to converge theirs to the majorities due to the fear of isolation. On the other hand, live streamers will also use this theory to establish trust with most users and achieve the conversion from interaction to sales.

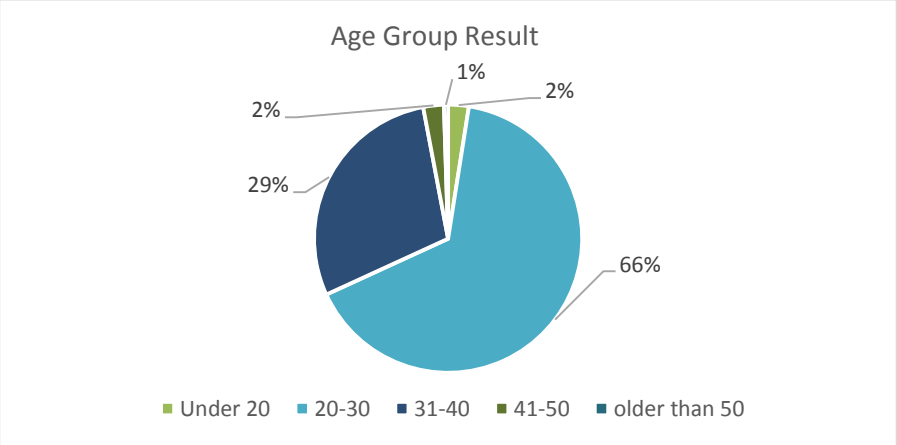
2.4 Uses and Gratifications Theory

The theory's significance is that it believes that the audience's media contact is an activity of selecting media content based on their own needs. This choice is a kind of 'subjective initiative' that can replace the viewpoint that 'audiences are passive' [9].

This theory is reflected in the e-commerce live streaming activity that before users need to buy goods, they must understand the product information. Through the live streaming function of the e-commerce platforms, the users' demand for a deep understanding of the products can be met, and therefore facilitating the final purchase behavior.

3 Research Methods

To analyze the attitude of Internet users towards e-commerce live streaming more objectively, the authors have conducted a survey, sent by e-mail from May to July 2020 and collected 201 valid questionnaires. Among the 201 participants, there were 99 males and 102 females. The age of the respondents of the survey is shown in graph in Figure 1.

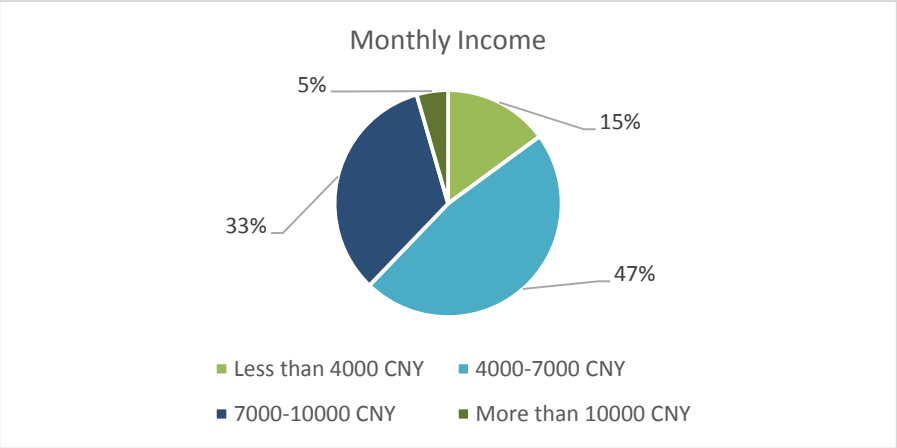


Source: Survey conducted by the authors

Fig. 1: *Age of respondents in years*

4 Research Results

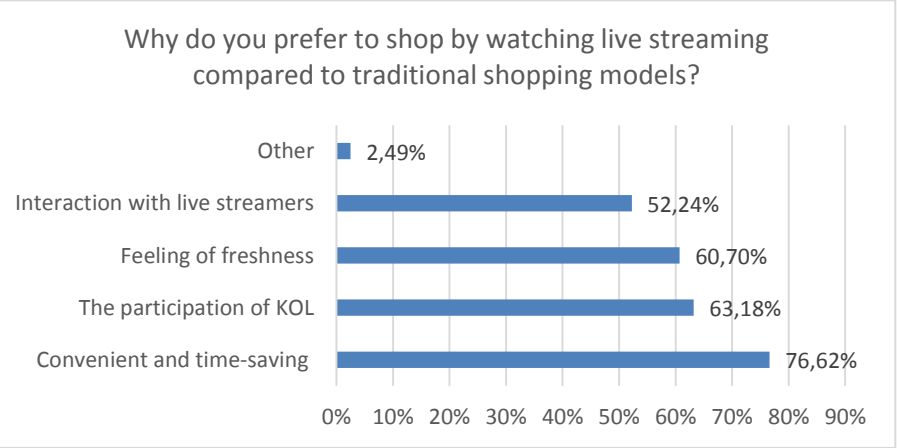
One hundred and thirty-two people among them were between 20 to 30 years old, accounted for 66% of the total amount of interviewees. Most of them are students and young people who have just graduated or career freshmen. Fifty-eight people were between 31 to 40 years old. People in these age groups were all post-90s and 80s; most of them were usually curious about new things and liked to follow the trend.



Source: Survey conducted by the authors

Fig. 2: *Monthly income*

According to survey data and shown in Figure 2, about 47% of all participants earned monthly between 4,000 (500 EUR) and 7,000 CNY (875 EUR), and about 33% of them earned more than 7,000 (875 EUR) but less than 10,000 CNY (1,250 EUR) per month. In the average salary data for 2019, the annual average wage of persons employed in urban non-private units in China was 90,501 CNY (11,313 EUR), which is an increase compared to the annual average wage of 8,088 CNY (1,011 EUR) over the previous year, and it was 7,541 CNY (943 EUR) if converted to an average monthly salary. The annual average wage of persons employed in urban private units in China was 53,604 CNY (6,700 EUR), equivalent to 4,467 CNY (558 EUR) per month [10]. It shows that most of the participants' salary was at the upper-middle level of China's average salary.



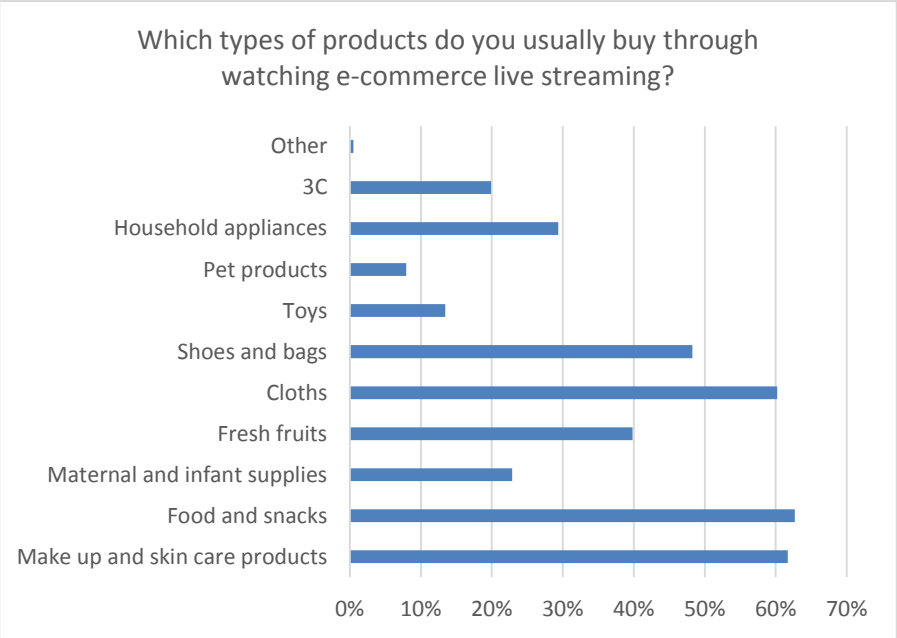
Source: Survey conducted by the authors

Fig. 3: *Reasons for watching e-commerce live streaming*

E-commerce live streaming shows as a new popular trend, see Figure 3, mainly because of its target audience, who are young generations of being post-80s and post-90s. The young generation has become the leading consumer group in China. According to data, in the 11th November (shopping festival in China), 2019, 55.9% of respondents who aged from 22 to 25 years old (post-95s), used installment buying, with an increase of 70% from the previous year, and accounted for the largest share in all age groups, followed by the group of people aged from 26 to 29 years old (post-90s) [11].

Among the respondents to the questionnaire, 96% of people indicated that they liked watching live streaming sales, only nine people said they did not like watching them. Most consumers were more willing to shop by watching live streaming than traditional shopping models

because live stream shopping is convenient and time-saving, as mentioned by 76.62% of participants. Besides, KOL's participation, feeling of freshness, and interaction with live streamers were also main reasons for them to choose live stream shopping. Some other people preferred to shop by watching live streams because they could receive much more discount coupons from the live room.



Source: Survey conducted by the authors

Fig. 4: *Frequently bought types of products*

By investigating the types of goods that Internet users purchase by watching e-commerce live streaming most often, we found that food and snacks, makeup, and skincare products, as well as clothes, shoes, and bags, are the most frequently bought things, see Figure 4.

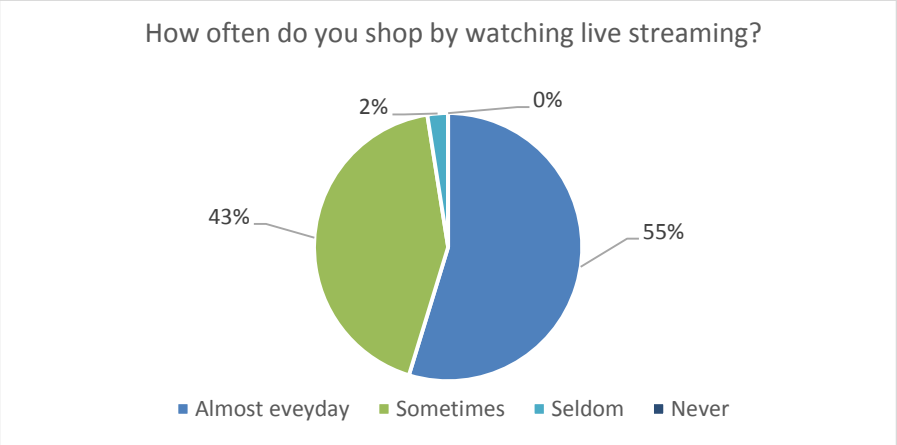
According to data, China's snack food market size reaches 347,795 million CNY (44 million EUR) in 2020. The market is expected to grow annually by 5.5% [12]. The e-commerce sales amount of the snack industry in 2018 was 62.1 billion CNY (7762.5 million EUR), with a year-on-year increase of 23.4%. Euromonitor International data shows that supermarket is still the primary sales channel of food and snacks, accounting for 60% in the whole market, followed by chain stores. Though the proportion of the sales of the e-commerce channel is not the largest, it is increasing quickly in the past few years [13].

In 2018, e-commerce became the largest sales tool for cosmetics and skincare in China, followed by supermarkets and department stores. According to data from the National Bureau of Statistics, from January to October 2019, the total retail sales of cosmetics in social consumer goods was 238.2 billion CNY (29,775 million EUR) with a year-on-year growth rate of 12.1%. The total e-commerce sales of cosmetics will likely reach a hundred billion CNY (12.5 billion EUR) in 2020.

At present, the leading e-commerce platforms in the clothing industry are still traditional platforms such as Taobao, Tmall, JD, and Vipshop. It is estimated that the proportion of social e-commerce platforms such as TikTok, Kuaishou will continue to increase in the future. Reasons for this are, on the one hand, traditional e-commerce is facing exhaustion of traffic, and social e-commerce uses social networks to achieve low-cost referral traffic; on the other hand, social e-commerce facilitates purchases through consumers' trust with a high conversion rate.

However, now it is evident that live streaming coverage is getting wider, from 3C digital products (Computer, Communication, and Consumer Electronics) and household appliances to automobiles, and real estate, all frequently appeared in live rooms.

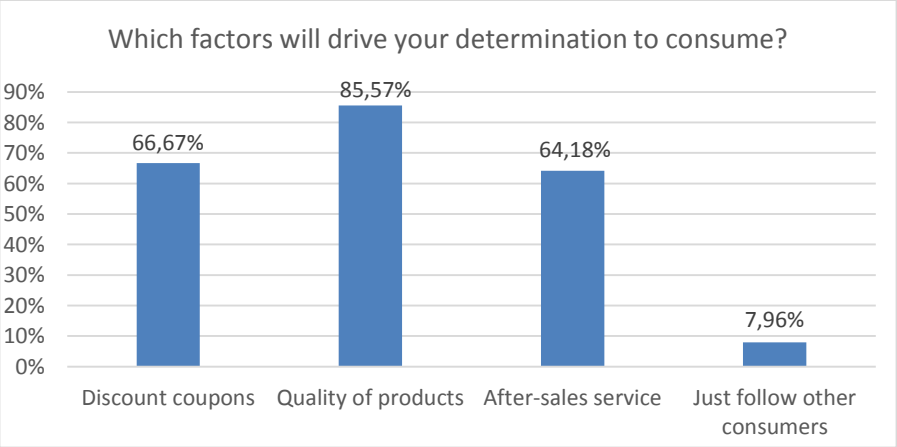
In April 2020, Yonghao Luo, who is one of the first generations of Internet celebrities, has completed his first live stream in TikTok. Unlike other live streamers, the major subscribers of Luo are males, so he focuses more on 3C digital products in goods selection. According to the data, his entire live stream lasted 3 hours, the total payment transaction exceeded 110 million CNY (13.75 million EUR) and cumulated more than 48 million viewers. Luo set the known highest live stream sales record on the TikTok platform. On the same day, Viya even sold rockets in her live room. Only with 5 minutes, more than 800 people paid deposits, and transactions were finally successfully concluded [14].



Source: Survey conducted by the authors

Fig. 5: *Frequency of watching live streaming*

According to the survey, 110 out of 201 participants shop by watching live streaming almost every day, see Figure 5, which suggests that over 54.73% of people show the strong intention of using such modern tool while the remaining proportion of people shows less intention of using the live streaming tools. However, none of the participants has ever watched e-commerce live streaming, which again proves the view that e-commerce live streaming is increasing fast enough in the young generation's lives.

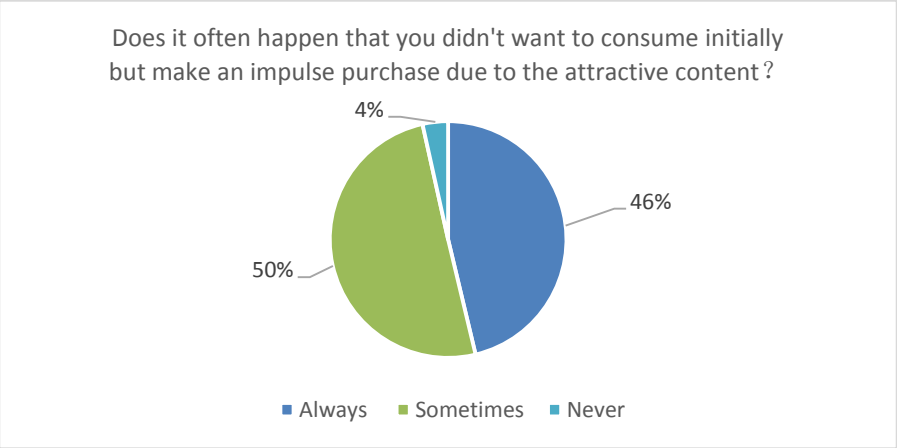


Source: Survey conducted by the authors

Fig. 6: *Determinant factors of promoting consumption*

Among the respondents, see Figure 6, 85.57% of people indicated that high quality of goods was the primary reason for them to consume or purchase, while some other factors such as

discount coupons and after-sales service would also affect viewers' willingness to purchase. Compared to traditional e-commerce shopping, Internet users can have further understandings of products recommended by live streamers by watching e-commerce live streaming. However, it still cannot altogether avoid some bad shopping experiences caused by problems of product quality, delivery, and after-sales service. Indeed, several consumers do not consider so many factors, but are attracted by the intense time-limited buying activities in the live room and placed an order following the other consumers.



Source: Survey conducted by the authors

Fig. 7: *Frequency of impulse purchase*

More than half of these 201 participants indicated that impulse purchasing happens from time to time, which can be interpreted as they do not want to consume initially but make an impulse purchase due to the attractive content; In the survey, see Figure 7, only 4% of participants have never made an impulse purchase before. Thus, it proves that most people are emotional and impulsive when watching live stream sales. They will spend unnecessary money when they are emotional especially when there are big discounts, and many other viewers are snapping up in the live room. The psychology that stimulates users to pay is 'the conformity with a sense of urgency driven by interests'.

The participants showed that, from their experience, there is still much room for e-commerce live streaming shows to improve. According to data, the top three complaints about online consumption in 2020 in China are refund issues, shipping issues, and product quality, followed by other problems such as return issues, selling fakes and after-sales services, etc. [15].

As more and more consumers begin to focus on product quality, it proves that Chinese residents' economic conditions have been improved. The increase in residents' income has enhanced their material requirements. In recent years, competition in the e-commerce industry has become increasingly fierce. For each e-commerce platform, 'Quality' has even become the guarantee of platforms' core competitiveness.

Besides other things, consumers also pay more and more attention to the authenticity of products and after-sales service; it shows that with social development and the improvement of living standards, consumers' rights and self-protection awareness are getting enhanced.

5 Reasons and Analysis of the Rise of e-Commerce Live Streaming Platforms

In China, live streaming, as a technology output, just like Internet technology, is deeply penetrated to various fields. Sports, games, education, finance, automotive, and other industries can all be related to live streaming, so the model of 'live streaming plus' appeared.

This chapter will primarily analyze the generation of the model ‘E-commerce plus Live streaming’ from the following aspects:

5.1 Wanghong Economy (Internet Celebrity Economy), Celebrity Effect

Wanghong economy is the nascent Chinese digital economy based on influencer marketing in social media, which can attract the attention of Internet users and convert into profit through e-commerce and online advertising.

The emergence of live streaming has provided new enlightenment for the transformation of e-commerce. Most of the live stream influencers are Internet celebrities and stars who attract many fans to follow, which can be easily understood as KOLs. The new marketing strategy has been formed through the combination of KOLs and e-commerce live streaming.

The famous cosmetics brand Maybelline New York had made use of live streaming in 2016. They invited Angelababy (a famous actress) and other 50 online celebrities to go on the broadcast together. According to the statistics, they sold 10,000 lipsticks in just 2 hours, and the sales are more than 1.4 million CNY (175,000 EUR) [16]. The new marketing model of 'live streaming plus economy' has prompted users to make consumption decisions, reduced the consumers' cost, made the users fully understand products, broken the space barriers, and improved the user's engagement and motivation.

According to data, nearly 40% of consumers were willing to purchase the products recommended by KOLs, among them, female users are more likely to be affected [17].

5.2 Attract Consumer Traffic through Live Streaming

For e-commerce companies, page views represent consumer traffic, and traffic is the basis for stores to achieve conversion. Therefore, e-commerce platforms always pay many efforts to attract consumers’ attention, and they work harder when they find stimulation such as shopping festivals, discount coupons, clearance sales, etc. However, after the e-commerce industry entering the period of steady growth, these methods are not attractive enough to stimulate consumers. Since consumers are getting tired and confused by unpredicted price fluctuations, they are not interested and loyal to certain brands. In contrast, live streaming sales are very attractive to consumers. E-commerce live streaming can display products in all directions, and simultaneously, live streamers can interact with consumers in real-time to bring them a new shopping experience and thus effectively focusing user attention to import traffic for the stores.

5.3 Obtain Consumers’ Demands as Soon as Possible

The core of the competition of e-commerce is the consumer. The quicker sellers accurately understand the trend and adapt to consumers’ real needs, the more benefits they will get. Therefore, many companies have set user research departments to understand their target users better. E-commerce live streaming is highly interactive, and live streamers can communicate with consumers about products in real-time so that they can understand the user's needs and consumption preferences as soon as possible. Through the deep interaction, a relatively stable relationship will be built by both parties: Consumers are willing to express their real demands, and merchants who receive feedback can adjust the products in time to meet the needs, thus increasing the economic efficiency. Therefore, live streaming is a useful tool for e-commerce platforms to obtain user attributes and needs.

5.4 Real Product Information

The primary way of traditional e-commerce to display products was pictures and texts. Although some platforms have started to use short videos to display product features, they failed to catch the real information to comprehensively estimate products. Besides, the texts, pictures, and videos were all carefully edited and modified before uploading to the platforms, which confused consumers about the real quality of the product. However, e-commerce live streaming broke the information asymmetry between sellers and consumers because it cannot be modified. Once the anchor starts live streaming, all product features and the anchor's behaviors will be exposed. Its characteristics let consumers realize the e-commerce live streaming's advantage of 'What you see is what you get', which shortens the distance between consumers and products, and gives consumers a unique but real shopping experience. Simultaneously, the live streamers of e-commerce platforms will also use a series of skills to enhance the real sense of product information dissemination. For instance, if live streamers are about to sell clothes, they will mark their height and weight and try clothes on, so that consumers can have a further understanding of the clothing information based on the real data. It will reduce the fitting errors from not trying cloth at present. The form of e-commerce live streaming effectively reduces the barriers in the process of information dissemination and lets users become the first-level information receivers, at the same time, the reliability of information is also improved.

5.5 Improve Consumers' Shopping Environment

In addition to the lack of interaction, traditional e-commerce also has another significant disadvantage: lack of social behavior and shopping atmosphere. Social behavior here means communicating with each other, and the shopping atmosphere means a lively atmosphere when buying on-site. However, in contrast, live stream shopping has these characteristics. When watching a live stream, viewers can make comments, give tips and gifts to streamers, there are also some reminders on the screen like 'XXX is buying the product' and significant discounts and coupons for the viewers. It can, on the one hand, increase user activity, and on the other hand, trigger consumers' desire to purchase.

5.6 Increase Interaction and Communication

E-commerce platforms use live streaming to gather the user's attention into the live room, closely connecting customers and products and facilitating interaction between consumers and live streamers. Traditional e-commerce generally uses pictures and texts to display product information. Under this situation, consumers obtain limited and visual information about products which leads to information asymmetry where information is unidirectional, and consumers are passive. However, e-commerce live streaming can exchange information in a visual face-to-face way between anchors and consumers because they can communicate in real-time. No matter what consumers want to know, they can give timely feedback to the anchor. The anchor will answer according to the user's needs, and consumers can actively choose the information they need to obtain.

The process of information dissemination is mainly composed of five essential elements: disseminator, media, content, audience, and feedback [5]. During e-commerce live streaming, the anchor is the disseminator, the platform is the media, product information is the content, viewers, and consumers are the audience, and the real-time interaction between the consumers and the anchors is the feedback. In daily communication, it takes a while for the disseminator to receive user feedback. For example, many consumers may evaluate the products on the platform after a period of use, but the information provided is no longer current, the demand of users may already have been changed. In contrast, the real-time interactivity of e-

commerce live streaming platforms guarantees the timeliness of information feedback. Sellers can receive consumer feedback or opinions on products at the same time, which is convenient for them to edit and modify products or services in real-time. Simultaneously, timely obtainment of user needs can adjust the supply of commodities, which can effectively avoid product surplus.

5.7 Determine Target Consumers More Accurately

Nowadays, commercial advertisements exist everywhere. However, many people are averse to the massive amount of advertising information, and the desired effect may not be achieved. E-commerce live streaming has transformed the form of advertisements by displaying the original advertising content in the form of live streaming and interacting genuinely with viewers. The new way of information transmission cannot only bring freshness to consumers but also be more easily be adopted. Therefore, advertising effectiveness can be more easily reached through e-commerce.

At the same time, e-commerce live streaming can accurately determine the target consumer group. The viewers who first enter the live room tend to be the ones who are sufficiently interested in the products. Therefore, e-commerce live streaming effectively gathers those people who have the same purchase intention. According to 'Uses and Gratifications Theory', users are individuals whose motivation clearly comes with specific needs, which is the reason they contact the media. They are going to show interest in a specific product through multiple interactions with the anchor, and the anchor can also accurately understand the users' demand. In this way, the transaction between consumers and sellers can more easily be completed.

5.8 High GMV Conversion Rate

GMV (Gross Merchandise Volume) conversion rate is one of the most concerning data for each e-commerce participant. If the traffic brought by the platform through various marketing methods does not lead to the growth of GMV, then the marketing methods cannot be considered as effective leading tools. Traditional e-commerce is facing the exact problem of a low GMV conversion rate. Generally, the conversion rate fluctuates between 5% and 10% [18]. Coupled with the increasing cost of attracting traffic, the amount of profit that e-commerce platforms can obtain decreases. However, the situation is getting improved by implementing the new marketing method of 'e-commerce plus live streaming'. Taobao claimed that it had a 65% conversion rate across live streaming in 2018 [19]. The new model of 'e-commerce plus live streaming' has created a new type of e-commerce with strong user stickiness and a high conversion rate, which has developed a new profitable approach for traditional e-commerce.

6 Problems and Development Strategies

6.1 Problems of e-Commerce Live Streaming Platforms

For further development of e-commerce live streaming, there are some obstacles that need to be removed:

6.1.1 Information Asymmetry

Compared with traditional e-commerce shopping, consumers can understand products through live streaming more intuitively, which helps them reduce the possibility of buying fake and inferior products. However, due to information asymmetry, consumers will still encounter the problem of 'The video is for reference only'. Some unscrupulous merchants displayed quality products during a live stream but sold fake goods in contrast.

6.1.2 Unsatisfied after-Sales Service

The potential targets coming with e-commerce live streaming are not only increasing sales but also increasing return rates. Taking the clothing business as an example, the return rate of clothing in traditional offline stores is less than 3%, but the return rate of e-commerce is as high as 30%, and the rate on large shopping festivals such as Double 11 is way higher [20].

6.1.3 Lack of Excellent e-Commerce Live Streamers

E-commerce live streamers interact with viewers through various live streaming techniques to gain their trust to complete the sales of goods, which is a job with high professional requirements. The development of an excellent e-commerce live streamer is not an easy task, which requires long-term practice and practice.

6.1.4 Consumer Stickiness Is Still Not High Enough

The e-commerce platform itself has insufficient consumer stickiness because the purchase of a certain product is a low-frequency behavior. For some consumers, browsing graphic information may already meet the needs of understanding product information, so there is no need to watch the live stream. Besides, watching live streams requires a particular time cost, which also declines consumer stickiness of e-commerce live streaming.

6.2 Development Strategies and Suggestions

According to the problems mentioned above, there are some recommended strategies for better development of e-commerce live streaming in the future:

6.2.1 Improve Content Quality and Strengthen Platform Supervision

Currently, on the e-commerce live streaming platform, random content is mainly produced in a UGC (User Generated Content) way. E-commerce live streaming platforms should establish more PGC (Professional Generated Content) content production models because professional content has a higher commercial value and attractiveness. The e-commerce live streaming platform can create its own IP (Intellectual Property) program and develop viewers' habit of watching the program regularly. Once enough viewers are attracted, the product advertisements can be implanted to obtain a better conversion rate. Simultaneously, platforms should also promote small merchants to produce content in the way of PGC. Only in this way could improve the quality of the entire platform. E-commerce platforms should also train merchants regularly to produce live content professionally and develop relevant system courses based on their own characteristics. Platforms could make comprehensive use of online and offline training to enhance merchants' ability to produce professional live content, thereby improving the entire platform's content quality. Also, the e-commerce platforms should include a stricter content review mechanism and gradually open the limits of authority to the merchants who have participated in the training. Through this review mechanism, on the one hand, the quality of the platform's overall live content can be improved, and on the other hand, it can strengthen the control right of platforms and evaluate the training results simultaneously.

6.2.2 Improve the Product Quality and Consumers' Viewing Experience

The first thing to enhance consumer stickiness is to accumulate word-of-mouth. Therefore, the quality of products should still be given top priority. Having quality control always comes first if merchants want to win consumers' trust.

Besides, live streamers should re-edit the content after the live stream and replay the video as soon as possible to reach viewers who have not watched it before. Apart from this, streamers should also encourage consumers to ask questions and share pictures after buying, so that they can extend the period of a live stream to let target consumers stay longer in this live stream and enhance the consumer stickiness.

6.2.3 Combination of KOL and Internet Celebrities

During the shopping festival of August 18 in 2016, SUNING combined Internet celebrities and KOLs to let them do live stream together. During the live event of fewer than two hours, the number of online viewers reached 7.21 million with millions of interactions. Internet celebrities can bring much popularity to e-commerce live streaming, but they are not very good at shopping guides because they do not have a thorough understanding of product information and selling skills; in that matter, they cannot provide professional product purchase information. To make use of the influence of Internet celebrities and reach professional shopping guides at the same time, SUNING adopted the model of 'Internet celebrities plus KOL'. Internet celebrities are responsible for bringing popularity and enlivening atmosphere; KOLs are responsible for providing valuable and practical purchase information. A combination of such has achieved an excellent live streaming effect.

6.2.4 Improve Users' Shopping Experience

User experience (UE) is all the subjective feelings users have when using a product or service. Consumers usually have psychological expectations before using a product or service. If the actual experience exceeds this expectation, they will be satisfied and may establish loyalty. During an e-commerce live streaming, a pleasant shopping experience would make consumers prefer to use this product and improve the reputation of the platform and brand.

First, the e-commerce live streaming platform can improve its fluency because the user experience of the APP directly relates to the user's evaluation of the live stream. Platforms should continuously optimize the fluency to avoid serious product experience issues such as video freezing or delays.

The traditional way of online shopping has made people accustomed to it, with no surprises at all. Platforms should make good use of high technologies to improve users' shopping experience. For example, the introduction of high-tech such as AR, VR, image processing, etc., will be good fits to enhance consumers' shopping experience in terms of visual sense, further deepening their understanding of the product to make a reasonable purchase decision.

Conclusion

The core understanding of 'Live streaming plus E-commerce' as a new e-commerce model, is that e-commerce platforms use live streaming to sell. It brings massive traffic to the e-commerce platforms, achieving the purpose of gathering people's attention, and improving the conversion rate of the shopping carnivals. Besides, e-commerce platforms can obtain consumer feedback as soon as possible, thereby gaining a greater understanding of consumers. However, the e-commerce live streaming industry also has many drawbacks, such as lack of professional live streamers, low consumer stickiness, weak after-sales services, etc.

Currently, in China, the live streaming industry has entered a stage of steady development. To achieve further development, it needs to get rid of the above-mentioned barriers.

Under new media marketing, e-commerce live streaming is a kind of inevitable development trend. Its direction of reform urgently needs to be clarified.

How to convert the influence of KOL into lasting purchasing power? How to increase the conversion rate and retention rate? How to maximize the fan value of influencers?

The authors make corresponding development strategies and suggestions for e-commerce live streaming based on the survey result and industry reports:

1. improving content quality and strengthen platform supervision,
2. improving the product quality and consumers' viewing experience,
3. combining KOLs and Internet celebrities, and
4. improving users' shopping experience.

With the application of image recognition, artificial intelligence, machine learning, and other technologies, e-commerce live streaming platforms will achieve further development. However, it should always be recognized that only doing a good job of product selection and ensuring the product quality can accumulate a good reputation for the entire platforms and better achieve their business goals.

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Živý přenos elektronického obchodování – Rozvíjející se průmysl v Číně a potenciální budoucí trend ve světě

Vzhledem k širokému používání Internetu se mnoho průmyslových odvětví rychle rozvíjí. Ekonomika založená na Internetu představuje významnou hrozbu pro tradiční ekonomiku. Živé vysílání plus elektronický obchod, který je považován za současnou globální ekonomickou situaci, je výsledkem kombinace živého vysílání a různých průmyslových odvětví prostřednictvím Internetu.
Živý přenos elektronického obchodu je jedním z nejdůležitějších typů online živého přenosu. V tomto článku je definován jako živý přenos platformy elektronického obchodování používaný KOL nebo prodejci produktů prostřednictvím vestavěné funkce živého vysílání platformy k propagaci zboží, značek, událostí atd. k dosažení cílů expozice značky a prodej produktů. Tento druh marketingového nástroje nyní převládá. V živém přenosu elektronického obchodování však existuje mnoho nedostatků, které je třeba zlepšit, protože vývoj elektronického obchodování je nezralý a dohled nad používáním Internetu stále probíhá.

E-commerce Live Streaming – Eine aufstrebende Branche in China und ein potenzieller zukünftiger Trend in der Welt

Mit der weit verbreiteten Nutzung des Internets haben sich viele Branchen rasant entwickelt. Die auf dem Internet basierende Wirtschaft stellt eine erhebliche Bedrohung für die traditionelle Wirtschaft dar. Live-Streaming plus E-Commerce, der als aktueller globaler Wirtschaftsstatus anerkannt ist, ist das Ergebnis der Kombination von Live-Streaming und verschiedenen Branchen über das Internet.
E-Commerce-Live-Streaming ist eine der wichtigsten Arten des Online-Live-Streamings. In diesem Artikel wird es als Live-Streaming der E-Commerce-Plattform definiert, die von Meinungsführern oder Produktverkäufern über die integrierte Live-Streaming-Funktion der Plattform zur Verbreitung von Waren, Marken, Ereignissen usw. verwendet wird, um die Ziele der Markenbekanntheit zu erreichen und Produktverkäufe. Diese Art von Marketinginstrument ist mittlerweile weit verbreitet. Es gibt jedoch viele Mängel, die verbessert werden müssen, da die Entwicklung des E-Commerce noch nicht ausgereift ist und die Überwachung der Internetnutzung noch nicht abgeschlossen ist.

E-commerce Live Streaming – Wschodząca branża w Chinach i potencjalny przyszły trend na świecie

Wraz z upowszechnieniem się Internetu nastąpił gwałtowny rozwój wielu gałęzi przemysłu. Gospodarka oparta na Internecie stanowi znaczące zagrożenie dla tradycyjnej gospodarki. Transmisja na żywo (live streaming) oraz handel elektroniczny, który jest uznawany za obecną globalną sytuację gospodarczą, są wynikiem połączenia transmisji na żywo i różnych branż przemysłowych za pośrednictwem Internetu.
Transmisja na żywo w handlu elektronicznym jest jednym z najważniejszych rodzajów transmisji na żywo online. W niniejszym artykule zdefiniowano to jako transmisję na żywo platformy e-commerce używanej przez KOL lub sprzedawców produktów za pośrednictwem wbudowanej funkcji transmisji na żywo platformy w celu promowania towarów, marek, wydarzeń itp. w celu osiągnięcia celów związanych z prezentacją marki i sprzedażą produktów. Ten rodzaj narzędzia marketingowego jest obecnie dominujący. W live streamingu istnieje jednak wiele niedociągnięć, które wymagają poprawy, ponieważ rozwój handlu elektronicznego jest niedojrzały, a nadzór nad korzystaniem z Internetu jest w toku.

NEW CHALLENGES IN INCOTERMS IN THE BACKGROUND OF THEIR HISTORICAL DEVELOPMENT

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Abstract

INCOTERMS conditions are internationally recognized delivery clauses. Their advantage is comprehensibility and uniform interpretation by the contracting parties, as well as easy incorporation into the contract. An undeniable advantage is the regular update. The individual updates reflect trends in international business practice and therefore clarify or repeal existing clauses or introduce new ones as needed. The aim of the article is to evaluate the development of the INCOTERMS clauses on their historical development and their impact on international commercial law relations, and through this to outline possible future developments. The authors also consider whether, given the rapid technological progress, the current ten-year cycle of revision of the INCOTERMS clauses is appropriate or whether it is too long. Among the new trends, the authors point to new types of transport, especially unmanned drones, and the continuing trend of a transparent and secure logistics chain.

Keywords

Autonomous transport; Blockchain; Drones; Incoterms; International trade; Technology.

Introduction

Central to commercial transactions concluded in the framework of international trade is the issue of passing the risk of accidental destruction and destruction of goods. Entrepreneurs in this area can use two ways that can greatly simplify the contracting process for the international purchase of goods, as well as possible undesirable problems in the future. The first is the United Nations Convention on the International Sale of Goods (CISG), or the Vienna Convention, which regulates these issues indirectly. Furthermore, International Commercial Terms (INCOTERMS), i.e., rules that individual parties can incorporate themselves into contracts in commercial transactions. Incoterms are an acronym for INternational COmmercial TERMS.

The rules of Incoterms have been defined and are constantly being developed by practitioners associated in the International Chamber of Commerce ICC, which was established in 1919 in Paris to promote greater openness of national markets for foreign trade and investment. The International Chamber of Commerce (ICC) published the first version of the Incoterms for establishing generally accepted definitions and rules for the delivery of goods between seller and buyer as early as 1936. Awareness of Incoterms gradually spread among entrepreneurs and very quickly became internationally recognized delivery clauses, without the knowledge of which the entrepreneur can no longer do without concluding a purchase contract. Thanks to these rules, entrepreneurs can avoid the uncertainty resulting from different interpretations of the method of delivery of goods and the transfer of risks and costs from seller to buyer, without complicating the extension of the agreement on these issues, as the abbreviations replace to this extent. The Incoterms are applicable to both international and domestic trade.

The first Incoterms were valid for only 13 countries. They are now used in more than 140 countries and are translated into 31 different languages. At present, there are a total of 11 commercial clauses in Incoterms 2020 divided for any mode of transport (EXW, FCA, CPT, CIP, DAP, DPU, DDP) and for sea and inland waterway transport (FAS, FOB, CFR, CIF).[1] With the conditions of FCA, DAP, DPU and DDP, it is now possible to secure transport with the seller's or buyer's own means. Because the Incoterms are drafted in detail in many languages and are widely available, even a layman is able to understand from these rules and their explanations what rights and obligations apply to him when choosing a particular clause. This alone can be seen in the importance of Incoterms for world trade.

Incoterms have the character of business conditions, they do not replace the contract, they only supplement it. This means that, if permitted by law, they replace or supplement statutory provisions. The advantage of Incoterms is their comprehensibility and uniform interpretation between the contracting parties, which eliminates possible disputes regarding the interpretation of individual provisions of the contract, which are replaced by these international rules.[2] The actual implementation of the conditions into the contract follows a simple formula [1]: "*[the chosen Incoterms® rule] [named port, place or point] Incoterms 2020*". The chosen Incoterms® rule means the three-letter term of the clause. Also, the named port, place or point, is extremely important to clearly specify. For all Incoterms® rules, except for group C, this place indicates where the goods are to be "delivered" (ie where the risk passes from the seller to the buyer). For Group D rules, this place is both the place of delivery and the place of destination, and the seller must arrange transport up to this point. For Group C rules, this place indicates the destination of the consignment, ie the point to which the seller must arrange transport at his own expense (this point, however, does not coincide with the place or port of delivery). Therefore, it is important to mark the place with the most accurate geographical information, and the use of GPS coordinates is not excluded. Versioning avoids the problem of clearly determining which version of the rules applies to a given purchase agreement. The advantage of Incoterms is therefore their comprehensibility, uniform interpretation between the parties, which eliminates any disputes regarding the interpretation of individual provisions of the contract, which are replaced by these international rules, as well as their simple incorporation into the contract.

Like most industries, international trade is changing. Whether it is transport, payment conditions, innovations in the process of contracting contracts, technological development, everything is gradually reflected in the contractual conditions and in business legal relations. And in the final stage, changes in business practice are incorporated into the Incoterms. The changes in the Incoterms rules can also be used to demonstrate the development of the world economy and trade. The current version of INCOTERMS 2020 entered into force on 1 January 2020. It is thus the eighth revision of international rules, and thus the ninth edition of the conditions.

The concept of the article is based on the conference paper of the conference Liberec Economic Forum 2021 [24] and the discussion within this conference.

1 Research Objectives

The aim of the article is to evaluate the development of the INCOTERMS clauses on their historical development and their impact on the international commercial law relationship, and through this to outline possible future developments. The authors identify trends that currently affect or will certainly affect international trade relations and their possible implementation in the current INCOTERMS conditions, i.e., whether the current INCOTERMS business conditions respond to these new trends or whether their change is already necessary.

2 Literature Review

The issue of Incoterms is given great attention in research. We can also look at delivery conditions from different angles. For example, Vogt a Davis [3] divided scientific articles into four areas: in terms of a general description of Incoterms' delivery terms, comparisons of individual versions of Incoterms or individual delivery clauses, the third area is the legal view, i.e., the inclusion of clauses in business cases. The last area (fourth) is the contributions that deal with the lack of understanding of the rules. Still, let's add more views. Incoterms can be considered a risk management as an effective tool for risk management. [4], [5]. [6] on the other hand, considers delivery rules to be a kind of "channel" that connects trade and logistics.

However, from all points of view, the basic purpose of these conditions can be traced, namely, to help entities determine their mutual roles, duties, and responsibilities in international trade. This will provide the parties with the certainty of a uniform interpretation of the clause included in the specific contract. The authors agree that the correct use of the clauses can speed up logistics for parties and bring cost savings [1], [3], [7], and to simplify and make accessible the link between logistics and trade in general [6].

But let's get back to the beginning. The tradition of using trade terms and incorporating them into contracts began in Great Britain in the nineteenth century. They were founded by experts associated in the ICC International Chamber of Commerce, whose goal is to support the development of the world economy by developing international trade, services and investment and removing their barriers (in more detail [8], [9]). Incoterms was first published in a codified edition in 1923 [10] and contained six conditions. This standardization has fostered international trade, but there have been significant differences in the interpretation of trade conditions between countries and sectors [11]. That is why the ICC proposed in 1936 to publish a publication of the International Terms and Conditions with the aim of a uniform interpretation of the terms and conditions. As it states [11] traders could thus rely on a uniform interpretation of the condition included in the purchase agreement. Incoterms have gradually become internationally recognized delivery clauses, which are almost a matter of course when concluding an international purchase agreement. The reason is also their comprehensibility. [7]. The ICC's Incoterms rules are reviewed and revised at more or less regular intervals; in the last forty years, they have been updated every ten years. The updates mainly reflect changes in international trade and supply rules. When referring to a specific clause, it is important to indicate the Incoterms version to avoid ambiguity in the version of the condition used. [10] states that it is especially important during the transitional period, when a new revision is issued. The last revision, i.e., the release of Incoterms, is from the year 2020.

Regular updates reflect changes in business practice and technological progress, but must also respond to societal developments, sustainable business, corporate social responsibility and increasing pressure to protect the environment. We can predict that the relatively rapid development in alternative modes of transport will also affect trade relations. That is, until the next update of the Incoterms conditions. The changes will affect all types of transport, autonomous vehicles in the case of road transport, autonomous vessels in the case of waterborne transport or drones in the case of air transport. Trends in transport and the use of electric vehicles, autonomous vehicles and combined electric freight transport are being studied by [12]. [13] and [14] analyze the possible use of drones in transport, [15] then describes the legal aspects of the issue of drones at the level of experts from the business environment, representatives of academia and experts or expert groups of research institutes. Although drones are still limited by battery life and therefore range, they can be considered the music of the future in the transport of goods [16]. In the next decade, the transport of goods will undergo fundamental changes, which will certainly be reflected in the conditions

of Incoterms. Because the innovations bring new legal risks, changes in the insurance approach and new risks due to the safety of technological innovations.

3 Methods and Data Collection

The source of data needed to compile an overview of the historical development of individual versions of the Incoterms conditions is directly the information published by the International Chamber of Commerce and the individual versions of the given Incoterms. The research period is from the first conditions from 1923 to the last version of Incoterms 2020. Subsequently, the authors analyzed the key developments in selected areas, which are reflected in the conditions of Incoterms and, according to the authors, will need to be reflected in future versions. The methods of scientific work based on the evaluation of primary and secondary data, induction and deduction, analysis and synthesis are used.

3.1 Development and Overview of Changes in Incoterms

At the beginning of the whole process of creating Incoterms rules stood the entrepreneurs themselves - such as industrialists, financiers, and traders, who decided to create an industry standard after the First World War precisely because of the absence of a global system of rules for business management. The first common terms and conditions were issued by the International Chamber of Commerce [8] in 1923, but the first official released version of Incoterms is from 1936. Over the years, there were individual revisions of the clauses, but also the rules were extended to other countries. The first terms were used in 13 countries, the eighth revision is used by traders in 140 countries and is translated into a total of 31 languages. Table 1 provides an overview of the clauses in the individual versions of Incoterms.

Tab. 1: *Incoterms versions*

	Group E	**Group F**			**Group C**				**Group D**				
1936	-	-	FAS	FOB	C&F	CIF	-	-	Ex Ship	Ex Quay	-	-	-
1953	-	-	FAS	FOB/FOR /FOT	C&F	CIF	-	DCP	Ex Ship	Ex Quay	-	-	-
1967	-	-	FAS	FOB/FOR /FOT	C&F	CIF	-	DCP	Ex Ship	Ex Quay	DAF	-	DDP
1976	-	-	FAS	FOB/FOR /FOT/ FOB Airport	C&F	CIF	-	CPT	Ex Ship	Ex Quay	DAF	-	DDP
1980	-	FRC	FAS	FOB/FOR /FOT/ FOB Airport	C&F	CIF	-	CPT	Ex Ship	Ex Quay	DAF	-	DDP
1990	EXW	FCA	FAS	FOB	CFR	CIF	CIP	CPT	DES	DEQ	DAF	DDU	DDP
2000	EXW	FCA	FAS	FOB	CFR	CIF	CIP	CPT	DES	DEQ	DAF	DDU	DDP
2010	EXW	FCA	FAS	FOB	CFR	CIF	CIP	CPT	-	DAT	DAP	-	DDP
2020	EXW	FCA	FAS	FOB	CFR	CIF	CIP	CPT	-	DAT	DAP	-	DDP

Source: Own based on [8] and [19]

3.1.1 Pre-INCOTERMS Edition 1923

Shortly after World War I, it was clear to the founders of the ICC that international trade should not be regulated by governments, but by private industry through uniform global standards. [3]. Therefore, as early as 1920, the first negotiations for the creation of common business conditions began. It was a study [8] of six commonly used terms in thirteen countries. A summary of the findings, and especially of the differences in interpretation, was published in 1923.

3.1.2 Pre-INCOTERMS Edition 1928

The version of the terms and conditions from 1928 underwent changes concerning the elimination of errors and clarification of the original version from 1923. The first survey identified a number of shortcomings, but the second study succeeded in remedying them and applying common business conditions to more than 30 countries.[8]

3.1.3 INCOTERMS 1936

We can speak of the 1936 version as the first official version of Incoterms. It consisted of six terms - FAS (Free Alongside Ship), FOB (Free on Board), C&F (Cost & Freight), CIF (Cost Insurance and Freight), Ex Ship (Delivered Ex Ship) and Ex Quay (Delivered ex Quay). [8] For the first time, there has been a uniform adjustment of procedures in international trade.

3.1.4 INCOTERMS 1953

The further development of Incoterms was influenced by the Second World War, due to which additional revisions of the rules were suspended. Therefore, the Incoterms were first changed in 1953, mainly due to the increase in rail traffic. In addition to the original six rules, three more rules have been added for non-maritime transport - DCP (Delivered Costs Paid), FOR (Free on Rail) and FOT (Free on Truck). [8]

3.1.5 INCOTERMS 1967

The 1967 version of the Incoterms corrected misinterpretations of the previous 1953 version. This revision was the third in a row and added two new terms - DAF (Delivery at Frontier) and DDP (Delivery at Destination). [8]

3.1.6 INCOTERMS 1976

Air transport was included in the group of Incoterms business conditions in 1976, specifically the FOB Airport (Free on Board Airport) condition. The FOB condition itself appeared in the first official version of Incoterms, where, however, it was typical for maritime transport. [8]

3.1.7 INCOTERMS 1980

The 1980 version of Incoterms was related to the expansion of container traffic and new documentation processes, which required further revision, which resulted in a new condition FRC (Free Carrier… Named at Point). [8]

3.1.8 INCOTERMS 1990

The main reason for creating the new version of Incoterms 1990 was the need to adapt the clauses to the increasing use of electronic data interchange (EDI) and adaptation to intermodal transport. In the new version, the FCA clause has been modified to suit all modes of transport, even in various combinations. As a result, clauses have been omitted which only concerned

certain types of transport, namely FOR, FOT and FOB Airport. In connection with the revision work, Incoterms were organized into four groups and 13 clauses:

- group E - withdrawal clause (EXW),
- group F - main freight unpaid (FCA, FAS, FOB),
- group C - main freight paid (CFR, CIF, CPT, CIP),
- group D - delivery clauses (DAF, DES, DEQ, DDU, DDP). [17]

3.1.9 INCOTERMS 2000

The revision process for the new edition of Incoterms 2000 took approximately two years. The International Chamber of Commerce in Paris sought responses, opinions or suggestions for improvement from a wide range of global traders. At the same time, it also sought to ensure that the wording of the Incoterms 2000 terms and conditions reflected business practice. Another reason was the changes in transport techniques, especially in connection with the development of containerization, combined transport, and the introduction of new technologies in transport. The changes were made in the area of customs, specifically in the area of customs clearance and payments of customs obligations under the FAS and DEQ, and then in the area of loading and unloading obligations under the FCA. Compared to Incoterms 1990, the individual conditions did not change, nor did their arrangement into four groups. Thus, changes can only be understood as the above-mentioned specification of formulations. [18]

3.1.10 INCOTERMS 2010

The Incoterms 2010 version consolidated the Group D clauses. The DAF, DES, DEQ and DDU conditions have been replaced compared to the Incoterms 2000 version by the new DAT (Delivered at Terminal) and DAP (Delivered at Place) rules, which can be used regardless of the agreed mode of transport. The number of conditions was reduced from thirteen to eleven. Furthermore, the Incoterms 2010 rules were newly divided into two classes, namely rules for all modes of transport and rules for maritime and inland waterway transport. The first group includes the conditions EXW, FCA, CPT, CIP, DAT, DAP, DDP and the second group FAS, FOB, CFR, and CIF. [19]. Transport safety was also addressed, as well as wording facilitating the use of electronic means of communication. Already in the INCOTERMS 1990 version, the replacement of classic paper documents by electronic data transmission was predicted. [2] In the 2010 revision, electronic data transmission is already considered a completely common, everyday practice.

Previous versions of the rules, i.e., issued before 2010, were classified into four groups, namely E, F, C and D, where E and D were located at the farthest points apart from the place of delivery, while F and C were located between them. Since 2010, the Incoterms rules have been classified according to the type of transport into two classes (Table 2). Nevertheless, the original division can be an aid to understanding the significance of the place of delivery.

Tab. 2: *Incoterms version – type of transport*

	Rules for all modes of transport								**Rules for maritime and inland waterway transport**			
2010	EXW	FCA	CPT	CIP	DAT	DAP	DDP	CPT	FAS	FOB	CFR	CIF
2020	EXW	FCA	CPT	CIP	DPU	DAP	DDP	CPT	FAS	FOB	CFR	CIF

Source: Own based on [8] and [19]

3.1.11 INCOTERMS 2020

Currently, the most current version is Incoterms 2020. The impetus for the changes was, on the one hand, the effort to link the rules as much as possible with practice, but also to facilitate the correct choice of the clause. For the new version, it was important to focus on improving the presentation so that users would be directed to the right rule for their contract. Therefore, cosmetic changes have been made which should lead to smoother export / import transactions. This is a clearer explanation of the definition and connection between the purchase contract and the supplementary contracts, with explanations for each rule and the possibility of re-ordering in accordance with the rules. In Incoterms 2020, there is a change in the name of the DAT (Delivered at Terminal) condition to DPU (Delivered at Place Unloaded). Also new is that the FCA condition will allow the issuance of a consignment note with on-board registration. The conditions of CIF and CIP were also changed, which sets new insurance standards. Incoterms 2020 also offers explanations for users to make working with clauses as simple as possible and the use of these terms and conditions in practice as user-friendly as possible. [1] The result is *11 commercial clauses* divided by type of transport – for any mode of transport (EXW, FCA, CPT, CIP, DAP, DPU, DDP) and for sea and inland waterway transport (FAS, FOB, CFR, CIF).

3.2 Modifications to Incoterms

The rules of Incoterms have been clearly defined over the years and reflect the business practice of selling and buying goods. They describe, as we have already stated, the obligations of the buyer and seller parties, clearly set out the transfer of risk between the parties, and determine which party is responsible for what costs. Even so, there may be a case where the parties need to modify the Incoterms rule. In such a case, it is necessary to specify such a change as clearly as possible. The express provisions in the purchase contract take precedence over the provisions in INCOTERMS [20]. If Incoterms respond in a timely manner to changes in developments and business practices, the need for individual changes will be lower.

4 INCOTERMS – New Challenges

The aim of Incoterms is to provide the contracting parties with an advantage in the form of a uniform interpretation of the terms and conditions, clear comprehensibility, and the applicable applicability according to a set formula. It is for these reasons that Incoterms are the most widely used in international trade. [7]. However, in order for the contracting parties not to have to modify the rules, it is desirable that the rules be not only interchangeable, but also correspond to commercial and legal practice. Since its first introduction in 1936, Incoterms have been gradually evolving and responding to changes in international trade, progress, and changes in the logistics chain. Significant updates are due to the development of transport and their priorities. The expansion of rail transport was the reason for the revision in 1953. Air transport was reflected in the changes in 1976. The expansion of container transport together with new documentation processes required a change in 1980. That is, 4 years after the last revision. In 1990, the clauses were reviewed as they proved inflexible. The clauses had to be adapted to a new trend - intermodal transport. Intermodal transport combines the advantages of individual transports and increases overall efficiency. An equally important factor is the lower environmental burden of intermodal transport. In the coming years, the clauses will be revised in line with the introduction of new technologies in transport, the development of containerization and intermodal transport. The year 2010 and 2020 were also marked by so-called cosmetic changes. The rules were newly divided into two classes, namely rules for all modes of transport and rules for maritime and inland waterway transport. The latest revisions

reflect an element of flexibility in technology innovations, ease of use and comprehensibility, all in the spirit of current business practice.

The last revision of the clauses is from 2020 and after one year critical opinions are being expressed. In their article [21], they concluded that even after the release of the new version of Incoterms 2020, the rules remain ambiguous in many cases and tend to be simplified. [22] in their study they point to innovations in technology, means of payment, artificial intelligence, and robotics. With the development of e-commerce, automated systems will be developed that are and will be able to select the most suitable conditions for a given business case. Also [23] states that digitization or the issue of security is insufficiently mentioned and regulated in the new clauses. Experts have also been seeing the Ex Works clause for a long time, calling for it to be amended or repealed, but unfortunately this has not happened.

As we can see from the development of clauses and individual revisions, technological progress is a major driver for change or the creation of new clauses. We already know that at the time of the next revision (i.e. in 2030) there will be technologies that were not yet fully used before. Technological developments are also reflected in production processes and logistics. Drones generally have great potential in transport. Therefore, even Incoterms should go in this direction. The use of autonomous means of transport is linked to the management of overall logistics in line with more efficient use of means of transport and sustainability. However, the reduction of damage caused by an autonomous means is problematic. On the one hand, the damage caused by the person operating the means of transport will be reduced, but new damage will arise in connection with the autonomous regime. In the event of such damage, it will be more difficult to prove the relevant liability. And it is precisely liability for damage caused by the operation of autonomous funds and, at the same time, insurance will have to be reflected in the contractual conditions.

Drones are therefore one of the main challenges for further revision of the clauses. Their advantages are the range to inaccessible areas and less involvement of the human factor. In addition to increasing transport safety, the necessary breaks are also eliminated by removing the human factor, thus speeding up overall traffic. Equally important is the social responsibility of currently using drones to use electric propulsion [16]. At the same time, in the case of drone transport, it is necessary to assume that there will be a revolution in logistics chains, when the existing logistics centers will be gradually reduced or even abolished. If the current technological obstacles, especially in the current low range of drones, can be overcome, several links in the logistics chain may be skipped, when the drone logistics center will be able to serve many clients over a very large area. However, only practice will show to what extent drones will be able to replace existing modes of transport.

However, we must not forget the technical provision of international trade and developments in this area. A blockchain has become internationally known, the possibilities of which go far beyond cryptocurrencies. It can be used, for example, in securing international business transactions, where it would be possible to clearly identify the place of origin thanks to the blockchain. However, all these new ways in which international trade could continue to develop have one major shortcoming, and that is the fact that there is currently no legal framework for them to be able to use them without much risk. And this is where INCOTERMS is offered as an ideal means of unifying or implementing these rules. Why not use the international recognition and acceptance of these clauses for the implementation of rules in other areas.

The last two years have also shown that the INCOTERMS rules now face a very difficult challenge. The whole world is currently facing the consequences of the COVID-19 pandemic, which is affecting trade-supplier relations in international trade to an unprecedented extent.

Unfortunately, the last revision of the INCOTERMS rules took place before the COVID-19 pandemic struck in full. However, over the last two years, we have witnessed, and still witness, how these clauses are being tested daily in conditions that were unthinkable a few years ago. In view of the fact that the international community will respond to the current situation by changing the INCOTERMS clauses only in 2030, it is definitely worth considering whether to speed up the whole process of updating them, even in the light of what has been said in this article. Here, however, we find ourselves in a very sensitive area, where, in addition to the requirement for topicality, stability is especially important in law. And it would certainly not benefit this stability if the INCOTERMS clauses were changed here, for example, every two years.

Conclusion

The Incoterms delivery conditions are currently the most used conditions, as evidenced by the ICC's care in the form of revisions, extensions, or refinements. The individual revisions, as described in the article, respond to the development of the global economy, as well as to the demands and habits of participants in international trade. Revisions are necessary and desirable, as obsolete clauses would not be used by participants. Incoterms thus becomes an effective tool for participants in resolving situations arising in international trade. Their use is already considered a standard, as evidenced by their spread across countries or sectors. Nevertheless, it is always necessary to pay attention to each business case when using clauses, because a carefully selected clause can save the trader a number of problems. This is one of the reasons why the latest revision in 2020 simplified the interpretation and presentation of clauses to make it easier for participants to choose the appropriate clause. It is still necessary to consider that the INCOTERMS delivery clauses do not regulate the legal relations between the buyer and the seller arising by default from the purchase contract, they do not address the transfer of ownership from the seller to the buyer. INCOTERMS are based on the principle of determining the minimum obligations of the parties. The parties may, if they so wish, agree on broader obligations. [20]. The express provisions in the purchase contract take precedence over the provisions in INCOTERMS.

Finally, we summarize the very essence of why the INCOTERMS clauses were introduced. These clauses were primarily intended to facilitate and speed up commercial transactions in international trade but were also intended to provide entrepreneurs with a considerable degree of certainty. Although the current INCOTERMS conditions still bring this, however, by not responding to new challenges, especially in new modes of transport, they leave a great deal of uncertainty to entrepreneurs who are going to use these new modes of transport. Therefore, it is being considered whether these facts should not have been considered in the revision of the clauses in 2020, and therefore the number of clauses or their significance should not be extended to other areas. From the point of view of ten-year revisions, change is also offered. Although the ten-year cycle of clause revision has stabilized since 1980, a more flexible response to changes can be read from the history of development, when in 1980 clauses required revision in connection with the expansion of container transport and new documentation processes (the result was a new FRC condition). The authors therefore believe that due to the rapid development in modes of transport or payment technologies, it will be necessary to carry out a revision before 2030.

The INCOTERMS clauses are therefore currently facing major challenges associated with both the introduction of new modes of transport and developments in the field of blockchain or the intervention in international trade caused by the COVID-19 pandemic. Although it would be desirable, as the authors mentioned above, for the clauses to be revised before 2030, the authors are also aware that the updating of the clauses is the result of complex

international compromises. Each country has dealt with the current situation differently, and this will make it very difficult to find further consensus across the international environment.

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NOVÉ VÝZVY INCOTERMS NA POZADÍ JEJICH HISTORICKÉHO VÝVOJE

Podmínky INCOTERMS jsou mezinárodně uznávané dodací doložky. Jejich výhodou je srozumitelnost a jednotná interpretace smluvními stranami, a také jednoduché začlenění do smlouvy. Nespornou výhodou je i pravidelná aktualizace. Jednotlivé aktualizace odrážejí trendy v mezinárodně obchodní praxi a podle potřeby tedy upřesňují či ruší stávající doložky nebo zavádí nové. Cílem článku je na historickém vývoji doložek INCOTERMS zhodnotit jejich vývoj a vliv na mezinárodní obchodněprávní vztahy a prostřednictvím tohoto nastínit možný budoucí vývoj. Autoři se zamýšlejí i nad tím, zda vzhledem k rychlému technologickému pokroku je současný desetiletý cyklus revize doložek INCOTERMS vhodný nebo zda se jedná o příliš dlouhou dobu. Z nových trendů autoři poukazují na nové typy dopravy, především bezpilotní drony, dále pokračující trend transparentního a bezpečného logistického řetězce.

NEUE HERAUSFORDERUNGEN INNERHALB DER INCOTERMS VOR DEM HINTERGRUND IHRER HISTORISCHEN ENTWICKLUNG

INCOTERMS-Bedingungen sind international anerkannte Lieferungsbestimmungen. Ihr Vorteil besteht in Verständlichkeit und einer einförmigen Interpretation seitens der verhandelnden Parteien. Sie können leicht in den Vertrag eingegliedert werden. Ein weiterer unbestreitbarer Vorteil besteht in der regelmäßigen Aktualisierung. Die individuellen Aktualisierungen reflektieren die Trends im internationalen Handel und verdeutlichen oder widerrufen bestehende Bestimmungen oder führen bei Bedarf neue Bestimmungen ein. Das Ziel dieses Artikels besteht in der Bewertung der Entwicklung der INCOTERMS-Bestimmungen im Hinblick auf ihre historische Entwicklung und auf ihre Auswirkung auf internationale Handelsgesetzbestimmungen. Dadurch sollen mögliche zukünftige Entwicklungen skizziert werden. Die Autoren ziehen auch in Betracht, ob der bestehende Zehnjahreszyklus der Revision der INCOTERMS-Bestimmungen im Hinblick auf den raschen technologischen Prozess noch immer am Platze oder aber ein zu langer Zeitraum ist. Innerhalb der neuen Trends weisen die Autoren auf neue Typen des Transports hin, hauptsächlich auf die Verwendung unbemannter Drohnen, und auf den kontinuierlichen Trend einer transparenten und sicheren Logistikkette.

NOWE WYZWANIA INCOTERMS NA TLE ICH HISTORYCZNEGO ROZWOJU

Warunki INCOTERMS są uznanymi na całym świecie klauzulami dostawy. Ich zaletą jest zrozumiałość i jednolita interpretacja przez strony umowy, a także łatwe włączenie do umowy. Niewątpliwą zaletą jest ich regularna aktualizacja. Poszczególne aktualizacje odzwierciedlają trendy w międzynarodowej praktyce gospodarczej, a zatem w zależności od potrzeb doprecyzowują lub uchylają istniejące klauzule lub wprowadzają nowe. Celem artykułu jest ocena rozwoju klauzul INCOTERMS na bazie ich historycznego rozwoju i wpływu na międzynarodowe stosunki handlowe, a poprzez to nakreślenie możliwych kierunków rozwoju w przyszłości. Autorzy zastanawiają się również nad tym, czy wobec szybkiego postępu technologicznego obecny dziesięcioletni cykl rewizji klauzul INCOTERMS jest właściwy, czy też nie jest on zbyt długi. Wśród nowych trendów autorzy wskazują na nowe rodzaje transportu, zwłaszcza bezzałogowe drony, oraz utrzymującą się tendencję do tworzenia przejrzystego i bezpiecznego łańcucha logistycznego.

PERFORMANCE OF CZECH FOOTBALL CLUBS: MALMQUIST INDEX APPROACH

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Abstract

Sport has become an important part of our lives in the modern times and sporting sites contribute significantly to the image and texture of modern cities. Regarding the popularity of sport, and football in particular, it has become an important modern place where specific types of economic and social interaction take place. The aim of this article is to propose a method for evaluating the performance of football clubs based on DEA and Malmquist index. Professional Czech football clubs playing in the Czech football competition Fortuna:Liga were selected for empirical analysis. To analyze the relative efficiency of football clubs, BCC and CCR models were employed. The study was conducted on a sample of 20 clubs through 2 inputs and 1 output collected during the 2015/16 – 2019/20 seasons. For some clubs the values of the Malmquist index were calculated. With help of MI it was possible to quantify the total productivity change factor and to decompose it to technological change and technical efficiency change. The results show that Czech football clubs achieved a relatively high level of efficiency in the period monitored and that traditional clubs achieved the highest efficiency score. These results could help club managers improve the performance of their teams.

Keywords

DEA; Sports statistics; Football; Czech professional football clubs; Malmquist index.

Introduction

Professional sports competitions attract millions of spectators worldwide. Sports activities then expand further and reach other critical economic sectors, such as hospitality, the media, or tourism. One of the world's most important sports competitions is mainly football competitions, which are extremely important for their economic and social activity. In the Czech Republic, professional football clubs are represented by a professional football league called Fortuna:Liga.

16 teams participate in the Czech highest football competition Fortuna:Liga. Historically, the most successful club has been Prague AC Sparta with 36 titles, followed by SK Slavia Prague with 20 titles. In the last five seasons, the Czech leagues have been dominated by the FC Viktoria Plzeň and SK Slavia Praha teams [1]. Only three teams have participated in all 27 years of the independent Czech league (since 1993): AC Sparta Praha, SK Slavia Praha and FC Slovan Liberec [1].

Although football clubs operate within the same legal framework as other companies, they are a particular type of business due to being mainly conditioned by sporting activities. The question, therefore, arises as to how to measure the performance of football clubs. Some studies mainly show a positive relationship between sports and financial performance. In this context, there is a need to recommend football managers' practices that could help clubs achieve both sports and business achievements. In this article, a method of evaluating the

performance of football clubs based on data envelopment analysis and Malmquist index will be proposed.

1 Literature Review

In the last few years, a considerable number of papers have been published that determine the economic and managerial efficiency by data envelopment analysis in various sports. Bhat, Sultana and Dar [2] present an extensive study on the application of various models of DEA in baseball, basketball, cricket, cycling, football, golf, handball, and tennis. It is found that DEA identified the sources of inefficiency and provided possible directions for improvement. A summary of selected authors who apply the DEA method in their research follows. Espitia-Escuer and Garcia-Cebrian [3] apply the DEA method and Malmquist indices to the evaluation of the football teams that have participated in the UEFA Champions League. Brosed Lázaro, Espitia-Escuer and Garcia-Cebrian [4] evaluate the performance of Spanish first-division basketball teams, in terms of efficiency. The second aim is to examine the total factor productivity evolution having information from several years. In their article, Garcia-Cebrian and Espitia-Escuer [5] analyze productivity levels and its components for teams that participated in the UEFA Champions League between 2003 and 2012. A study by Kang [6] measured the relative efficiency and productivity change of Korean professional sports teams using the DEA model and the Malmquist Index for 2006-2009. Jardin [7] evaluate the efficiency of French football clubs from 2004 to 2007 using data envelopment analysis. Then, in his research, studies the dynamics of clubs' performance using the Malmquist index. Barros and Douvis [8] estimate changes in productivity using data envelopment analysis applied to a representative sample of football clubs operating in the two European countries: Portugal and Greece. Barros and Douvis rank the football clubs according to their change in productivity between the 1999/2000 and 2002/2003 seasons, concluding that some clubs experienced productivity growth while others experienced a decrease in productivity. Barros, Assaf and Sá-Earp [9] present a two-stage bootstrapped DEA model to analyze the technical efficiency of Brazilian premier league football clubs for the period 2006–2007.

2 Methodology

The data used for the purposes of the research come from the official databases of the Czech Fortuna:Liga and are supplemented by private databases of companies from the football environment. The researched period includes the seasons from 2015/16 to 2019/20. The research is divided into the following five steps.

Step 1: Defining the research sample and compiling a list of football clubs to be evaluated.

The research included a group of 20 football clubs playing in the highest Czech football league called Fortuna:Liga. Information about these clubs was subsequently obtained for the entire selected period. The core is data from InStat [10], which analyzes the performance of athletes and sports teams. They are supplemented by the database of the Transfermarkt.com server [11] and the databases of the Czech Fortuna:Liga [1].

Step 2: Determination of output and input variables.

Due to the number of DMUs (16 clubs in one season), two input and one output variable were included in the DEA model. For the model with 16 football clubs (DMUs) and three variables included in the efficiency model, the model has sufficient discriminant power. The first input variable is the number of players (hereinafter I1). The second input variable is total squad market value (hereinafter I2). The number of points achieved in the season was chosen as the output variable (hereinafter O1).

Step 3: Selection and construction of DEA models.

The central part of this is the research of performance of Czech professional football clubs playing the highest competition Fortuna:Liga, through the method of data envelopment analysis and Malmquist index. Data envelopment analysis (hereinafter DEA) is used as a specialized modelling tool for evaluating the efficiency of a group of comparable decision-making units (i.e., football clubs).

In general, DEA models are based on the inputs and outputs of the evaluated units. Further, the efficiency with which the football club can transform its inputs into outputs is compared, i.e. the extent of the outputs the football club can achieve with the number of available inputs [12].

Generally, DEA models can be divided according to the model's orientation into input-oriented, output-oriented, and non-oriented models. Further sorting of DEA models can be done based on the nature of the production process. In this case, a distinction can be made between models based on the assumption of constant returns to scale (CCR model), and models based on the assumption of variable returns to scale (BCC model) [13].

In the presented article, the CCR-I and BCC-I models with input orientation were applied to the obtained data. In the basic input-oriented CCR-I model with the assumption of constant returns to scale, the objective function is maximized under restrictive conditions (1) [12]. In the case of considering variable returns from scale (BCC-I model), it is sufficient to extend the previous model by the condition of convexity [14]. The CCR-I and BCC-I models differ only by valid convexity condition (2).

$$E_0 = min.\theta - \varepsilon(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+)$$

$$s.t. \sum_{j=1}^{n} \lambda_j X_{ij} + s_i^- = \theta X_{i0}, i = 1, \dots, m$$

$$\sum_{j=1}^{n} \lambda_j Y_{rj} - s_i^+ = Y_{r0}, r = 1, \dots, s$$

$$\lambda_j, s_i^-, s_i^+ \geq 0, j = 1, \dots, n, i = 1, \dots, m, r = 1, \dots, s. \theta \text{ unrestricted in sign.} \quad (1)$$

$$\sum_{j=1}^{n} \lambda_j = 1 \quad (2)$$

In this model, λ_j are the weights of all DMUs, s^-_i and s^+_r are slack variables, $\varepsilon > 0$ is an infinitesimal constant defined to be smaller than any positive real number and θ is the efficiency score that expresses the reduction rate of inputs in order for this unit to reach the efficient frontier.

Step 4: Technical efficiency score calculation.

Technical efficiency and scale efficiency scores were determined for each football club. All necessary calculations were performed using OSDEA-GUI software. The technical efficiency score determined using the CCR-I model is called the overall technical efficiency (hereinafter OTE). In contrast, the score determined using the BCC-I model is called pure technical efficiency (hereinafter PTE). The overall technical efficiency score can, therefore, be divided into the pure technical efficiency score and the scale efficiency score (hereinafter SE), see relation (3). The scale efficiency measures the degree to which a unit can improve its efficiency by changing its size [15].

$$SE = \frac{OTE}{PTE} \quad (3)$$

Step 5: Calculation of the Malmquist Index.

Basic DEA models do not take into account trends or changes in the efficiency of clubs' activities over time. This deficiency is eliminated using the Malmquist Index (hereinafter MI), which evaluates changes in efficiency over time. The MI can be divided into two parts [16]. The first component measures technical efficiency changes (E) and the second component measures technological changes (T) between periods *t* and *t + 1*.

In this article, input-oriented MI was used, which can be expressed by equation (4). Where x^t are inputs in period *t*, y^t are outputs in period *t*, x^{t+1} are inputs in period *t + 1*, y^{t+1} are outputs in period *t + 1*. E_q is the change in the relative efficiency of unit q with respect to other units between periods *t* and *t + 1*, T_q is the change in production possibility frontier as a result of technology development between periods *t* and *t + 1*, or in other words technological change. In this equation, the MI is calculated as the product of E_q and T_q, and it provides several advantages over other indices [16]. Components E_q and T_q are given by equations (5) and (6).

$$MI_q(x^{t+1}, y^{t+1}, x^t, y^t) = E_q T_q \tag{4}$$

$$E_q \frac{D_q^{t+1}(x^{t+1}, y^{t+1})}{D_q^t(x^t, y^t)} \tag{5}$$

$$T_q = \sqrt{\frac{D_q^t(x^{t+1}, y^{t+1}) D_q^t(x^t, y^t)}{D_q^{t+1}(x^{t+1}, y^{t+1}) D_q^{t+1}(x^t, y^t)}} \tag{6}$$

For selected clubs and each period, the values of the distance functions and of each component of the MI were determined in the MaxDEA 7 Ultra software environment. Finally, the value of the Malmquist Index was calculated using equation (4). A value of $MI_q > 1$ indicates an increase in productivity; $MI_q = 1$ means there has been no productivity change; and $MI_q < 1$ means a decrease in productivity [17].

3 Results

This part of the article is devoted to empirical research, where the nonparametric DEA methodology was used. Table 1 shows the resulting efficiency scores for CCR-I model for all clubs examined from all seasons of the Fortuna:Liga. The last row of Table 1 shows the average values of OTE score. The CCR-I model resulted in the identification of up to four efficient clubs in a single season. This means that the size of these clubs is optimal and at the same time, the clubs are able to transform the given inputs into outputs efficiently.

Tab. 1: *OTE score of Czech clubs playing Fortuna:Liga*

Club	OTE					Average
	2015/16	2016/17	2017/18	2018/19	2019/20	
1. FC Slovácko	0.85	0.89	0.87	0.72	0.85	0.84
1. FK Příbram	0.52	0.71	-	0.74	0.50	-
AC Sparta Praha	0.69	0.63	0.55	0.66	0.62	0.63
Bohemians Praha 1905	0.64	0.76	0.85	0.82	0.76	0.77
FC Baník Ostrava	0.23	-	0.71	1.00	1.00	-
FC Fastav Zlín	0.69	0.99	0.58	0.85	0.54	0.73
FC Hradec Králové	-	0.96	-	-	-	-
FC Slovan Liberec	0.85	0.60	0.63	0.71	0.72	0.70
FC Viktoria Plzeň	1.00	0.78	1.00	1.00	1.00	0.96
FC Vysočina Jihlava	0.65	0.89	0.70	-	-	-
FC Zbrojovka Brno	1.00	0.87	0.55	-	-	-
FK Dukla Praha	0.66	0.83	0.79	0.48	-	-
FK Jablonec	0.70	0.85	0.81	0.83	0.86	0.81
FK Mladá Boleslav	0.87	0.84	0.46	0.54	0.61	0.66
FK Teplice	0.51	1.00	0.60	0.63	0.67	0.68
MFK Karviná	-	0.89	0.80	0.56	0.44	-
SFC Opava	-	-	-	1.00	0.65	-
SK Dynamo Č. Budějovice	-	-	-	-	1.00	-
SK Sigma Olomouc	0.53	-	1.00	0.68	0.73	
SK Slavia Praha	0.97	1.00	0.70	1.00	0.90	0.91
Mean	**0.71**	**0.84**	**0.73**	**0.76**	**0.74**	

Source: Own

Table 2 shows the resulting efficiency scores for BCC-I model for all clubs examined from all seasons of the Fortuna:Liga. The last row of Table 2 shows the average values of PTE score. The BCC-I model resulted in the identification of up to six efficient clubs in a single season. This means that the clubs are able to transform the given inputs into outputs efficiently.

Tab. 2: *PTE score of Czech clubs playing Fortuna:Liga*

Club	PTE					Average
	2015/16	2016/17	2017/18	2018/19	2019/20	
1. FC Slovácko	0.99	0.92	1.00	0.80	0.88	0.92
1. FK Příbram	0.85	0.90	-	0.81	0.84	-
AC Sparta Praha	0.74	0.73	0.66	0.67	0.82	0.72
Bohemians Praha 1905	0.80	0.88	1.00	0.84	0.79	0.86
FC Baník Ostrava	0.76	-	0.81	1.00	1.00	-
FC Fastav Zlín	1.00	1.00	0.84	0.86	0.84	0.91
FC Hradec Králové	-	1.00	-	-	-	-
FC Slovan Liberec	0.88	0.70	0.75	0.77	0.76	0.77
FC Viktoria Plzeň	1.00	0.83	1.00	1.00	1.00	0.97
FC Vysočina Jihlava	0.97	0.93	0.83	-	-	-
FC Zbrojovka Brno	1.00	0.91	0.81	-	-	-
FK Dukla Praha	0.86	0.84	0.91	0.79	-	-
FK Jablonec	0.86	0.97	0.81	0.83	1.00	0.89
FK Mladá Boleslav	0.95	0.87	0.64	0.59	0.74	0.76
FK Teplice	0.75	1.00	0.78	0.76	0.92	0.84
MFK Karviná	-	0.91	0.95	0.65	0.69	-
SFC Opava	-	-	-	1.00	1.00	-
SK Dynamo Č. Budějovice	-	-	-	-	1.00	-
SK Sigma Olomouc	0.87	-	1.00	0.77	0.89	-
SK Slavia Praha	1.00	1.00	0.76	1.00	1.00	0.95
Mean	**0.89**	**0.90**	**0.85**	**0.82**	**0.89**	

Source: Own

Table 2 also shows that all clubs that were classified as efficient according to the CCR-I model are also classified as efficient according to the BCC-I model. It is apparent that the PTE score in the BCC-I model is higher than the OTE score in the CCR-I model, as the CCR-I model considers the scale efficiency (SE), which reduces the OTE value. For clubs that are classified as inefficient according to the CCR-I model yet as efficient according to the BCC-I model, it can be concluded that their technical inefficiency is caused by scale inefficiency. Therefore, it can be stated that the size of these clubs is not optimal and an inappropriate sports tactic was chosen. Scale efficiency and scale inefficiency is shown in Table 3.

Tab. 3: *Scale efficiency of Czech clubs playing Fortuna:Liga*

Club	SE					Average
	2015/16	2016/17	2017/18	2018/19	2019/20	
1. FC Slovácko	0.86	0.97	0.87	0.89	0.97	0.91
1. FK Příbram	0.60	0.78	-	0.91	0.59	-
AC Sparta Praha	0.93	0.86	0.84	0.98	0.76	0.87
Bohemians Praha 1905	0.80	0.86	0.85	0.98	0.96	0.89
FC Baník Ostrava	0.30	-	0.87	1.00	1.00	-
FC Fastav Zlín	0.69	0.99	0.69	0.99	0.64	0.80
FC Hradec Králové	-	0.96	-	-	-	-
FC Slovan Liberec	0.96	0.85	0.83	0.92	0.95	0.90
FC Viktoria Plzeň	1.00	0,94	1.00	1.00	1.00	0.99
FC Vysočina Jihlava	0.67	0.96	0.85	-	-	-
FC Zbrojovka Brno	1.00	0.95	0.68	-	-	-
FK Dukla Praha	0.76	0.99	0.86	0.61	-	-
FK Jablonec	0.81	0.88	1.00	1.00	0.86	0.91
FK Mladá Boleslav	0.91	0,96	0.72	0.91	0.82	0.86
FK Teplice	0.68	1.00	0.76	0.83	0.72	0.80
MFK Karviná	-	0.98	0.83	0.86	0.65	-
SFC Opava	-	-	-	1.00	0.65	-
SK Dynamo Č. Budějovice	-	-	-	-	1.00	-
SK Sigma Olomouc	0.61	-	1.00	0.89	0.82	-
SK Slavia Praha	0.97	1.00	0.92	1.00	0.90	0.96
Mean	**0.78**	**0.93**	**0.85**	**0.92**	**0.83**	

Source: Own

To establish the productivity levels attained by Fortuna:Liga clubs, an additional study using Malmquist index was carried out to improve understanding of empirical implications of productivity measures in professional football. The sample was reduced to the 10 clubs that participated in the Fortuna:Liga in all five seasons.

The change in productivity and its two components were calculated for the clubs that participated in the Fortuna:Liga in the seasons 2015/2016 and 2019/2020, as if they had been consecutive years, with the objective of approximating the evolution of their productivity over the entire period analyzed in this article. The results are shown in Table 4.

Tab. 4: *Malmquist index for the clubs participating in the Fortuna:Liga in the period analyzed*

2015/2016 – 2019/2020	Efficiency change	Technological change	Malmquist index
AC Sparta Praha	1.028	0.941	0.968
Bohemians Praha 1905	1.030	0.991	1.021
FC Fastav Zlin	0.983	0.930	0.914
FC Slovacko	1.000	0.951	0.951
FC Slovan Liberec	0.971	0.932	0.905
FC Viktoria Plzen	1.000	0.904	0.904
FK Jablonec	1.038	0.964	1.000
FK Mlada Boleslav	0.955	0.910	0.869
FK Teplice	1.073	0.926	0.993
SK Slavia Praha	1.000	0.911	0.911
Average	**1.008**	**0.936**	**0.944**

Source: Own

On average, the results show a decrease in productivity, an increase in efficiency and technological regression. If the results are interpreted individually for each team, only Bohemians Praha 1905 increases its productivity, due to an increase in efficiency that compensates for its technological regression. On the other hand, FK Jablonec experiences no change in productivity, increase in efficiency and show technological regression.

The rest of the teams show a decline in productivity, some of them due to a drop in both efficiency and technological regression (FK Mlada Boleslav, FC Slovan Liberec, and FC Fastav Zlin). Analyzing the information in Table 4, one could conclude that over the period studied there is a widespread decline in productivity, which is also evident in its two components, but primarily in a technical regression.

Conclusion

Given football clubs' current economic and financial situation, there is an increasing need to know how efficiently a club uses its resources. In addition, this analysis is also crucial for evaluating the sports performance of clubs. Among the various tools that are widely used to measure efficiency, the data envelopment analysis and Malmquist index were chosen in this article.

In this article, the DEA was applied to the best clubs in the Czech Republic, which participate in the highest football competition Fortuna:Liga. There were 20 different clubs that played Fortuna:Liga in five seasons (2015/16 to 2019/20). The research provided several conclusions.

The first conclusion: from the analyzed period from the point of view of the OTE score, the winner of Fortuna:Liga was always described as efficient with the exception of the 2019/20 season and the club with the lowest OTE score of Fortuna:Liga mostly left the league at the end of the season.

The second conclusion can be drawn from the larger number of seasons included in the research. As can be seen, in the five seasons analyzed, no club was able to maintain efficiency throughout the period under review. It is important to note that the clubs and resources used change from season to season, as do the opponent's teams. Therefore, when an efficient club uses the same resources in the same way in past seasons, it is not enough to be efficient in the coming seasons.

As a third conclusion, various sources of inefficiency were identified. The first source of inefficiency is observed in pure technical efficiency (PTE) and is related to the waste of inputs. To achieve the same output, a lower value of inputs (i.e., a lower total squad market value or a lower number of players) should suffice. The second source of inefficiency can be observed by calculating scale efficiency and is associated with the selection of inappropriate sports tactics. In this case, of course, the team's head coach is the most involved. The problem is not just how they use their sports resources. These clubs should seek to develop a medium- and long-term strategy to develop new and different tactics with the resources they have or could have in the future. The purchase of players should also take place in the context of the development of these new sports tactics. There are also clubs that suffer from both sources of inefficiency. In this case, clubs should reduce resources and, in terms of size, find out how effective clubs are developing sports tactics.

In this article, changes in productivity in football clubs playing in Fortuna:Liga from 2015/2016 to 2019/2020 have been calculated by means of the Malmquist index. The results obtained in this article show no clear increase in productivity during the period studied, both on the average and individually. In conclusion, it does not appear that the organizer of this tournament has been able to increase the productivity of the teams that has participated in it during the period analyzed. Consequently, the overall recommendation for the football clubs analyzed in this study would be to improve their productivity. Breaking down the Malmquist index into efficiency change and technical change and seeing that neither of the two show a clear increase. Therefore, the recommendation would be to design rules for the tournament that would improve the productivity of the participating teams by linking sports success to the increase in productivity.

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VYUŽITÍ MALMQUISTOVA INDEXU PRO HODNOCENÍ VÝKONNOSTI ČESKÝCH FOTBALOVÝCH KLUBŮ

Sport je důležitou součástí našich životů a také velice významně přispívá k identitě a struktuře moderních měst. Pokud jde o popularitu sportu, zejména fotbalu, stal se významným moderním prvkem, kde se odehrávají specifické druhy ekonomické i sociální interakce. Cílem tohoto článku je navrhnout způsob hodnocení výkonnosti fotbalových klubů na základě metody DEA a Malmquistova indexu. Pro empirickou analýzu byly vybrány profesionální české fotbalové kluby hrající nejvyšší fotbalovou soutěž s názvem Fotuna:Liga. K analýze relativní účinnosti klubů byl použit BCC a CCR model. Studie byla provedena na vzorku 20 klubů hrajících v sezónách 2015/16 - 2019/20. Do modelů byly zahrnuty 2 vstupní proměnné a jedna výstupní proměnná. Pro vybrané kluby byly následně vypočítány hodnoty Malmquistova indexu. Pomocí Malmquistova indexu bylo následně možné kvantifikovat celkovou změnu produktivity faktorů a rozložit ji na technologickou změnu a změnu technické účinnosti. Výsledky ukazují, že české fotbalové kluby dosáhly ve sledovaném období relativně vysoké úrovně efektivity a že nejvyššího skóre efektivity dosáhly tradiční kluby. Tyto výsledky by následně mohly manažerům klubů pomoci zlepšit výkonnost jejich týmů.

LEISTUNG DER TSCHECHISCHEN FUSSBALLVEREINS: MALMQUIST INDEX-ANSATZ

Sport ist in der Neuzeit zu einem wichtigen Bestandteil unseres Lebens geworden und Sportstätten tragen wesentlich zum Image und zur Struktur moderner Städte bei. In Bezug auf die Popularität des Sports, insbesondere des Fußballs, ist er zu einem wichtigen modernen Ort geworden, an dem bestimmte Arten von wirtschaftlicher und sozialer Interaktion stattfinden. Ziel dieser Arbeit ist es, eine Methode zur Bewertung der Leistung von Fußballvereinen auf der Grundlage des DEA- und Malmquist-Index vorzuschlagen. Für die empirische Analyse wurden professionelle tschechische Fußballvereine ausgewählt, die im tschechischen Fußballwettbewerb Fotuna:Liga spielen. Um die relative Effizienz von Fußballvereinen zu analysieren, wurden BCC- und CCR-Modelle verwendet. Die Studie wurde an einer Stichprobe von 20 Klubs durch 2 Inputs und 1 Output durchgeführt, die in den Spielzeiten 2015/16 – 2019/20 gesammelt wurden. Für einige Vereine wurden die Werte des Malmquist-Index berechnet. Mit Hilfe des MI war es möglich, die totale Faktorproduktivitätsänderung zu quantifizieren und in technologischen Wandel und technischen Effizienzwandel zu zerlegen. Die Ergebnisse zeigen, dass tschechische Fußballvereine im Beobachtungszeitraum ein relativ hohes Effizienzniveau erreichten und traditionelle Vereine die höchste Effizienzbewertung erzielten. Diese Ergebnisse könnten Clubmanagern helfen, die Leistung ihrer Teams zu verbessern.

WYKORZYSTANIE WSPÓŁCZYNNIKA MALMQUISTA DO OCENY WYDAJNOŚCI CZESKICH KLUBÓW PIŁKI NOŻNEJ

Sport jest ważną częścią naszego życia a ponadto w znaczący sposób przyczynia się do kształtowania tożsamości i struktury nowoczesnych miast. Ze względu na popularność sportu, a w szczególności piłki nożnej, stał się on ważnym współczesnym elementem, w którym zachodzą określone rodzaje interakcji ekonomicznych i społecznych. Celem niniejszego artykułu jest zaproponowanie metody oceny wydajności klubów piłkarskich w oparciu o metodę DEA i współczynnik Malmquista. Do analizy empirycznej wybrano profesjonalne czeskie kluby piłkarskie grające w najwyższych czeskich rozgrywkach Fortuna:Liga. Do analizy względnej efektywności klubów piłkarskich wykorzystano modele BCC i CCR. Badania przeprowadzono na próbie 20 klubów grających w sezonach 2015/16 - 2019/20. W modelach ujęto 2 wejściowe zmienne i jedną zmienną wyjściową. Dla wybranych klubów obliczono wartości współczynnika Malmquista. Za pomocą współczynnika Malmquista możliwe było skwantyfikowanie ogólnej zmiany produktywności czynników i zdekomponowanie go na zmianę technologiczną i zmianę efektywności technicznej. Wyniki pokazują, że czeskie kluby piłkarskie osiągnęły w badanym okresie stosunkowo wysoki poziom efektywności, a kluby tradycyjne uzyskały najwyższy wynik wydajności. Wyniki te mogą pomóc menedżerom klubów w poprawie wydajności ich zespołów.

TOURISM IN THE MORAVIAN KARST

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Abstract

The article focuses on sustainable tourism in the protected landscape area of the Moravian Karst. Participants in the research included municipalities, stakeholders in the field of tourism, residents, and visitors. The Moravian Karst (CHKO) is an example of a preserved landscape area that managed to combine environmental protection and tourism. Visits to caves prevail; however, visitors do not limit their activities to this type of tourist attraction. They also visit other natural as well as cultural sights. Most municipalities think that the existence of the Moravian Karst CHKO positively influences the development of tourism. They appreciate new jobs and the inflow of finance from the regional budget.

Keywords

Protected landscape area; Sustainable tourism; Moravian Karst; Visitor; Resident.

Introduction

The international community recognized the urgency of environmental protection at the UN Conference on the Environment in Stockholm in 1972. Participants at the conference pointed out that the Earth is endangered by people themselves. The conference significantly influenced the formation of the worldwide environmental protection policy. [4]

In 1983 the World Committee for the Environment and Development was established. The committee was the first one to offer a definition of sustainable development in a paper called "Our Shared Future" in 1987. Sustainable development is defined as follows: "Sustainable development is such that fulfils the needs of the present generation without endangering the ability of future generations to fulfil their needs"

One of the key factors for the tourism industry to succeed in all areas, including rural and protected areas, is the support of a local community [2], [3]. Changes in residents' attitudes are important since they provided a way that planners and tourism practitioners should follow in order to achieve an adequate level of community tourism development and planning. This adequate level was connected with satisfied quality of life, increased opportunities for new jobs, reduced costs of living [5]. A few studies underlined that residents' sense of well-being and their sustenance for tourism development were connected with how the outcomes of tourism were evaluated by the members of a community [1]. This means that if residents perceive a positive benefit-cost ratio, it is more likely that they will support tourism and take active roles in tourism activities [8]. Economic benefits from tourism, like employment and economic gain, were used as indicators to examine community attachment, residents' quality of and satisfaction with life, and attitudes towards tourism. Although economic benefits were a significant predictor, a combination of factors, such as social, emotional, and economic, performed better in analyzing how residents' perceived values influence the quality of life, their satisfaction with life, and support for further tourism development [7], [12]. According

to Sweenev and Soutar [9], important aspects of tourism development were also those intangible values that can be derived from place attachment or personal benefits. Since communities may have different traditions, cultures and natural resources, residents' level of support and attitudes towards tourism development and perceived quality of life may depend on the nature of a destination. The term 'sustainable development' has been used since the 1960s.

The industrialization era which started in Czechoslovakia after WWII influenced the environment significantly. A formerly rural country became an industrial one. This change resulted in a significant increase in pollution due to the construction of power plants, chemical factories and raw material mines. After the Velvet Revolution in 1989, the Ministry of the Environment and the Czech Environmental Inspection were established. Soon after that, the parliament passed significant laws to protect various aspects of the environment. [13]

To maintain sustainability, it is crucial to harmonize economic interests and environmental needs and to balance technological progress and environmental limits. It means that sustainable development rests on three basic pillars: the economic, the social and the environmental ones. [6]

Tourism in protected landscape areas is a specific problem. A protected landscape area is a general term referring to a territory which is unique or very significant due to its natural, aesthetic and cultural value where the scope of qualitative or quantitative restrictions of anthropogenic activities differs.

A protected landscape area (hereinafter referred to as the CHKO) is the second highest level of environmental protection, preceded only by the status of national parks. Large areas with harmonically shaped landscape, specific relief, a significant share of natural eco-systems of forest and permanent grass vegetation, with plentiful woody plants and sometimes also with extant traces of historic settlements can be declared protected landscape areas. These areas are economically used in harmony with rules applicable to the specific protection zone with the aim to maintain and improve their natural state and to retain and create the best ecological functions of the territory. The utilization of such areas for recreational purposes is admissible if it does not damage the natural values of the protected landscape areas. A CHKO, its role and specific protection terms and conditions are declared by means of a government decree.

Nowadays, there are 25 CHKOs in the Czech Republic (the Beskydy Mountains, the Bílé Karpaty Mountains, Blaník Hill, the Blanský Les Region, the Broumov Region, the České Středohoří Highlands, the Bohemian Karst, the Český Les Mountains, the Český Ráj Region, the Jeseníky Mountains, the Jizerské Mountains, the Kokořín Region, the Křivoklát Region, the Elbe Sandstone Rocks, the Litovelské Pomoraví Region, the Lužické Mountains, the Moravian Karst, the Orlické Mountains, the Pálava Region, the Odra River Region, the Slavkovský Les Mountains, the Šumava Mountains, the Třeboň Region, the Žďárské Highlands, the Železné Mountains).

Ecotourism is considered an important sustainable development tool because it is "responsible travel to natural areas that conserves the environment and improves the well-being of local people" (definition of ecotourism by The International Ecotourism Society in 1990 – United Nations Environment Program, 2002). In fact, ecotourism not only brings economic benefits to local communities such as increasing local employment and income but also makes tourists "more aware of nature and more supportive of its conservation via changes in their personal behaviour, greater political support and larger financial contributions for such conservation". [10,11] Thus, many countries have promoted ecotourism to national parks and protected areas.

From the point of view of tourism, the adherence to the following bans and rules is important in protected landscape areas: no camping and making a fire outside locations approved by an environmental protection body, no arrival and stay of motor vehicles and caravans outside roads and local streets and sites approved by an environmental protection body, no biking competitions outside roads, local streets and sites approved by competent bodies.

1 Methods of Research

The survey took place in October and November 2019 and in March 2020. The survey was partly performed by students of tourism at the University of Economics and Business as a part of their bachelor thesis polls. The objective of the survey was to identify the extent of awareness of sustainable tourism, the positives and/or negatives the CHKO status brings to a region, and to discover the opinion on the quality of the environment and the scope of participation in its protection. Representatives of municipalities showed the lowest willingness to participate in the survey; only 6 out of 26 municipalities participated in the survey. As regards stakeholders, their participation was more extensive when 46 entities took part. The highest number of respondents came from owners of catering and accommodation facilities (41 and 37%); in addition to the aforementioned, there were 18% of operators of tourist sights, 10% of producers of regional products and 9% of respondents were employees of information centres. Residents of the region and visitors to the region were approached personally and the principle of quota sampling was used to choose the respondents. Above all, visitors were addressed in different places and on different days of the week. As for people residing on the territory of the CHKO, we managed to address 150 respondents. This group included all age categories and an equal share of men and women. Tourists arriving in the area were interviewed in person. They were intentionally addressed at various locations of the CHKO and on various days of the week. A total of 166 respondents participated in the survey.

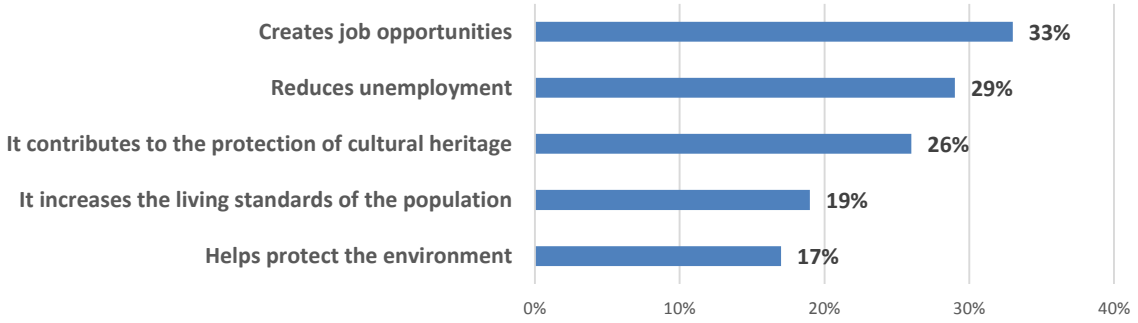
2 Results and Discussion

The existence of the Moravian Karst CHKO is perceived positively by 5 out of 6 municipalities. In their opinion, tourism contributes to the economic development of the region. It creates jobs for local people. However, on the other hand, tourism adversely influences the environment and local people. There is heavy traffic in the region which deteriorates the local roads and requires more money for their maintenance. Residents might consider the high number of tourists disturbing rather than useful. Municipalities appreciate the helpful cooperation under the Association for the Development of Rural Areas in the Moravian Karst and activities of local action groups. Municipalities understand sustainable tourism as tourism with a maximum reduction of adverse features, respect to the environment and balanced development that takes the environmental protection, benefits for the society and stable economic growth into consideration without emphasizing profit maximization.

56% of respondents operating in business know the term sustainable tourism. Businessmen usually think that sustainable tourism will be gentle to the local landscape, ensure the distribution of visitors to various places within the region and retain sources for future generations. It is tourism that is sustainable on a long-term basis (which means non-destructive) as regards the impact on the landscape, local economy, and community. Other tourist sights should be promoted to prevent the concentration of tourists in 2 or 3 places within the Moravian Karst. It should be based on local sources in harmony with nature. The services should be sufficiently attractive but at the same time, their utilization should not interfere with nature much. Not all businesses participate in the process of environmental protection. However, most of them protect the environment in a certain way, most frequently by minimizing waste, recycling it and repeatedly using various things, such as dishes. They

also educate their employees and participate in voluntary events during which the Moravian Karst is cleaned.

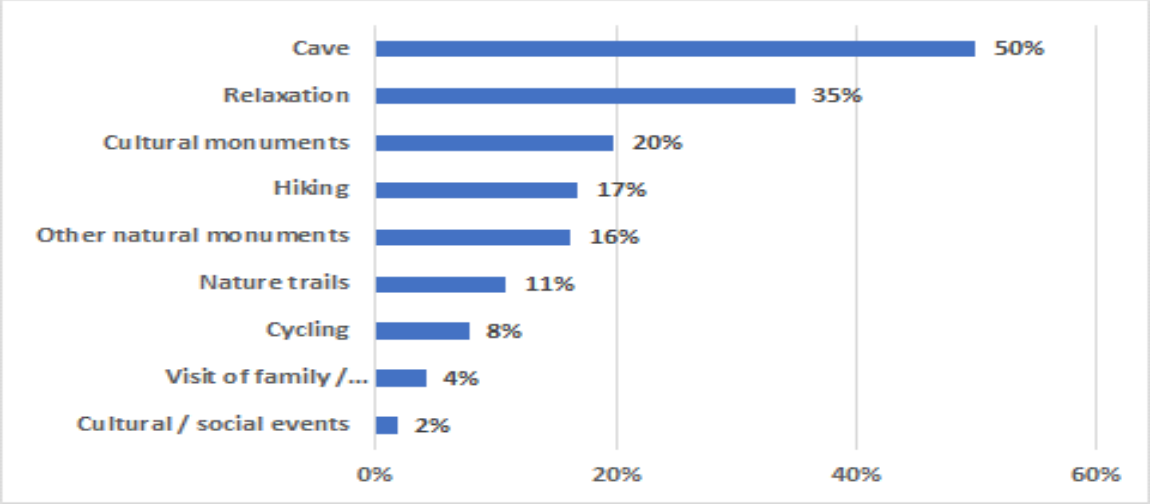
As for the survey among Moravian Karst citizens, the majority of respondents (73%) are interested in the issue of environmental protection of the Moravian Karst CHKO. Only 19% of residents are interested in the development of tourism in the CHKO. 71% of respondents directly meet tourists and their attitude towards them is mostly positive (89%). 80% of residents think that the existence of the Moravian Karst CHKO positively influences the development of tourism in the destination. What they see as the benefit of tourism for the region is shown in Figure 1. Significant sights in the territory are more carefully protected due to tourism, which results in a higher extent of environmental protection. Moreover, local people can improve their economic situation since tourism is a field which provides and creates new jobs where local people are employed. However, tourism has a negative impact as well. Negative features include heavy traffic and related air pollution. Tourism might also disturb the lives of local people and induce additional costs. Most citizens participate in environmental protection, mostly by minimizing and recycling waste. Residents also retain rainwater and use it to take care of their gardens.



Source: Author's own survey

Fig. 1: *The contribution of tourism for the CHKO Moravian Karst*

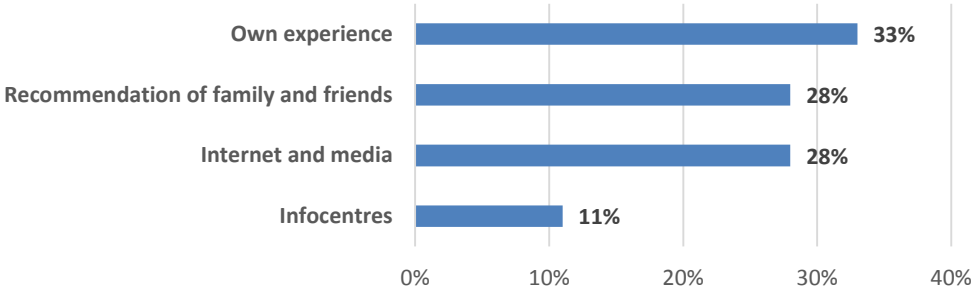
Reasons to visit the Moravian Karst CHKO are listed in Figure 2 where addressed visitors were allowed to give 3 reasons at the most. Fifty per cent of respondents visited one of the caves; one-third of respondents (who usually stay for several days) expect their stay to give them an opportunity to relax. One-fifth of tourists visited cultural sights and one-quarter of them hiked or rode bikes.



Source: Author's own survey

Fig. 2: *Reasons to visit the Moravian Karst CHKO*

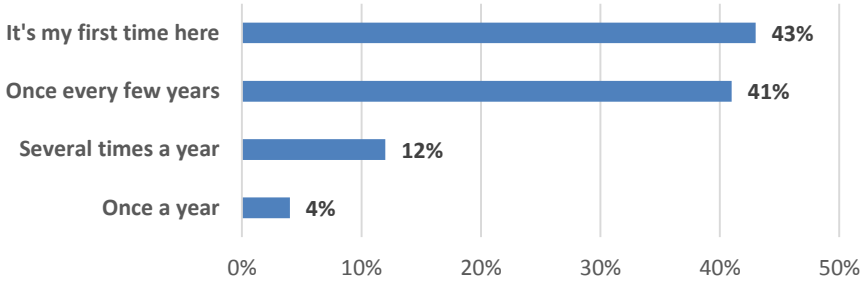
The sources of information before visiting the Moravian Karst included most frequently: the tourists' own experience, a recommendation from family members or friends, and internet and media (Figure 3). Every tenth tourist visited a tourist information centre.



Source: Author's own survey

Fig. 3: *Sources of information before the visit*

Why personal experience is the most common source of information follows from Figure 4, because 57% of visitors have already visited the region. Three-quarters of visitors came by car. In the visitors' opinion, the CHKO is not overfilled with tourists. The environment is well preserved (72%). Only one-third of visitors are familiar with the term sustainable tourism and can define it. 80% of respondents were satisfied with their visit to the CHKO. 20% of them were satisfied partly.



Source: Author's own survey

Fig. 4: *How often do you come here?*

Conclusion

The Moravian Karst is an example of a preserved landscape area that managed to combine environmental protection and tourism. Visits to caves prevail; however, visitors do not limit their activities to this type of tourist attraction. They also visit other natural as well as cultural sights.

One of the objectives of the questionnaire survey was to find out from all groups of respondents what sustainable tourism is in their understanding. Sustainable tourism is highly important in protected landscape areas. Most representatives of municipal governments knew this term. 56% of businessmen and only 37 % of local citizens and 34% of visitors were familiar with sustainable tourism. It is apparent that there is a lot of space for education and information sharing in this field.

Most municipalities think that the existence of the Moravian Karst positively influences the development of tourism. They appreciate new jobs and the inflow of finance from the regional budget. They resent the heavy traffic which results from tourism.

Stakeholders, especially owners of accommodation facilities, consider tourism very good. Most facilities are ready to accommodate handicapped visitors as well. The respondents think

that they contribute to sustainable tourism by their effort to minimize waste and to strictly sort out refuse that can be recycled subsequently. Stakeholders would appreciate greater support of tourism by regional authorities and municipalities and better promotion of other tourist sights so that tourism is not concentrated on several most famous sights only.

Two-thirds of local citizens addressed during the survey showed interest in environmental protection. The respondents think that the CHKO as a whole is not promoted sufficiently, and attention should be focused on other places as well, not just caves. Their opinion is identical with businessmen's opinion in this aspect. They show a positive attitude to tourists and consider the creation of new job vacancies and reduction of unemployment the greatest benefit of tourism in their region. Heavy traffic is a feature that they resent.

The questionnaire survey showed that the territory attracts new visitors, but people also like to return to the region. The number of visitors is not perceived to be high and the environment in the region is considered of good quality. The survey performed among visitors showed that 86% of them spent one day in the region. Almost all of them were satisfied with the quality of services. Some of them would appreciate the improvement in the field of catering and parking.

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CESTOVNÍ RUCH V MORAVSKÉM KRASU

Článek se zaměřuje na udržitelný cestovní ruch v chráněné krajinné oblasti Moravský kras. Mezi účastníky výzkumu patřily obce, zúčastněné strany v oblasti cestovního ruchu, obyvatelé a návštěvníci. Moravský kras (CHKO) je příkladem zachovalé krajinné oblasti, která dokázala skloubit ochranu životního prostředí a cestovní ruch. Převažují návštěvy jeskyní; návštěvníci však své aktivity neomezují pouze na tento typ turistické atrakce. Navštěvují také další přírodní i kulturní památky. Většina obcí si myslí, že existence CHKO Moravský kras pozitivně ovlivňuje rozvoj cestovního ruchu. Oceňují nová pracovní místa a příliv financí z regionálního rozpočtu.

TOURISMUS IM MÄHRISCHEN KARST

Der Artikel konzentriert sich auf den nachhaltigen Tourismus im Landschaftsschutzgebiet Mährischer Karst. Zu den Teilnehmern der Untersuchung gehörten Gemeinden und Interessengruppen im Bereich Tourismus, Einwohner und Besucher. Der Mährische Karst (CHKO) ist ein Beispiel für ein Landschaftsschutzgebiet, dem es gelungen ist, Umweltschutz und Tourismus miteinander zu verbinden. Höhlenbesuche überwiegen; Besucher beschränken ihre Aktivitäten jedoch nicht auf diese Art von Touristenattraktion. Sie besuchen auch andere natürliche sowie kulturelle Sehenswürdigkeiten. Die meisten Gemeinden sind der Meinung, dass die Existenz des Mährischen Karstes CHKO die Entwicklung des Tourismus positiv beeinflusst. Sie schätzen neue Arbeitsplätze und den Zufluss von Finanzmitteln aus dem Regionalhaushalt.

TURYSTYKA W MORAWSKIM KRASIE

Artykuł skupia się na zrównoważonej turystyce w Parku Krajobrazowym Morawski Kras. W badaniu wzięły udział gminy, gestorzy turystyki, mieszkańcy i turyści. Morawski Kras (Park Krajobrazowy) jest przykładem zachowanego obszaru krajobrazowego, któremu udało się połączyć ochronę środowiska i turystykę. Przeważają wizyty w jaskiniach, jednak turyści nie ograniczają się do tego typu atrakcji turystycznych. Odwiedzają także inne pomniki przyrody i zabytki kultury. Większość gmin uważa, że istnienie Parku Krajobrazowego Morawski Kras pozytywnie wpływa na rozwój turystyki. Doceniają nowe miejsca pracy i napływ środków z budżetu regionalnego.

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