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Table of contents

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Managerial decisions on the nature and scale of corporate activity diversification in the construction sector

Romualdas Ginevičius

ABSTRACT

Corporate activity diversification is a promising but at the same time risky condition of a company's adaptation to the business environment. Effectiveness of diversification processes in enterprises may be achieved by research in the following areas: development of methods of internal and external business environment analysis as a basis for diversification decisions; understanding the dependence of the scope and nature of corporate activity diversification on the market situation; providing science-based advice for the management of diversified companies, especially large ones; improvement in the methods of diversification measuring so that a complex analysis of the diversification process would become implementable. Based on the study of the Lithuanian construction sector, this paper seeks to provide new insights into the following aspects of corporate activity diversification: preconditions and conditions for deciding on corporate activity diversification; the problem of the scale and nature of diversification; organisational management conditions for the success of diversification projects. Furthermore, an in-depth discussion of the problematic of measuring the achieved level of diversification is offered.

KEY WORDS

corporate activity diversification, construction sector, success factors, diversification measurement

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Introduction

Today, the success of economic agents is determined not by their ability to launch products or provide services, but by their capacity to sell them in the market. Thus, the strategic focus of businesses is shifted from the area of production to marketing, i.e. the area of market relations. Companies need to be aware of both new opportunities and emerging threats so as to take advantage of the former and prevent the latter. Development of the ability to adapt

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is the most effective way to implement any business strategy. In a constantly changing environment, companies survive only if the complexity and dynamics of their decisions are adequate to the changes in the external environment (Ansoft, 1965), which was particularly clearly revealed by the global financial crisis of 2009–2010. The construction, wholesale and retail sectors were hit hardest by the shrinking markets – they went bankrupt. This was because companies in the above-mentioned sectors did not have any independent sources of revenue.

Risk reduction and long-term financial stability are the main objectives of corporate activity diversification (Amik et al., 1988; Schüle, 1992; Montgomery, 1994; Ginevičius, 1998a, 2008b; Kieser & Kubicek, 1992). A diversified company can achieve the first objective by offsetting losses in declining markets with the gain from growing ones. The cycles of achieving the second objective are depicted in Figure 1.

The literature on a product life cycle distinguishes four stages of this cycle: creation and introduction, growth, maturity and decline (Gort & Klepper, 1982; Maksimovic & Gordon, 1995; Dickinson, 2005; Zhipeng, 2006). To maintain stable revenue, losses caused by a fall in sales of one product (stage 4) are offset by an increase in sales of another one that is in the third stage of its life cycle (Fig. 1).

Company's ability to adapt to changing external requirements can only be achieved through corporate growth (Ansoff, 1965) which, however, must not be passive (i.e. directed only to save the positions already occupied) because market growth is the main precondition for both global and national economic development. For this reason, companies need to expand their activities to the extent that would allow them to maintain growth rates no lower than those of the general market. Only in this case, they can expect to raise or at least to maintain their market shares.

Diversification is one of the four basic corporate growth strategies (Ansoff, 1965). It is based on three essential principles: first, the introduction of the products that differ from those already produced to such an extent that they can be sold in new markets; second, entry into new markets that differ from current ones to such an extent that it makes sense to develop the volumes of production; third, the development of the long-term production expansion schemes without damaging the part which reflects the current corporate production nomenclature (Arbeitskreis, 1973).

Because corporate diversification is a process of great complexity and even controversy, the opinions on its strategical efficiency in terms of corporate adaptation to the external environment are still conflicting (Amik et al., 1989; Ansoff, 1957, 1965). Several decades of scholarship on this topic present a nuanced view on when and how diversification might be beneficial to an enterprise (Miller, 2006; Pennings et al., 1994; Teece et al., 1993; Wan & Hoskisson, 2003). Even today, although the first steps of corporate activity diversification were made in the USA as early as 1850 and gathered pace immediately after World War II, many questions remain unanswered (Lehmann, 1993). The main relevant issues are as follows:

- preconditions and conditions for deciding on corporate activity diversification;
- the problem of the scale and nature of diversification;
- organisational management conditions for the success of diversification projects;
- measuring the achieved level of diversification.

This article addresses all the above-mentioned issues.

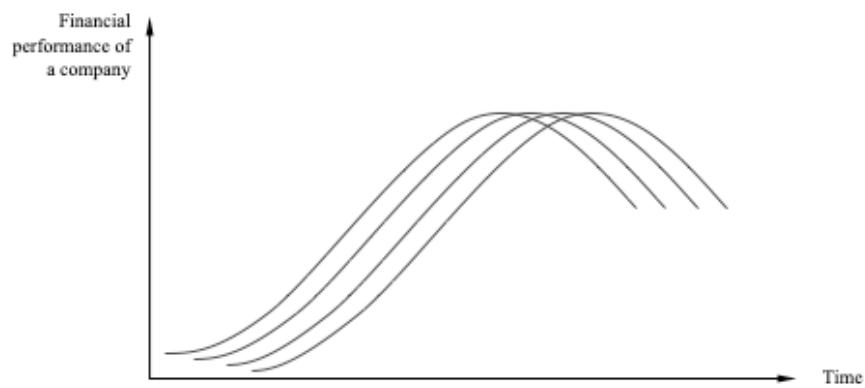

Fig. 1. Company's product life cycles

1. Preconditions and conditions for decision-making on corporate activity diversification

Ansoff's four corporate growth strategies can be divided into two groups (Pierscionek, 1966):

- expansion strategies (market penetration, development and product improvement);
- diversification.

The choice of one of the two options must be based on the analysis of internal and external business conditions because namely this analysis determines corporate growth prospects. The above-mentioned strategies reveal long-term sale forecasts based on the trends in national economic policies, international indicators, business specifics, competition, cost fluctuations and so forth. If it turns out that expansion strategies do not provide any opportunities to develop the current business and thus increase the volume of products or services, or if there is a risk of a decline in a company's market share, then the company should further grow through diversification.

As already mentioned before, Ansoff's concept of a strategy choice is based on the analysis of internal and external business environment (Ansoff, 1957) (Fig. 2).

On the other hand, it is widely acknowledged that diversification, as a corporate growth strategy, plays an increasingly important role in business management, and a growing number of international corporations rely on in their activities. For instance, in recent years, it has been implemented by more than 94 per cent of the world's top 500 corporations (Li et al., 2013). The importance of diversification has grown significantly in the context of business internationalisation, which is particularly noticeable in developing economies (Chen et al., 2014).

Many previous studies address the impact of diversification on different corporate activity aspects: reinvestment strategies (Mackey & Barney, 2013), capital costs and structure (Hann et al., 2013), the effects of banking activity diversification on stock markets (Sawada, 2013), company's value (Kuppuswamy et al., 2014; Hyland, 2003; Jara-Bertin et al., 2015; Nazarova, 2015), the profitability of business operations (Zahavi & Lavie, 2013; Becerra & Santaló, 2006; Santarelli & Tran, 2016; Knapková et al., 2019; Bilan et al. 2019), and the need of technologies for the implementation of the diversification process (Li et al., 2013; Wang et al., 2014). Many studies focus on the impact of corporate ownership on the processes of diversification (Chung, 2013; Hernández-Trasobares & Galve-Górriz, 2016; Schmid et al., 2015; Sanchez-Bueno & Usero, 2014). Geographical diversification of business companies (Chonghui et al., 2013; Thoumrungroje & Tansuhaj, 2005; Gaur & Delios, 2015; Qian et al., 2013; Yahaya et al., 2009; Mauer et al., 2015), diversification risks (Busse et al., 2014; Yücel & Önal, 2015), the processes of diversification in business networks (Kim et al., 2014; Chen & Jaw, 2014) are areas of continuous interest among researchers.

Internal environment assessment is based on the SWOT analysis, i.e. identification of a company's strengths, weaknesses, opportunities and threats, while the main purpose of external environment assessment is to identify what opportunities a company has to capture new markets. In the context of increasing complexity and dynamics of national and global economic systems, the analysis of enterprise's environment requires application of

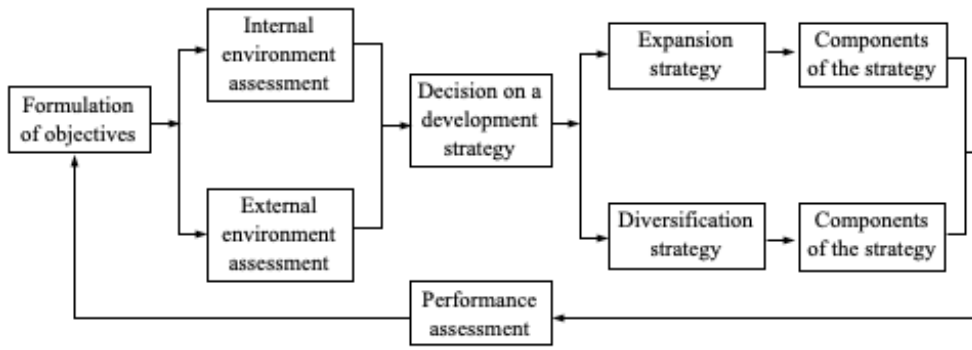

Fig. 2. Scheme of the corporate strategy formation process
Source: author's elaboration on the basis of (Ansoff, 1957).

sophisticated methods grounded in the foresight logic (Nazarko et al., 2007a; Nazarko et al., 2007b; Ejdys et al., 2019). Such analyses are relevant to all economic sectors (Nazarko et al., 2015), including construction. The analysis should also comprise assessment of the potential of a new business, the synergies expected from capturing new markets, etc. (Ginevičius, 1998).

2. Problem of the scale and nature of diversification

The problem of the scale and nature of diversification covers several aspects: first, identification of the scale or, in other words, the number of simultaneous activities; second, the technological relation among the conducted activities.

The basis for tactical actions while implementing a particular diversification strategy is the so-called corporate core skill (Wrigley, 1970). This concept refers to the general ability of a company to accurately and effectively accumulate the knowledge of markets and technologies for profit, growth, and thus external adaptation. Basically, the core skill reflects a company's professionalism and its strategic potential. It determines how many and what types of activities a company can conduct considering the situation in the market.

The scale of diversification, or the number of simultaneous activities, reflects the quantitative nature of the diversification process, while the technological relation among the conducted activities is linked to the technological similarity of these activities. In this sense, a distinction is made between related and unrelated diversification. Related diversification refers to the expansion of the new products manufactured or sold within the corporate core skill. Unrelated diversification, on the contrary, refers to the inclusion of such products that require the skills outside the corporate core skill. The latter type virtually reflects the qualitative side of diversification.

All aspects of the scale and nature of diversification are closely linked together (Fig. 3).

Figure 3 proposes that both quantitative and qualitative parameters of the process of corporate activity diversification depend on the market situation. A market can be growing, shrinking or steady. When the market is growing, the demand for current products is so high that a company can profitably raise its production volumes without high risks. In this situation, there is no point in raising the number of unrelated activities. Previous research also confirmed that the degree of corporate activity diversification is declining in growing markets (Ginevičius, 2008a).

In shrinking markets, companies find themselves in the opposite situation because the demand for current products is significantly declining. Companies can only survive by entering new, less crisis-affected markets with their new products. Thus, when markets shrink, the importance of corporate production diversification grows.

Stable markets combine the features of both growing and shrinking markets. Entering new markets is always associated with various extra costs, which means a higher risk not to achieve a desired economic result. On the other hand, an excessive narrowing of the production program may also have a negative effect because a company becomes too sensitive to demand fluctuations.

An economically reasonable number of simultaneous activities can be estimated by employing a correlation-regression analysis, the basic model of which is written as follows: $y = f(x)$. Here y represents the results of commercial-economic activities (operational efficiency) in diversified companies, e.g. profit; x marks the number of activities. The research in the construction sector allowed to assess the impact of the scale of diversification on operational efficiency (Fig. 4) (Ginevičius, 2005).

Figure 4 indicates that the companies which have not changed the profile of their activities as well as the ones that unreasonably expanded this profile record lowest operational efficiency, which was confirmed by the results of the research in the construction sector. The general trends of the diversification process also show that the highest operational efficiency is achieved by concentrating corporate

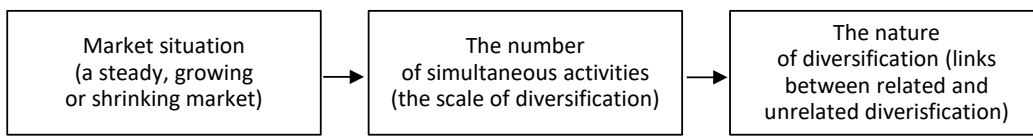

Fig. 3. Dependence of the scale and nature of corporate activity diversification on the market situation

activities in the areas not too remote from the corporate core skill.

Previous research indicates that before the global financial crisis of 2008–2009, when the construction sector was growing steadily, companies had started narrowing their profiles because they had been making large profits from their core activities and therefore did not see any need to expand their activities to other, unrelated markets. But when the sector began to shrink, companies started expanding their profiles to have independent sources of revenue and thus offset their losses in the core market.

As can be seen in Figure 4, when the market in the EU's developing states is steady, the rational number of corporate activities in the construction sector amounts to 2–4. There is a trend that this number grows over time, which means that the quality of management in diversified construction companies is also rising. In any case, the number of simultaneous activities is significantly affected by the size of a company. These are "the two sides of a coin": when the size of a company grows, the degree of corporate activity diversification also increases, and vice versa – a rising degree of corporate activity diversification leads to the growth in the size of a company.

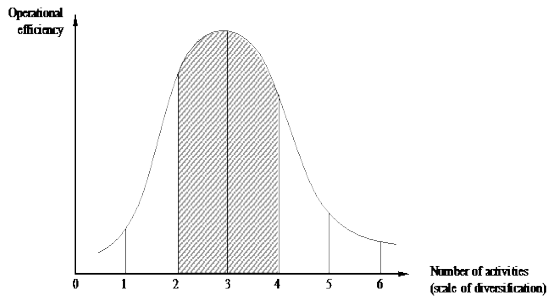

Fig. 4. Dependence of operational efficiency on the number of activities

There exists a close relationship between the number of activities and the nature of diversification, i.e. between quantitative and qualitative sides of diversification: when the number of activities grows, companies move away from their core skills, which means an increase in the scale of unrelated diversification.

A generalized picture of the corporate activity diversification process depending on a market situation is presented in Figure 5.

Figure 5 indicates that a project of corporate activity diversification will be successful, if a company is able to develop an appropriate strategy and assess the whole set of conflicting conditions and, most importantly, to anticipate the changes in the market.

Organisational management conditions for the success of diversification projects should also be considered. The experience of diversified companies confirms the fact that diversification is a complex and controversial phenomenon since a large number of diversification projects fail, especially in the early stages of their implementation. The main cause of this failure is that a corporate organisational management structure does not correspond to the philosophy of diversification as the development strategy. Until the stormy development of the diversification processes between 1950 and 1970, corporate management had been dominated by an exclusively functional structure where particular management units used to specialize in the performance of well-defined functions only. Such structures were reasonable when a company focused on the release of one or several closely-related products, i.e. when a company was specialized. However, because diversification processes were developing faster than the restructuring of corporate organisational management systems, the management

A. Declining market	B. A well - established market	C. Growing market
Number of areas of activity	Number of areas of activity	Number of areas of activity
→ increases	decreases ← → increases	decreases ←
Scale of diversification	Scale of diversification	Scale of diversification
→ increases	decreases ← → increases	decreases ←
The nature of diversification	The nature of diversification	The nature of diversification
related → unrelated	related ← → unrelated	Related ← unrelated
Performance of a company	Performance of a company	Performance of a company
stabilizes	getting better ← → deteriorating	→ getting better
Operational risk	Operational risk	Operational risk
→ increase	decreases ← → increases	decreases ←

Fig. 3. Dependence of the scale and nature of corporate activity diversification on the market situation

of diversified companies became inefficient, which led to low operational efficiency and even bankruptcies. It was later realized that the release of new products refers to different material-technical resources, especially in terms of technologies, i.e. it refers to new knowledge that is different from the core skill knowledge. This perception, in turn, led to the transition from a functional organisational management structure to a divisional one, i.e. formation of autonomous management units based on the released products. The main feature of this structure was the focus on different product markets.

Some scientific studies propose that the strategy of diversification seems controversial in terms of a modern organisation. It is considered that modern organisations must focus on the use of knowledge and thus develop the level of professionalism which ensures a successful competition. The development of professionalism, in turn, can only be ensured by an appropriate degree of specialization. This contradiction is fully resolved by employing a divisional organisational management structure since divisions specialize in the release of a particular product only.

The divisional organisational management structure allows a diversified company to significantly reduce its management costs by taking advantage of synergies (Hitt et al., 2001). Today, the commercial and economic performance of diversified companies, especially large ones, depends exclusively on the quality of their management.

3. Measuring the level of diversification

Measuring the level of diversification is a fundamental problem in the diversification process that is far from being fully resolved. The theory of diversification has expanded the extent of both unrelated and related diversification. This issue earns special attention in scientific studies. In order to manage the diversification process, it is necessary to quantify its level at a certain point of time. Methods for measuring unrelated diversification are most developed. They are all based either on the number of activities or estimation of the variation between the number of activities and the volumes of work. The first approach is based on the diversification index system proposed by M. Gort (Gort, 1962; Bühner, 1985; Wolf, 1995a, 1995b), while in the second case, the diversification index is estimated by the following principal expression (Wolf, 1995a, 1995b):

$$D_j = \sum_{i=1}^{n} \omega_i P_i , \quad (1)$$

here *Dj* – diversification index; *Pi* – the relative size of activity *i*; *ωi* – the significance of activity *i*; *n* – the number of activities.

By equating the significance of a particular activity to its relative size *(ωi = Pi)*, the Herfindahl concentration index is obtained:

$$D_H = \sum_{i=1}^{n} P_i P_i = \sum_{i=1}^{n} P_i^2 \quad (2)$$

Since production concentration is the opposite of production diversification, the Herfindahl index is transformed to obtain Berry diversification index (Berry, 1971):

$$D_B = 1 - D_H = 1 - \sum_{i=1}^{n} P_i^2 \quad (3)$$

For measuring unrelated diversification, the entropy and Uton indices are also used (Jackuemin et al., 1979; Palepu, 1985; Uton, 1977).

$$E_D = \sum_{i=1}^{n} P_i \ln \frac{1}{P_i} \quad (4)$$

$$W_u = 2\sum_{i=1}^{n} iP_i - 1 \quad (5)$$

here: *Ed* – diversification entropy index; *Wu* – Uton diversification index.

The main shortcoming of the above-discussed methods applied for measuring diversification is insufficient methodological substantiation. Gort indices are imperfect because they are linked to limited classification systems, i.e. they do not cover all areas of corporate activities and do not estimate the variation among them.

The value of the most common Berry index is directly affected by the variation in the volumes of work, thus this index does not consider the number of activities, though namely the latter determines the changes in the organisational management structure in a diversified company.

For improvement of the Berry index, the following diversification measure is proposed (Ginevičius, 2009):

$$D_G = 1 - \frac{1}{\sum_{i=1}^{n} \frac{1 - P_{\max}}{1 - P_i}} \quad (6)$$

here: *DG* – unrelated diversification index; *Pmax* – the relative size of the largest activity by volume.

In order to illustrate the situations in Figure 5 with a real example, a typical period of 2005–2019,

which incorporates all three market stages (periods 2005–2007, 2008–2009 and 2010–2019, respectively), will be considered.

Period 2005–2007 represents a growing market characterised by the tendency that Lithuanian construction companies, which generate a substantial share of the country's GDP, were granted major restriction-free bank loans on exceptionally good terms, which led to a disproportional expansion of the construction sector and a "price bubble" formation. Construction companies did not need to expand their business profiles as they earned steady revenues from their core activities, which is evidenced by the low values of diversification indicators (see Table 1).

The small effect of diversification on corporate commercial performance is also confirmed by the results of the correlation-regression analysis (see Table 2).

As can be seen in Table 2, over the period 2005–2007, the effect of diversification on corporate commercial profitability was weak.

Period 2008–2009 represents the global financial crisis characterised by the burst of the "price bubble", i.e. the construction sector shrank significantly, corporate revenues fell, and corporations had no reserves to repay bank loans. The situation resulted in the bankruptcies of a significant number of construction, retail and wholesale companies which possessed no independent sources of revenue, i.e. they had failed to expand their business profile on time. On the other hand, the other part of business companies were aware of the impending danger and prepared for it accordingly: they diversified their activities to introduce new products to the markets less affected by the crisis, which is evidenced by the higher values of diversification indicators (see Table 1) as well as the results of the correlation-regression analysis disclosing the links between corporate commercial performance and the degree of diversification (see Table 2).

The third period (2010–2019) is characterised by a well-established market. In this situation, companies achieve their best commercial results when they, on one hand, do not unreasonably narrow their business profiles, on the other hand, do not develop new products unreasonably remote from the core product, and can therefore exploit the same technologies and knowledge without any need to change their organisational management structures, etc. This is evidenced by the values of the diversification indicator as well as the results of the correlation-regression analysis (see Tables 1 and 2).

Tab. 1. Average values of diversification indicators of the companies operating in the Lithuanian construction sector

Values of diversification indicators	Period, years		
	2005–2007	2008–2009	2010–2019
D_B	0.23	-	0.3
D_G	0.27	0.4	0.3

Tab. 2. Dependence of commercial profitability of the companies operating in the Lithuanian construction sector on the degree of diversification

Period, years	Regression equation	Value of correlation coefficient R
2005–2007	$E = 0{\cdot}14 + 10{\cdot}450D_G + 9{\cdot}888D_G^2$	0.22
2008–2009	$E = 0{\cdot}134 + 0{\cdot}026D_G$	0.66
2010–2019	$E = 0{\cdot}195 + 0{\cdot}025D_G$	0.42

Estimation of the scale of unrelated diversification is based on the presumption that corporate activities are not related either technologically or in any other way. But the reality is usually different, so the actual picture of diversification is distorted. Thus, to further improve the quantitative estimation of the scale of diversification, new methods need to be developed.

The methods applied for qualitative estimation of the scale of related diversification are even less developed, though this aspect of diversification is extremely important considering the fact that different corporate activities are technologically or in any other way related to the core activity. Probably due to the difficulty to quantitatively estimate these relations, the scale of related diversification is commonly measured by employing the discrete-categorical measure (Wrigley, 1970). The essence of this method is that all companies are divided into four categories: single product, dominant product, related product and unrelated product. Practical application of this concept revealed a number of shortcomings, which led to its subsequent refinement by Rumelt (Rumelt, 1974). Nevertheless, even this methodology does not provide a reliable basis for measuring related diversification. The latest methods for measuring this type of diversification include Varadarajan and Ramanajan's (Varadarajan & Ramanujan, 1987) suggestions which, however, are highly subjective.

The main drawback of the above-discussed methods developed for measuring the scale of related

diversification is that they do not consider quantitative estimation, which is considered in the following index (Ginevičius, 2012):

$$D_s = 1 - \frac{\sum_{i=1}^{n} \frac{W_i}{P_{\max}} P_i}{1 - P_{\max}} \quad (7)$$

here: *Ds* – index of the related corporate activity diversification; *Wi* – aggregate strength of the relationship between the ith product-market combination and the core product-market combination; Wmax – the largest possible value of the relationship between the ith product-market combination and the core product-market combination.

Formula (7) indicates that the related diversification measurement is based on the quantitatively expressed strength of the relationship between all product-market combinations and the core product-market combination.

Average values of the indicator of related diversification estimated for construction companies in different periods of the term under consideration are presented in Table 3.

The low value of unrelated diversification (see Table 1) and the high value of related diversification (see Table 3) indicate that when the number of simultaneous activities is decreasing, companies are moving closer to their core products, i.e. they exploit the same production technologies. All this is typical of a growing market.

When the degree of unrelated diversification increases, the degree of related diversification decreases (see Tables 1 and 3), which means that when the number of simultaneous activities declines, companies move away from their core production technologies and start applying new ones that differ from the former. At the same time, the opportunities to sell new products in new markets appear.

In a well-established market, the degree of unrelated diversification decreases, which prompts companies to move closer to their core products, thus the degree of related diversification increases accordingly (see Tables 1 and 3).

Tab. 3. Average values of the indicator of related diversification for construction companies under consideration

Periods of the term under consideration, years	2005–2007	2008–2009	2010–2019
Value of D_s indicator	0.47	0.15	0.35

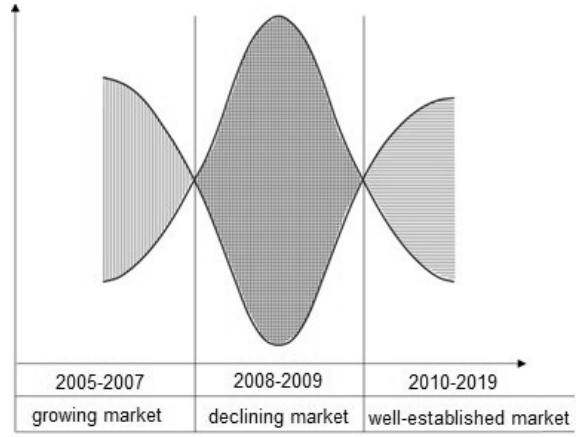

Fig. 6. Tendencies of corporate activity diversification depending on the market situation observed in the construction sector

Summarising, the following generalized picture of the interrelations between unrelated and related diversification depending on the market situation emerges (see Fig. 6).

Nevertheless, this method for measuring the scale of corporate activity diversification does not resolve the problem of how the measure of related diversification can be integrated into the measure of unrelated diversification, which is important because only by integrating these two measures, a complex estimation of the scale of diversification can be conducted. The above-discussed issues of corporate activity diversification require further research.

Conclusions

Corporate activity diversification is a process of high complexity and its assessment is controversial. On one hand, diversification creates opportunities to disperse the market activity and thus ensure long-term financial stability; on the other hand, as a development strategy, it is relatively risky.

The basic issues of the diversification process that have not yet been fully resolved are as follows: preconditions and conditions for making a decision on corporate activity diversification; the problem of the scale and nature of diversification; organisational management conditions for the success of diversification projects; measuring the achieved level of diversification;

Resolution of the first issue requires the improvement of the methodology for analysing the internal and external business situation. An

organisation that is not properly prepared for activity diversification is bound for failure.

The scale and nature of diversification depend on the market situation, i.e. it depends on whether a market is growing, shrinking or steady. In shrinking markets, the number of activities rises along with the scale of unrelated diversification, which allows stabilising corporate financial performance, but raises operational risks.

In growing markets, by contrast, the number of activities decreases along with the scale of diversification (the related diversification is predominant), operational efficiency improves, and risks decline.

Effective management of a diversified company is ensured by the transition from a functional to a divisional organisational management structure, though the issues of the effective management of large diversified companies remain unsolved.

Successful management of the diversification process calls for the adequate estimation of the scale of diversification at a particular point of time. The most common measures of unrelated diversification are based on the presumption that corporate activities are not related either technologically or in any other way. However, because the reality is usually different, these measures provide a distorted picture of diversification. Thus, to further improve the adequacy of quantitative estimation of the scale of diversification, new methods need to be developed.

Related diversification is commonly estimated by applying the discrete-categorical, i.e. qualitative measure. Nevertheless, without a quantitative estimation, integration of the measures of unrelated and related diversification into a single generalizing index is impossible, as is a complex estimation of the scale of diversification.

Literature

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Relationship between organisational silence and employee demographic characteristics: the case of Lithuanian teachers

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A B S T R A C T
Organisational development requires creative and open employees, who must feel confident to use their inventiveness and share ideas. However, some entities encounter organisational silence. The lack of research into this phenomenon in Lithuanian educational institutions encouraged the authors of the article to investigate how demographic characteristics of teachers relate to types of organisational silence. The authors used two nonparametric tests for analyses, i.e. Mann–Whitney U to study gender and Kruskal–Wallis H to investigate age and marital status. The quantitative research targeted teachers of 104 Lithuanian secondary schools. The research findings contribute to filling the knowledge gap in the topic of organisational silence in Lithuania. The enclosed demographic characteristics can help rectify the current situation in educational institutions.

K E Y W O R D S
organisational silence, organisational voice, organisational culture, demographic characteristics

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Introduction

The modern world is constantly changing and developing, which poses new challenges for organisations aiming to function successfully, offer new products, and adapt to novel situations. For the most part, the human factor is essential for organisations to survive. Contemporary employers attempt to involve employees in the management of the institution, expecting them to speak up, react to the problems and challenges in the working and broader environ-

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ment, share their knowledge and experience, and stand up for their convictions. Usually, employees have ideas, information and opinions on how to improve their work constructively. Sometimes, employees share, but often they remain silent, keeping their personal opinion to themselves (Bagheri et al., 2012). The phenomenon when members of an organisation refuse to express their opinion regarding organisational matters because of various reasons is referred to as organisational silence (Chen, 2018).

Tangirala and Ramanujam (2008) noted that organisational silence might be a complex phenomenon. It may consist of different subjects, such as the effectiveness and the productivity of the workgroup, individual problems at work, and anxiety about the behaviour considered ethically inappropriate. The phenomenon can apply to different people working in an organisation, e.g., specialists, mid-level workers, heads, and top-level managers. Also, it can have different purposes and reasons, e.g., a desire to maintain the current situation or fear of being misunderstood (Tangirala & Ramanujam, 2008). Thus, organisational silence may be a combination of different factors, including reasons, sectors, people, levels and types. Some scientists believe that organisational silence differs depending on gender (Fapohunda, 2015), age and marital status (Hatipoglu & Inelmen, 2018), the role of an employee at the workplace (Fapohunda, 2012), and culture (Hess & Jepsen, 2009). Consequently, employee silence is a complex and frequent phenomenon which requires more attention from scientists.

Organisational silence is a topic, which should be considered vital by all organisations. The phenomenon is researched in different fields of economic activity, such as the public sector (Behtoui et al., 2017), health care (Yalçin & Baykal, 2019), accommodation services (Zhang et al., 2019), finance (Adeel & Muhammad, 2017), telecommunications and technologies (Emelifeonwu & Valk, 2019), and the heavy industry (Dedahanov & Rhee, 2015). The analysis of scientific literature revealed a lack of research into the manifestation of organisational silence in the sector of education. The system of education aims to teach children to think creatively and critically as well as look for open and innovative solutions to a situation (The National Education Strategy for 2013–2022). To achieve these goals, teachers must be brave, skilful, open to innovations, and capable of expressing their opinion. Furthermore, the diversity of employees in terms of gender and age promotes creativity and innovation in an organisation (Syed, 2014; Hatipoglu & Inelmen, 2018). Hence, deliberate concealment of ideas may negatively affect the work of teachers, their development and the quality of education.

Based on the above, the authors of this article aimed to investigate how organisational silence was distributed among teachers with different demographic characteristics. The research also aimed to indicate how demographic characteristics of teachers related to types of organisational silence.

The research used several methods, including the analysis of scientific literature, quantitative questionnaire, descriptive statistics, reliability analyses, the Mann–Whitney U test and the Kruskal–Wallis H test.

1. Literature review

1.1. Definition of organisational silence

The investigation into the concept of organisational silence starts from knowing that "silence" and "voice" (i.e. having a voice in an organisation) are two opposing notions. In recent decades, more attention has been given to the concept of "voice" in the management of organisations (Allen, 2014). This concept is defined as a behaviour used by employees to express their opinions, suggestions and ideas. Employee voice facilitates staff participation in organisational decision-making (Emelifeonwe & Valk, 2019). Effective communication in an organisation requires two parties: a speaker and a listener. This way, two forms of communication — voice and silence — interact in the process.

Hirschman (1970) was the first to present the phenomena of voice and silence in an organisation. According to the author, silence in an organisation signified the loyalty of employees. On the other hand, the employee silence allowed assuming an agreement to policies, decisions and behaviours of colleagues and managers expressed by certain inaction as well as the confirmation of the status quo (Dyne et al., 2003). Such perception treated employee silence as a positive stance.

However, the turn of the century came with a better understanding of the importance of employee attitudes in the development and transformation of an organisation. According to Köylüoğlu et al. (2015), generation of information outrivalled the traditional understanding of production. The current globalised world requires increasingly greater staff involvement

in controlling the streams of information in an organisation. Therefore, since the last decade of the 20th century, organisational silence has been perceived as a negative phenomenon.

Silence in organisations was not only perceived as a sign of passive approval. Employee silence may be an active, conscious, purposeful and deliberate choice, but it also can be unintentional. In this respect, it is important to note theoretical insights by Cohen (1990), Morrison and Milliken (2000), Pinder and Harlos (2001). Cohen (1990) was probably the first to deny that silence necessarily meant assent. He proposed that silence could also mean a contradiction and disagreement, which could arise because of the lack of information or the absence of opportunities to use a voice (Pinder & Harlos, 2001). Therefore, under certain circumstances, silence may be a natural way of expression. Penuel et al. (2013) called this unintentional manifestation of silence "natural silence" (Le et al., 2019). The gist of silence was perceived as natural when an organisation had no other choice but to remain silent.

Morrison and Milliken (2000) defined organisational silence as a collective phenomenon. The authors were among the first to use the concept "organisational silence". They created the concept of silence climate to explain how standards of the organisational culture impacted employee silence (Wynen et al., 2019). The authors suggested that employees remained silent because they knew that it was pointless or dangerous to express their opinion in the context of their organisation. Employees take part in a model of organisational culture which comprises internal politics, demographic characteristics, convictions of the top management, feelings shaped in the collective, and communication processes. This model explains how lower-level employees become disappointed or afraid to speak up. According to Morrison and Milliken (2000), organisational silence becomes a collective behaviour when employees decide to conceal organisational matters.

Pinder and Harlos (2001) presented a different understanding of deliberate organisational silence, defining it as inhibition of a person's emotional, cognitive expression and behaviour, knowing that it may influence the person or the organisation. For instance, when a person does what is expected without speaking up, it may be a sign of protest in an organisation (Dedahanov & Rhee, 2015). Therefore, employee silence may have different meanings depending on motives. When employees have individual motives, they may choose not to reveal their opinion voluntarily. Silence may have different motives. According to Mokhtari (2016), they can be of three different types:

- managerial (negative reaction of the employer to comments, a forcible style of management, employee fear of negative responses to their comments, the atmosphere of distrust and suspicion),
- organisational (the inertia of work, the centralised organisational structure and the absence of the bottom-up feedback procedure),
- social (following the crowd, group responsibility instead of personal responsibility, and group thinking), and
- personal (maintaining the status quo and the pessimism of the management) (Bordbar, 2019).

Therefore, employee silence may result from an organisational model as well as personal interests.

Different reasons may originate organisational silence. According to Milliken and Morrison (2003), the most frequent reasons for not speaking up can have consequences related to organisational silence. For instance, inexperienced employees consider their opinion meaningless and unable to change anything. In this case, employees usually choose to remain silent. This silence may affect the psychological health of employees and the whole organisation. Employees may choose silence not only because of low self-esteem but also due to the lack of information, fear, certain personal qualities and negative experiences. Therefore, the phenomenon of organisational silence and its reasons are defined differently by scientists, such as Morrison and Milliken (2000), Pinder and Harlos (2001), Cohen (1990), Dyne et al. (2003).

In the analysis of the concept of organisational silence, another important aspect is its impact on the organisation as a whole and each employee individually. According to Milliken and Morrison (2003), adverse outcomes can be expected, e.g., being labelled or viewed negatively, damaged relationships, retaliation or punishment, and belief that speaking up will make no difference. However, silence can bring even more significant negative consequences.

Human resources are the most critical component of educational institutions because they create value for future generations. Therefore, it is vital to know and understand employee attitudes towards work and their motivation when participating in the processes of education. When employee silence becomes a rooted conviction, people tend to perceive themselves as useless members of their organisation. Consequently, psychological contradictions appear between actions and thoughts, damaging employee job satisfaction, their loyalty and motivation (Akar,

2018). Such a situation may prevent employees from being creative and open to innovations.

Communication is believed to be crucial to the success of an organisation. The choice to remain silent may harm the communication and overall functioning of an educational institution (Bagheri et al., 2012). As educational institutions must exchange information and ideas on a daily basis, positive and negative relationships between employees can be detected easily. The lack of collaboration in such institutions makes it hard to ensure the necessary streams of information and achieve organisational goals (Köse & Köse, 2019). The choice to remain silent halts the clarification of mistakes and problems and distorts effective solutions. This way, organisational silence manifests as an ineffective process that wastes energy and efforts.

In some cases, employee silence may be useful as it can decrease the surplus of managerial information, deescalate interpersonal conflicts, and protect employee privacy (Dyne et al., 2003). However, this phenomenon is more frequently considered harmful. Organisational silence is a new phenomenon that has great significance for communication and consequences on individual and organisational levels. This issue is critical for most modern organisations (Köse & Köse, 2019), including educational institutions. Thus, organisational silence should be analysed in more detail in the field of education.

1.2. Types of organisational silence

Organisational silence manifests in a variety of types, such as remaining silent in meetings, low participation, the lack of collective voice, etc. (Bagheri et al., 2012). To be able to recognise employee silence, it is necessary to know the types of manifestation as well as types of silence.

Scientific literature presents different typologies of organisational silence, most frequently mentioning acquiescent (Pinder & Harlos, 2001), defensive (Pinder & Harlos, 2001) and prosocial (Dyne et al., 2003) types of silence.

Pinder and Harlos (2001) (Amiri et al., 2018) were the first to mention the types of acquiescent and defensive silence. Acquiescent silence is a type of passive behaviour (Nafei, 2016), characterised by low participation, negligence and inactivity. Although employees who opt-out for this type of silence have important opinions or ideas, they try to distance themselves from issues, avoiding involvement. They believe that their opinion will make no difference. It is incredibly hard to disturb this type of silence (Pinder & Harlos, 2001). Dedahanov and Rhee (2015) gave the following example of acquiescent silence: when managers do not react to information provided by employees or do not encourage them to take part in discussions on organisational issues, employees perceive this behaviour as a signal that it is useless to speak up as it would change nothing; thus, they become silent. In such a situation, silence manifests as deliberate passive behaviour when an employee does not provide the necessary information and is satisfied with the current situation.

Contrary to the above, defensive silence is active behaviour of an employee (Wynen et al., 2019). This type of silence means the belief that speaking up was risky for the held position because of possible arguments, contradictions or sanctions and that this risk outweighed the advantages of speaking up. Employees choose this type of silence consciously to "protect" themselves and to maintain their status quo (Bordbar, 2019). Therefore, the main motive of defensive silence is fear of possible detrimental consequences.

According to Dyne et al. (2003), silence can be fear-based passive behaviour, but also, it can be intentional and deliberate conduct chosen single-mindedly. This finding reveals a complex and manifold nature of silence (Amiri et al., 2018). Consequently, Dyne et al. (2003) suggested one more — prosocial — type of organisational silence. Prosocial silence is a refusal to reveal work-related ideas, information or opinions based on altruism and collaborative motives (Dyne et al., 2003). Prosocial silence might be the result of the public spirit within an organisation when employees aim to benefit their colleagues and the workplace without expecting a reward (Shahjehan & Yasir, 2016). Therefore, prosocial silence may be harmless to an organisation.

Pinder and Harlos (2001) also proposed that different types of organisational silence may have several meanings depending on the context where they occur. Therefore, much more comprehensive empirical research is required to define the manifestation of the types of silence in a particular educational institution.

1.3. Types of organisational silence depending on demographics

Many research efforts have been made to examine different types of organisational silence in relation to demographic characteristics. It might seem that historical and cultural conditions alone impact on

voice or silence of genders in an organisation (Hess & Jepsen, 2009). Some values, norms and attitudes are common to some cultural regions and age groups (Chen & Choi, 2008). Some age-dependent studies (Hatipoglu & Inelmen, 2018) indicate that compared with middle-aged employees, younger members of staff are more likely to resist using their voice.

In some cultures, organisational silence is discussed as a social problem of gender discrimination (Fapohunda, 2015; Hatipoglu & Inelmen, 2018). Some research indicates a relationship between the level of education of an employee and their trust (Hatipoglu & Inelmen, 2018). Hatipoglu and Inelmen (2018) stated that men with a higher level of education and positive trust assessed opportunities to use their voice more positively. A similar conclusion was made for women. Nevertheless, some research indicates no gender-based differences in organisational silence (Köse & Köse, 2019). Thus, the issue remains open.

2. Research methods

The research aimed to indicate the relationship between the demographic characteristics of teachers and the types of organisational silence. The analysis of the scientific literature revealed the shortage of research into the manifestations of organisational silence in the sector of education. As the system of education aims to teach children to think creatively and critically as well as look for open and innovative solutions to various situations, teachers must be brave, skilful, open to innovations and capable of expressing their opinion. Diversity in gender and age of employees promotes creativity and innovations (Syed, 2014; Hatipoglu & Inelmen, 2018). However, deliberate concealment of ideas by teachers may have a negative effect on their work as well as the development and the quality of education. Thus, teachers from several secondary schools were chosen as the research sample.

The questionnaire was made from 30 statements by Dyne et al. (2003), applying the 5-point Likert's scale, where 1 meant "totally disagree" and 5 — "totally agree". This scale allowed indicating the three types of organisational silence (Table 1), i.e., acquiescent (Pinder & Harlos, 2001), defensive (Pinder & Harlos, 2001) and prosocial (Dyne et al., 2003). The demographic characteristics of gender, age, and marital status were collected for the analysis.

The sample size of 106 respondents was counted using a sample size calculator (Raosoft, 2019), applying the margin of error of eight per cent and, the confidence level of 90 per cent (Kardelis, 2017). The size of the population amounted to 29 042 (Statistics, 2019). The margin of error and the confidence level were counted as possible reliability while sampling. The research was organised at the end of 2019. The research data were gathered using an electronic questionnaire, ensuring anonymity for participants. The research applied the ethical principle of volunteering, providing a right for teachers to refuse participation. Teachers from 104 Lithuanian secondary schools filled-out the questionnaire. With Cronbach's Alpha of 0.807, research data is considered reliable and valid.

Table 2 compares the demographic data of respondents compiled by the authors with Lithuanian statistics. In Lithuanian secondary schools, 16.2 per cent of teachers are male (SMM, 2017). Table 2 also presents the distribution of respondents by age, compared to the percentage part in national statistics (SMM, 2018). But the difference is not such significant, and it could be assumed that the range of respondents is valid for comparing data according to chosen demographics.

The authors applied the nonparametric Mann–Whitney U test for gender analysis. The nonparametric Kruskal–Wallis H test was used to analyse age and marital status. The difference between demographically divided groups was significant when $p < 0.05$. Data were analysed using the SPSS program.

Tab. 1. Types of organisational silence

General nature of behaviour	Primary employee motive	Specific type of behaviour
Passive	Disengaged (resignation)	Acquiescent silence
		Acquiescent voice
Proactive	Self-protective (fear)	Defensive silence
		Defensive voice
	Other-oriented (cooperation)	Prosocial silence
		Prosocial voice

Source: compiled by the authors, according to Dyne et al. (2003).

Tab. 2. Research-related demographic data

Category	Variable	Part in the research (%)	Part in national statistics (%)	Difference (%)
Gender	Women	88.5	83.8	+4.7
	Men	11.5	16.2	-4.7
Age	18–24	5.8	0.52	+5.28
	25–40	22.1	14.54	+7.56
	41–55	56.7	48.16	+8.54
	56–65	15.4	33.84	-18.44
Marital status	Single	14.4	-	-
	Married	74.0	-	-
	Divorced	11.5	-	-

Source: compiled by the authors using the research data and SMM statistics (2017, 2018).

3. Research results

Mean values for analysed types of organisational silence (Table 3) particular to respondents indicate that Lithuanian teachers are rather passive than pro-active as the mean value of acquiescent silence amounts to 3.51, while the mean value of defensive voice is 3.41 (Table 3).

The defensive voice could still be considered proactive behaviour compared to defensive silence. The Mann–Whitney U test (Table 4) used for gender showed that types of organisational silence did not depend on gender.

If to ignore the significance, some differences were found between passive behaviour of women and men when talking about acquiescent voice, and pro-active behaviour when comparing defensive and prosocial types of silence. Accordingly, men are more passive in using their voice and at the same time, proactively silent.

Analysis of organisational silence by age groups (Table 5) did not indicate statistically significant differences. However, mean values of age groups were rather diverse. The data suggest that such pro-active behaviour as defensive voice is more characteristic to more mature teachers in the age group of 25–40, and prosocial silence is more typical of young teachers in

Tab. 3. Mean values and standard deviations for different types of organisational silence

Types of organisational silence (OS)	Mean	Std. Deviation
Acquiescent silence	3.51	0.66
Acquiescent voice	1.89	0.76
Defensive silence	2.27	0.73
Defensive voice	3.41	0.75
Prosocial silence	1.86	0.71
Prosocial voice	1.99	0.70

Tab. 4. Results of the Mann-Whitney U test for different types of organisational silence

Gender N (%) / Type of OS	Female		Male		Mann–Whitney Test	
	88.5	11.5	U	W	Z	Asymp. Sig. (2-tailed)
Acquiescent silence	52.55	52.08	547.0	625.0	-0.05	0.96
Acquiescent voice	51.36	61.25	447.0	4725.0	-1.08	0.28
Defensive silence	51.24	62.17	436.0	4714.0	-1.18	0.24
Defensive voice	52.55	52.08	547.0	625.0	-0.05	0.96
Prosocial silence	51.05	63.63	418.5	4696.5	-1.37	0.17
Prosocial voice	52.60	51.75	543.0	621.0	-0.09	0.93
Note: the difference is significant if $p < 0.05$						

Tab. 5. Differences in types of organisational silence (OS) by age groups

Age N (%) / Types of OS	18–24	25–40	41–55	56–65	Chi-Square	Asymp. Sig.
	5.8	22.1	56.7	15.4		
Acquiescent silence	47.25	51.37	52.68	55.44	0.37	0.95
Acquiescent voice	65.58	53.46	50.38	54.03	1.52	0.68
Defensive silence	74.17	51.22	49.62	56.84	4.04	0.26
Defensive voice	23.58	60.93	52.06	52.84	7.40	0.06
Prosocial silence	68.50	55.20	48.80	56.28	3.08	0.38
Prosocial voice	62.25	47.59	53.62	51.78	1.34	0.72
Note: the difference is significant if $p < 0.05$						

Tab. 6. Differences in types of organisation silence (OS) by marital status

Marital status N (%) / Types of OS	Single	Married	Divorced	Chi-Square	Asymp. Sig.
	14.4	74.0	11.5		
Acquiescent silence	44.47	51.57	68.50	4.57	0.10
Acquiescent voice	62.40	50.71	51.63	1.94	0.38
Defensive silence	62.90	50.32	53.50	2.22	0.33
Defensive voice	49.47	53.16	52.04	0.19	0.91
Prosocial silence	63.03	50.95	49.29	2.21	0.33
Prosocial voice	55.83	52.68	47.21	0.56	0.76
Note: the difference is significant if $p < 0.05$					

the age group of 18–24. For elder groups starting with 41 years of age, such passive behaviours as acquiescent silence and voice are more typical (Table 5). The analysis of different types of organisational silence depending on the marital status using the Kruskal–Wallis H test detected no statistically significant differences (Table 6). Nevertheless, some differences were found in mean values of such marital statuses as single, married, and divorced (Table 6).

Based on research data, the passive behaviour of single teachers is usually acquiescent voice, and their proactive behaviour is defensive silence, prosocial silence and voice. For comparison, passive behaviour of divorced teachers is usually acquiescent silence, and their proactive behaviour does not stand out, among others. No difference was found between passive and proactive behaviour of organisational silence among married teachers (Table 5).

4. Discussion of the results

The research focused on the identification of organisational silence in relation to demographic characteristics, such as gender, age and marital status. Research results did not determine statistically significant, thus evident, differences between selected demographic characteristics. However, some differences can be discerned in the calculations of descriptive statistics.

Based on the research, men are more passive in using their voice and at the same time, more proactively silent. These results may be discussed in the context proposed by Jackson et al. (2014), stating that organisational silence may differ across genders due to differences in social expectations and expressions of ideas (Jackson et al., 2014). Men and women are emotionally different (Kring & Gordon, 1998). Women are more likely to show passive negative emotions, such as sadness (Brody & Hall, 2010). Men tend to react emotionally actively and show aggression (Kring & Gordon, 1998). Such research results indicate the impact and difference of emotions. Thus, organisations should consider such information to create a secure environment from the point of view of organisational silence. Such emotional differences were not analysed in this research and could be considered in the future.

The analysis of age groups showed that such proactive behaviour as the defensive voice was typical for teachers in the age group of 25–40, and prosocial silence was characteristic to very young teachers in the age group of 18–24. For elder groups starting with 41 years of age, such passive behaviours as acquiescent silence and voice were more typical. These research findings are different from those by Hatipoglu and Inelmen (2018) who determined that younger generations were expected to refrain from speaking up; thus, younger employees were rather passive compared to middle-aged (Hatipoglu & Inelmen, 2018). Differences between the results of the research could also arise due to cultural differences in investigated countries. This possibility should be considered in future research.

The presented research of types of organisational silence among teachers indicated the manifestation of such passive behaviour as acquiescent silence and such proactive behaviour as defensive voice. Such organisational silence could be considered as moderate, which is consistent with the research results by Köse and Köse (2019). Based on research results, single teachers are usually proactively silent, and divorced teachers are more passively silent.

Although marital status is not deemed a statistically significant characteristic for differences in types of organisational silence, overall findings indicate the need for further research. For example, research by Zhang et al. (2019) demonstrated that work and family of an employee were two interdependent and interrelated microsystems, suggesting possible impact made by the family on organisational silence. Future research should focus on the analysis of work-related factors in connection to organisational silence.

5. Recommendations

Knowing that organisational silence can be harmful to an educational institution, certain preventive measures should be taken before the silence occurs. The organisational silence could be measured using an adjusted scale by Dyne et al. (2003). This scale helps to indicate the situation and types of organisational silence in an institution. The scale could be expanded by additional aspects, such as creativity and innovative behaviour of employees as well as preventive measures against organisational silence.

Revolutionary systemic changes may be required in an institution to transition from the atmosphere of silence to culture that encourages the active involvement of employees. However, as scientific literature suggests, the change must start with top managers of an institution (Bagheri et al., 2012). The main focus should be on creating trust as organisational silence tends to decrease with growing confidence, and vice versa (Dedahanov & Rhee, 2015). Trust could be built by sharing responsibility. When delegating tasks to employees, managers express their trust and reinforce employee identity and emotional attachment to the organisation (Hassan et al., 2019). Involvement of employees in management creates a certain relationship and communication with the management. At the same time, it creates a safe atmosphere which encourages people to feel that they belong and can to speak up freely (Bagheri et al., 2012). Therefore, employees associate greater responsibility with the understanding that their contribution to the organisation is valued and that expressing their opinion and ideas helps the organisation to grow stronger and develop.

Apart from giving more responsibility to employees, the scientific literature lists other possible measures, i.e. the introduction of an HR management systems or seminars for the improvement of communication skills of the management and employees (Amiri, 2018). However, aiming to prevent or decrease organisational silence, all preventive measures must be initiated by top management. Leaders of an organisation must understand and demonstrate their wish to change employee behaviours, encourage openness and feedback. Additional research is required to identify the most suitable preventive measures for educational institutions.

Conclusions

The research presented in this article did not investigate statistically significant differences of maintained organisational silence in relation to demographic characteristics, such as gender, age or marital status. Thus, further research should focus on factors related to the work of teachers in educational institutions.

Calculations of descriptive statistics revealed some differences in organisational silence in relation to demographic characteristics such, as gender, age or marital status:

- men were more passive in using their voice and at the same time, more proactively silent than women. Thus, the gender aspect might be impor-

tant for the assessment of organisational silence manifested in a secondary school

- such proactive behaviour as the defensive voice was typical for teachers in the age group of 25–40, and prosocial silence was characteristic to very young teachers in the age group of 18–24. An assumption can be made that young teachers are less aware of their competence,
- aingle teachers are usually proactively silent compared to divorced teachers who are more passively silent. An assumption can be made that divorced teachers are less reactive than single teachers, and it could be related to their life situations, as it may be less constraining being single than being married or divorced.

The research described in the article focused the analysis on a narrow field of the broader topic of organisational silence. The specific strength of this research is the provision of new knowledge that fills the gap in the research field of organisational silence in Lithuania, enclosing data with demographic characteristics particular to educational institutions facing organisational silence.

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Controlling Effectiveness Model — empirical research results regarding the influence of controlling on organisational performance

Agnieszka Bieńkowska

ABSTRACT

The article aims to explain how controlling influences an organisation as a whole, considering the job performance of employees and managers. It describes the development and verification of the Controlling Effectiveness Model, which characterises the impact, the place of each variable and the direction of each relationship in the effort to shape organisational performance. The hypothesis was verified with the help of empirical research, which was conducted with 264 organisations operating in Poland. The survey took place in October 2019. The authors of the article used the CAWI method. Efforts had been made to ensure a diversified research sample encompassing various organisational characteristics. The exploratory and confirmatory factor analysis and the sequentially mediated regression model were used to verify the hypothesis. The empirical research allowed confirming a statistically significant indirect impact of the quality of controlling on organisational performance. This relationship depends on the job performance of managers and employees. The analysis of the impact made by controlling on the job performance of employees and managers as we as the organisational performance resulted in a mediation model (the Controlling Effectiveness Model) and confirmed the effect of controlling on organisational performance through the impact on job performance of managers and employees. The article has practical implications. The organisations that decide to implement controlling should focus on the quality of this management support method. It is not enough to simply implement controlling as organisations need to ensure the correct implementation. In this context, it is also relevant to properly shape functional, organisational and instrumental controlling solutions (tailored to the characteristics of the organisation as a whole, as well as to the environmental conditions, under which the organisation operates), which determine the quality of controlling.

KEY WORDS

management, controlling, organisational performance, Controlling Effectiveness Model, empirical research

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Introduction

Even though the notion of the effectiveness of management methods is not new, it is still important from a practical and theoretical point of view. Although according to Zimniewicz (2013, p. 167), "management concepts are full of promises", the management of an organisation expects a real positive impact on the organisation as a whole when deciding to implement solutions for a specific management method. The literature discusses the goals for

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implementing individual management methods and the results of their implementation (Bieńkowska & Zgrzywa-Ziemak, 2011). The goals of the management methods are considered in the intentional approach, and the results inform about the specific effect achieved in an organisation. However, both goals and results essentially relate to the benefits associated with the implementation of a specific method. Benefits are diverse in terms of goals or results and may concern the reference areas, e.g. strategic, managerial, social, economic and technological (Bieńkowska & Zgrzywa, 2011).

Organisational performance is one of the most important performance parameters of organisational functioning, next to its productivity, efficiency or effectiveness. It is understood as a multidimensional construct (Richard et al., 2009; Tworek & Sałamacha, 2019; Maletic, 2015; Sujová et al., 2019; Bieńkowska et al., 2020), related to the results of organisational functioning. The improvement of organisational performance is among discussed benefits of management methods planned for implementation; however, it is practically never defined as a direct goal of such methods. It is a synthetic construct, which can be influenced indirectly and financially by exerting influence on different areas (depending on a method) of the organisational functioning (Richard et al., 2009; Benčová & Kaľavská, 2009; Rylková, 2015). However, insufficient specific empirically verified models are available in the literature that would explain the impact of current management methods on organisational performance.

The above remark also applies to controlling, which is among the most frequently implemented management methods in Poland (Bieńkowska & Zgrzywa-Ziemak, 2011; Lisiński et al., 2012; Tworek, 2019) and the world (Tworek, 2019). According to Weber (2019, p. 125), "In the past two decades, controlling has experienced quite a victory march. This is true for both business practice and academia". In a way, the popularity of controlling proves that it is possible to achieve measurable benefits appreciated by entrepreneurs in an organisation. The main benefits of implemented controlling are:

- ensured continuity of functioning and stimulated development of the organisation (Bea, Friedl & Schweitzer, 2005; Chachuła, 2009; Kuc, 2002);
- improved efficiency and competitiveness of the organisation as a whole (Nowosielski, 2001; Marciniak, 2008; Kuc, 2002);
- optimised (maximised) financial results (Brzezin, 2001);
- ensured economic efficiency (profitability) and financial liquidity (Hahn & Hungenberg, 2001);
- ensured sustained and systematic improvement in economic performance (Kuc, 2002).

Organisational performance is obviously named as one of the most important benefits of implemented controlling (Bieńkowska et al., 2019a; Bieńkowska et al., 2019b; Tworek, 2019), and it is treated as a general result parameter referring to the organisation as a whole. Unfortunately, so far, the literature has not explained the mechanism of the influence made by controlling on this parameter of the organisational functioning, and this issue still constitutes a research gap in management sciences. Therefore, this article aims to explain the mechanism behind the influence made by controlling on the organisational performance. The conducted research assumed that the influence of controlling on organisational performance is indirect. For example, the results obtained by Bieńkowska et al. (2019c) confirmed that job performance acts as a mediator in the relationship between the use of controlling measures and organisational performance. However, it should be noted that controlling — as a method for the support of the management — primarily affects the performance of managers, who in turn influence employees by building their job performance. However, it is not enough to consider the implementation of controlling alone (i.e., whether to implement and for what period, cf. Bieńkowska et al., 2019a, 2019b) as it is necessary to also reflect on their quality, which translates into the influence of controlling on the functioning of the organisation as a whole. Weber and Nevries (2012) emphasised the need to focus controlling on an internal customer. Therefore, the correct functioning of controlling in an organisation, which is tailored to the needs of managers and employees, determines its effectiveness (Bieńkowska, 2015).

The identified mechanism of the influence made by controlling on organisational performance constitutes the basis for the development of the Controlling Effectiveness Model, assuming that the effectiveness of controlling is understood in this article as the strength of the influence made by controlling on organisational performance. Therefore, the obtained results not only allow explaining how controlling affects the results of organisational functioning, but they also help to develop the Controlling Effectiveness Model, which allows filling the previously identified research gap.

The theoretical part of the article presents the essence of controlling as a management-support method and refers to the quality of its products and services. It demonstrates the impact of controlling on organisational performance, considering the influence of the discussed method on organisational performance through the job performance of managers and employees. In terms of the Controlling Effectiveness Model, the empirical part examines the mechanism of the impact made by controlling on organisational performance. The Controlling Effectiveness Model is verified using the path analysis executed with the help of SPSS AMOS. The obtained research are discussed and summarised.

1. Notion and quality of controlling

Controlling is a management-support method, which on the one hand is one of the most frequently implemented methods in modern organisations (Bieńkowska & Zgrzywa-Ziemak, 2011; Tworek, 2019), and on the other hand, it still raises a number of controversies related to its different perception in and within different countries (Mocanu, 2014; Guenter, 2013; Schäffer & Binder, 2008; Chenhall, 2003; Wagenhofer, 2006; Schäffer et al., 2001). These controversies primarily result from the multi-threaded history of controlling, which promotes differences in the perception around the world.

The modern understanding of controlling was created in the USA, in close relation to management accounting from the very beginning. In this country, both the profession of "controller" and the term "controllership" have been established to describe all activities carried out by controllers (Jackson, 1949; Goto et al., 2014). The American perception of controlling was adopted after World War II by some European countries (especially English-speaking). So today, controlling in the US and some European countries is combined with management and is referred to as "managerial/management control" (Otley, 1994; Otley, 1999; Granlund & Taipaleenmäki, 2005; Anthony & Govindarajan, 2007; Malmi & Brown, 2008; Strauß & Zecher, 2013) or "managerial/management control and accounting" (Otley & Emmanuel, 2013). However, "management control systems provide information that is intended to be useful to managers in performing their jobs and to assist organisations in developing and maintaining viable patterns of behaviour" (Otley, 1999, p. 364). In these countries, the term "controlling" is relatively rarely used and usually replaced with the term "managerial accounting" (Luther, Joes & Saxl, 2010, pp. 1–2). A different situation is in Germany, where a different view has emerged on this management support method. First of all, the term "controlling" in its modern understanding was created in Germany (Deyhle, 1976), and understood as a subsystem of organisational management support (Horvath, 2006), support for planning and coordinating subsystems (Reichmann, 2011; Horvath, 2002; Janka & Günther, 2020), coordination of the management system (Küpper, 2008), or the way to ensure the rationality of decisions (Weber & Schäffer, 2019; Weber, 2019; Schäffer & Weber, 2019; Zéman & Lentner, 2018). In this approach, controlling is presented de facto as a method next to management, although it has a significant impact on the management (Horvath, 2002; Reichmann, 2012; Schäffer & Brückner, 2019). Moreover, it is important to understand the difference between controlling and management accounting, especially form a modern point of view (Dijkman, 2019). This article adopted the concept of controlling derived from Germany and grounded in Polish theory and practice. In Polish organisations, controlling is most often seen as a management-support method (Goliszewski, 2015; Bieńkowska, Kral & Zabłocka-Kluczka, 1998) referring to coordination (Horvath, 2002), which, thanks to its economic overtones, enables making right decisions in an organisation (Marciniak, 2008; Bieńkowska, 2015; Weber & Schäffer, 2019; Weber, 2019) An important fact was emphasised by Goliszewski (1991), who stated that controlling did not replace management, but rather made management possible by supporting, giving opinions and advising.

However, it is not enough for an organisation to simply implement controlling to ensure its effectiveness. It is also vital to ensure the quality of controlling (Weber, 2001, 2011; Vollmuth, 2000; Nowosielski, 2014, 2018; Chalastra, 2010; Karwacki, 2011). The quality of controlling can be defined as "the degree to which the set of inherent properties of products (services, services) of controlling meets the requirements primarily of recipients of these products (managers and/or other recipients in the organisation), but also controllers — as the implementers of the idea of controlling" (Bieńkowska, 2015, p. 221). Therefore, the quality of controlling refers to products (services) of controlling, i.e., the information generated by the controlling information

system, including reports and controlling analyses, plans or budgets, as well as controlling services such as decision support, participation in planning, supervision of the control system or coordination of the planning processes in the organisation among other things (Bieńkowska, 2015). Therefore, the manifestations of the quality of controlling understood in this way and also seen as assessment measures that operationalise this construct, are in line with the expectations concerning the properties of controlling products, e.g.:

- timeliness, reliability, unambiguity and substantive adjustment to the formulated information requirements provided by controlling (Kowalak, 2009) postulates that the quality of the controlling system depends on the relevant information resources);
- a budgeting system that fulfils both incentive and informational functions;
- a planning and control system oriented towards a common goal for the organisation as a whole (Bieńkowska, 2015, p. 221).

2. Impact of controlling on the organisational performance

The explanation of the influence made by controlling on organisational performance and the development of the Controlling Effectiveness Model seems important from the point of view of theory and practice. The scale and strength of these controlling benefits determine the legitimacy of the implementation of controlling in an organisation as well as its effectiveness.

In the literature, the effectiveness of controlling is understood as "the relation (ratio) of the benefits of controlling functioning in an organisation to the costs of this functioning" (Bieńkowska, 2010, p. 299). It means that the more benefits and the fewer costs are directly related to the functioning of controlling, the greater is its effectiveness. In this approach, it is not enough to measure the parameters of the organisational functioning (e.g., in the form of the organisational performance level) to identify the effectiveness of controlling. It is also necessary (perhaps, at the very least) to identify the strength of the impact made by controlling on these parameters. Hence, the strength of the influence of controlling on organisational performance was adopted as the effectiveness of controlling in this study. At the same time, the quality of controlling should be considered rather than its implementation. Moreover, organisational performance as a result parameter concerns the costs of the organisational functioning in each of the analysed areas.

Besides, the influence made by controlling on an organisation as a whole does not seem to be direct. Therefore, in the construction of the Controlling Effectiveness Model, the direct relationship was mediated by the job performance of managers and employees. Hence, controlling influences organisational performance indirectly. This way, the Controlling Effectiveness Model characterises the impact, the place of each described variable and the direction of each relationship in the effort to shape organisational performance. The development stages of the Controlling Effectiveness Model are described below.

Looking at controlling through the prism of its quality primarily connects this management method with groups of stakeholders who use its products (services). Such an approach requires to consider the needs and expectations of various stakeholder groups of controlling. At the same time, it seems that the managers of individual responsibility centres and the top management of the organisation are the most important recipients of controlling services in the organisation. Other groups of important recipients are accounting and financial services, as well as line employees (Bieńkowska, 2015).

In light of the above, it is necessary to consider the impact made by the implementation of controlling on the work performed by managers. Certainly, as per Weber, it should be emphasised that the overarching goal for the implementation of controlling is "to increase the efficiency and effectiveness of management and to strengthen adaptation to changes occurring inside and outside the organisation" (Weber, 1991, p. 50; Sierpińska & Niedbała, 2003, p. 15). Ensuring the management rationality is also indicated as the goal of controlling (Kuc, 2011; Zur Muehlen, 2002; Nowosielski, 2018; Weber, Schäffer, 2019; Weber, 2019; Schäffer & Weber, 2019; Adegboye et al., 2019), which can be directly linked to "enabling managers to make more accurate (credible) decisions in the organisation" (Marciniak, 2008, p. 17), "management decision making" (Zoni & Merchant, 2007), coordination of the management system (Küpper, 2008) or "improving the business management process" (Nowak 2003, p. 9) or improving management (Zur Muehlen, 2002, p. 72).

Sierpińska and Niedbała (2003, p. 7) stated that controlling "provides various levels of management with cross-sectional information necessary to manage a future-oriented enterprise". Marciniak (2008) underlined that the main aim of controlling was to enable managers to make more accurate (credible) decisions in the organisation, which translated into an increase in management's involvement and direct participation in the decision-making process. Weber and Schäffer (2019, 2008), as well as Weber (2019), also stated that controlling was about the rationality assurance for management decisions. Hence, it turns out that the managerial staff of the organisation is a direct recipient of products offered by controlling, i.e. the "information generated by the controlling information system, including all kinds of reports and controlling analyses, plans or budgets" (Bieńkowska, 2015, p. 220–221). Skowronek-Mielczarek and Leszczyński (2007, p. 68) indicated that the "information security of value-oriented and result-oriented company management" was the main premise for the implementation of controlling. This opinion was also confirmed by Goto et al. (2014), claiming that the role of controllership was to "supply information for decision-making in an effective and efficient way, by supporting the process management, aiming to achieve the expected results". According to Sierpińska and Niedbała (2003, p. 7), controlling "provides various levels of management with the cross-sectional information necessary to manage a forward-looking enterprise". The statement was also confirmed by Laval (2015, p. 61), according to whom the "controlling function is shifting from data preparation to an active part in advising management".

At the same time, referring to the quality of controlling, and, thus, aiming to adapt its products (services) to the needs of managers in the organisation, Weber (2001, p. 67) emphasised that the low quality of controlling services translated into the low quality of decision-making cells. According to Vollmuth (2000, p. 205) "especially in larger enterprises, controlling is critically approached and is not particularly respected. There are often difficulties in communicating with management because reports are not always prepared in a way that is comprehensible to recipients". Weber and Nevries (2010) emphasised that the internal orientation of controlling on the customer affected the achieved quality of controlling services. This, in turn, implies an increase in the satisfaction of managers and their trust in controllers, resulting in a positive impact on their decisions and the activities of the organisation as a whole. According to the authors, it is very important to achieve broadly understood success, both in terms of "feelings" of managers expressed in the quality of their decisions, as well as in the scope of the organisation's activity as a whole (Weber & Nevries, 2010, p. 17). Moreover, Bieńkowska et al. (2019a, 2019b) presented empirical evidence that the quality of controlling outputs actually shortened the decision-making time and resulted in the overall increase in the effectiveness of the organisation's management. According to Sova (2019), controlling is an effective enterprise management tool. The statements given above allow the following hypothesis:

H1. The quality of controlling directly influences the job performance of managers.

The implementation of controlling in an organisation seems to directly improve the job performance of employees in the organisation. Bieńkowska et all. (2019c) empirically verified the impact made by the implementation of controlling (measured by the time of its functioning in the organisation) on the job performance of employees, confirming the positive relationship between the studied variables. At the same time, job performance meant the effectiveness of employee activities, which contribute to the implementation of organisational goals (Forooqui & Negendra, 2014, p. 95). When directly referring to the job performance of employees in relation to the quality of controlling, it is important to firstly consider the impact of specific products (services) of controlling on the work performed by employees. The empirical research by Bieńkowska et al. (2019a, 2019c) confirmed that the rising quality of controlling outputs caused, among others, an increase in satisfaction, employee morale and involvement in the achievement of results among other things. Chachuła (2009, p. 37) noted that the purpose of the implementation of controlling was, among other things, the orientation of cells on results. Therefore, first, employee access to controlling information should be considered. Nowogródzka and Szarek (2012, p. 86) noted that a well-organised controlling system allowed obtaining accurate, current and proper information and its better flow in the organisation, so employees who had access to the "right information" transmitted by controlling could use it in their work, thus increasing their own job performance. Moreover, according to Nowogródzka and Szarek (2012, p. 86), "the proper functioning of controlling enables coordination of all activities in individual areas of the organisation". Besides,

employees participating in properly designed (in terms of controlling) budgeting processes can better understand the financial framework of requirements and limitations of their work. Küpper (2008; Guenther, 2013) also mentioned that coordination tools used in controlling within HRM, i.e. management principles, targeted setting incentive values, shared expectations and positive emotional interactions. According to Nowak (2003, p. 9) controlling "has become a response to the organisation's needs regarding the need to adapt to functioning in a highly variable environment and, in this context, it guarantees the improvement of the processes taking place in it." Moreover, Deneke (2018) indicated the improvement of the process effectiveness as an advantage arising from the implementation of controlling. Finally, it should be emphasised that the functioning of employees in responsibility centres properly designated as part of controlling, where employees felt co-responsible for achieving the set goals and the effectiveness of managing the entrusted resources (Nowosielski, 2001), helped to increase their job performance, which naturally contributed to the objectives of these reference systems. The considerations provide the basis for the following hypothesis:

H2. The quality of controlling directly influences the job performance of employees.

It should also be emphasised that employees are indirect beneficiaries of the controlling implemented in an organisation. In the organisation that implements controlling, managers apply the so-called controlling management (Bieńkowska, Kral & Zabłocka-Kluczka, 1998), which is:

- planning based on controlling the budget, as well as the information and reporting controlling system, or the technique of management by objectives;
- organising teamwork based on separate centres of responsibility;
- controlling the work of the team and employees according to assessment measures proposed and analysed by controlling;
- motivating employees by creating remuneration systems and other measures based on solutions and information provided by controlling.

They all affect work performed by employees in an organisation. Thus, each time solutions based on the achievements of controlling are applied by managers, the indirect impact of the quality of controlling on the job performance of employees is emphasised.

Furthermore, the indirect impact of the quality of controlling on the job performance of employees means that controlling affects job performance indirectly, through the job performance of managers. Thus, the higher is the quality of controlling, the more efficient is the management and the more accurate are the decisions made by managers. Therefore, they perform their tasks better (as explained earlier) and have a more positive impact on their employees and the job performance of their employees. In view of the above, the following hypothesis is proposed:

H3. The quality of controlling influences the job performance of employees indirectly, through the job performance of managers.

The direct influence of managers on employees is a well-known mechanism because it is directly inscribed in the essence of management and is understood as the influence of superiors on subordinates (Witczak, 2008, p. 208). Therefore, the additional hypothesis is also valid:

H4. The job performance of manager directly influences the job performance of employees.

Moreover, it should be emphasised that both the job performance of employees and managers affect organisational performance. These relationships have been repeatedly examined and described in the literature (Forooqui & Nagendra, 2014; Brewer & Selden, 2000; Lado & Wilson, 1994; Dessler, 2011; June & Mahmood, 2011). Furthermore, the job performance of managers influences the organisational performance not only directly, but also indirectly, through the job performance of employees, which is obviously related to the earlier described nature of management (as the impact of superiors on subordinates aiming to achieve the assumed goals in the organisation as a whole) (Witczak, 2008). Therefore, the following additional hypotheses can be formulated:

H5. The job performance of managers influences organisational performance indirectly through the job performance of employees.

H6. The job performance of employees directly influences organisational performance.

H7. The job performance of managers directly influences organisational performance.

When considering the impact made by controlling on the functioning of the organisation as a whole, it is important to emphasise the unique diversity of benefits received from implemented controlling mentioned in the literature. Amann and Petzold (2014) underlined the crucial role of controlling in ensuring organisational success. These

include, among other things, ensuring the continuity of the operation, stimulating the development and ensuring the development and improvement of the competitive position of the organisation (Bea, Friedl & Schweitzer, 2005; Chachuła, 2009; Kuc, 2002); optimisation (maximisation) of the financial result and value of the organisation (Brzezin, 2001); and finally, improving the performance of the organisation as a whole (Nowosielski, 2001; Marciniak, 2008; Kuc, 2002). Hahn and Hungenberg (2001), Bieńkowska et al. (2019a, 2019c) also found a direct connection between controlling and organisational performance as a synthetic measure that refers to the comprehensive results of the functioning of the entire organisation (Benčová & Kaľavská, 2009). According to Roman et al. (2014, p. 18), "balanced controlling represents the highest level in controlling development process".

While referring to the impact of the quality of controlling on the functioning of the organisation as a whole, it should be underlined that many authors emphasised the impact of the implementation of controlling on various parameters of the organisational functioning. However, the literature rarely offers views regarding the impact made by the quality of controlling on organisational performance. Nevertheless, "the usefulness of controlling in the process of management rationalisation is being questioned, there is the need to reduce controlling positions, arguing with the high costs of maintaining these services, the lack of translation into the financial result, poor work efficiency or low quality of services" (Nowosielski, 2011, p. 244). However, Bieńkowska et al. (2019b) and Tworek (2019) pointed to the positive relationships between the quality of controlling outputs and organisational performance.

Moreover, the impact made by controlling on organisational performance is indirect, as well as each of the above-mentioned objectives of controlling. The specified goals should rather connect to the goals of organisational management (also strategic management), and the controllers can influence their achievement only to some extent. "Controlling can have (and has) an impact on both ensuring the organisation's long-term existence and continuity of its functioning, but it is an indirect impact" (Bieńkowska, 2015, p. 60). In this context, there is a need to indicate mediators that explain the mechanism behind the indirect influence of controlling on the result constructs. This study adopts mediators in the form of variables considered in the literature to be direct objectives of controlling and resulting directly from its definition as a method of supporting management, namely, the job performance of managers and employees. This seems justified even more so by the results obtained by Bieńkowska et al. (2019c), who clearly confirmed that job performance is a mediator of the relationship between the use of controlling and organisational performance.

In the context of the relationship described above, it seems that there is a need to analyse the impact made by the quality of controlling on organisational performance while analysing the mediating role of the job performance of employees and managers. It will allow verifying the Controlling Effectiveness Model, which comprehensively explains the mediated influence made by the quality of controlling on organisational performance through the job performance of employees and managers. Therefore, in light of the above, the main hypothesis should be formulated as follows:

H8. The quality of controlling influences organisational performance indirectly through the job performance of managers and employees.

Fig. 1 presents the diagram illustrating the structure of the Controlling Effectiveness Model and the adopted research hypotheses H1–H7.

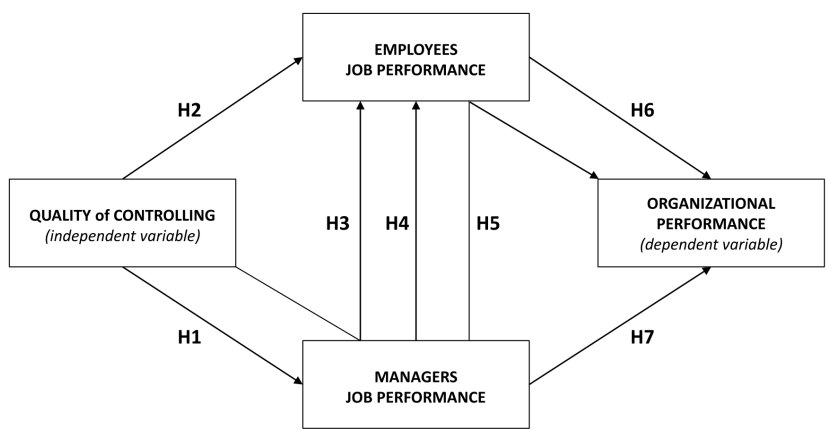

Fig. 1. Structure of the Controlling Effectiveness Model

3. Research methodology

3.1. Sample description

In October 2019, the survey was conducted on 246 organisations functioning in Poland to verify the proposed Controlling Effectiveness Model. The country of origin was the only condition limiting the sample, and the surveyed organisations were not randomly selected. The CAWI method was used. However, efforts had been made to ensure a diversified research sample in terms of varied organisations characteristics. The sample of characteristics is presented in Table 1. Although 231 organisations commented on the implementation of controlling, only those with implemented controlling were considered for research. Therefore, 188 organisations were included in the sample.

To verify a sufficient distribution of sample organisations in the population of all organisation, the used control variables were connected to main elements of an organisation and its environment: environment dynamics, environment unpredictability, environment complexity, production diversification, production repeatability, community-oriented culture, and employee education. The control variables were measured based on a single-item scale using a 5-point Likert scale (Table 2).

The normality of the distribution of control variables was verified using the Shapiro Wilk test and the Kolmogorow-Smirnow test (Table 2). Based on the tests, the sample was sufficiently diversified (contained organisations with all sets of characteristics) to draw general conclusions based on it.

3.2. Variable characteristics

Variables quality of controlling (QCON), the job performance of managers (MPER), the job performance of employees (JPER) and organisational performance (ORGPER) were used to verify hypotheses. Appendix A provides items used to measure each of them.

Quality of controlling was measured based on four aspects: quality of reports and analysis of controlling, information delivered by controlling, budgets developed by controlling and controlling coordination (Bieńkowska, 2015). It was measured based on an 8-item scale (using a 5-point Likert scale).

Tab. 1. Research sample characteristics concerning organisation size and the implementation of controlling

Organisation size controlling implementation	Controlling is implemented	Controlling is not implemented	Total
Micro (below 10 people)	21	14	35
Small (11–50 people)	66	11	77
Medium (51–250 people)	57	4	61
Large (above 250 people)	42	14	56
Total	186*	43	229
*2 organisations did not indicate their size			

Tab. 2. Normality of distribution of control variables

Control variables	Kołmogorow-Smirnow[A]			Shapiro-Wilk		
	Statistic	df	*p*	Statistic	df	*p*
The company's environment is constantly changing	0.233	232	0.000	0.885	232	0.000
Changes in the company's environment are unpredictable	0.203	232	0.000	0.901	232	0.000
The company's environment is complex	0.264	232	0.000	0.868	232	0.000
The company offers a lot of different products	0.250	232	0.000	0.887	232	0.000
The manufacturing process is routine; tasks are repetitive	0.214	232	0.000	0.906	232	0.000
Organisational culture is strong, and employees are sharing it willingly	0.247	232	0.000	0.890	232	0.000
Most employees have a higher degree of education	0.191	232	0.000	0.911	232	0.000

Job performance of employees was measured considering four aspects: job quality, job efficiency, punctuality and effectiveness of achieving goals at the workplace (Forooqui & Negendra, 2014). It was measured based on a 4-item scale (using a 5-point Likert scale) (Bieńkowska et al., 2020).

Job performance of managers was measured considering four aspects: decision-making effectiveness, work efficiency, speed and precision of information transfer, and the effectiveness of achieving goals at the workplace (Bieńkowska et al., 2020). It was measured based on a 4-item scale (using a 5-point Likert scale).

Organisational performance was measured using the concept of the Balanced Scorecard (Kaplan & Norton, 1996; Handoko & Wehartaty, 2017), which allowed including multiple aspects of organisational performance in four perspectives. Those perspectives were measured based on a 10-item scale (using a 5-point Likert scale) (Bieńkowska et al., 2020).

3.3. Descriptive statistics and the reliability analysis of scales

The reliability of the scales of each variable was verified for the obtained research sample and is presented in Table 2. The Cronbach's α, as well as the Factor Analysis, were calculated for the quality of controlling, the job performance of managers, the job performance of employees, and organisational performance. The results indicated high internal reliability of the scales and measurements. The Cronbach's α confirmed that scales were reliable (value above 0.8). The test confirmed the absence of collinearity issues. Therefore, the model could be built based on the given set of data (Table 3, last column).

3.4. Research results

First, r-Pearson's correlation analysis was performed (Table 4). The strength of the relationship was measured with r-Pearson's correlation coefficient. The relationship was considered strong when $r > 0.7$, mild when $r > 0.3$ and weak when $r < 0.3$.

The obtained results (Table 4) show a statistically significant and high correlation between all analysed variables. However, it is definitely the highest in the case of the relationship between the job performance of managers as well as the job performance of employees and the organisational performance. Next, the multiple linear regression was used to determine whether the variables from the model indeed significantly influenced organisational performance, controlling the sample once again for variables connected to main elements of an organisation and its environment, i.e. dynamics, unpredictability and complexity of the environment; diversification and repeatability of production; and community-oriented culture and employee education. Two regression models were built: the first with control variables only, when $R2 = 0.504$, meaning that 50.4% of the variation of the dependent variable was explained by the variation of independent variables; and the second with control variables and variables, which were to be used for the model development, when $R2 = 0.715$, meaning that 71.5% of the variation of the dependent variable was explained by the variation of independent variables. Delta $R2 = 0.211$ ($p = 0.001$) was verified to be statistically significant. Therefore, the results justified performing model verification.

The path analysis was executed using SPSS AMOS to verify the Controlling Effectiveness Model. Based on the results, the place of each variable and the direction of each relationship were established. The model was verified as defined and well-fitted ($Chi2\ (1) = 25.796$, $p < 0.001$; $CFI = 0.946$; $RMSEA = 0.364$). The Chi-Square test showed that the model was statistically significant. Its fit was measured with CFI (which should be above 0.8) and RMSEA (which should be below 0.2). An overview of the model is presented in Table 5. Tables 6–8 contain the values of total, direct and indirect effects occurring among variables within the Controlling Effectiveness Model.

The obtained results show the internal structure of the Controlling Effectiveness Model. It was empirically verified that the quality of controlling influenced the organisational performance only indirectly through the management performance and

Tab. 3. Defined variables together with the results of the reliability analysis of scales and the test of collinearity

Variable	No. of scales	Cronbach's a	Factor analysis (%)	M	SD	VFI
QCON	8	0.883	54.958	3.4051	0.77834	1.936
MPER	4	0.839	67.473	3.5664	0.84513	2.283
JPER	4	0.848	68.657	3.6283	0.90450	2.354
ORGPER	10	0.883	48.762	3.4239	0.69953	-

Tab. 4. Correlation analysis between analysed variables

		QCON	JPER	MPER
JPER	**r**	0.645**	1	
	p	0.000		
	N	187	187	
MPER	**r**	0.543**	0.732**	1
	p	0.000	0.000	
	N	187	187	187
ORGPER	**r**	0.693**	0.778**	0.745**
	p	0.000	0.000	0.000
	N	175	175	175
** Correlation is significant at the level of 0.01 (two-sided)				

Tab. 5. Regression Weights

	Estimate	S.E.	C.R.	*p*
MPER <--- QCON	0.589	0.067	8.811	***
JPER <--- MPER	0.579	0.057	10.085	***
JPER <--- QCON	0.408	0.062	6.547	***
ORGPER <--- JPER	0.385	0.049	7.857	***
ORGPER <--- MPER	0.307	0.052	5.856	***

Tab. 6. Standardised Total Effects

	QCON	MPER	JPER
MPER	0.589	0.000	0.000
JPER	0.749	0.579	0.000
ORGPER	0.469	0.529	0.385

Tab. 7. Standardised Direct Effects

	QCON	MPER	JPER
MPER	0.589	0.000	0.000
JPER	0.408	0.579	0.000
ORGPER	0.000	0.307	0.385

Tab. 8. Standardised Indirect Effects

	QCON	MPER	JPER
MPER	0.000	0.000	0.000
JPER	0.341	0.000	0.000
ORGPER	0.469	0.223	0.000

the job performance of employees. At the same time, it was important that, apart from the direct impact of the quality of controlling on the job performance of employees, the indirect impact through performance management was also significant. The strongest effect between controlling the quality and organisational performance occurred in the case of sequentially mediated relationship through the management performance (the indirect effect = 0.341) and the job performance (the indirect effect = 0.223). However, the effects occurring through single mediation (the quality of controlling — job performance — organisational performance and the quality of controlling — management performance — organisational performance) were high enough to be included in the model as well. The obtained results allowed accepting hypotheses 1–8.

4. Discussion

The article aimed to explain how controlling affected the results of organisational functioning. In particular, the analysis focused on the impact made by controlling on the job performance of employees and managers and on the organisational performance, aiming to build the mediation model (the Controlling Effectiveness Model) and confirming that controlling affected the organisational performance through the influence on the job performance of managers and employees. The obtained results confirmed the adopted assumptions. They allowed confirming that the job performance of employees and managers was the mediator of the relationship between the quality of controlling and the organisational performance. This finding proved the indirect impact of the quality of controlling on the functioning of the organisation as a whole, which confirmed the initial findings (Bieńkowska, 2015). The first part of the model confirmed that the quality of controlling affected the job performance of managers directly, which was consistent with the observations by Weber (1991), Kuc (2011), Nowosielski (2018) or Zur Muehlen (2002) and results provided by, e.g., Bieńkowska (2015) or Bieńkowska et al. (2019b), showing that controlling as a management-support method increased quality and also positively influenced decisions made by managers. It was also confirmed by Marciniak (2008). Another finding, which is also important and not entirely obvious, was that controlling also affected the employees of the organisation. The effects were found to be direct and indirect, with the latter being slightly weaker. Therefore, employees were a direct user of the products and services offered by controlling, i.e., the information and reporting system, as well as budgeting (Bieńkowska et al., 2019a, 2019b; Küpper, 2008). In addition, they were influenced by the so-called controlling management, i.e., actions of managers using controlling tools and the controlling way of thinking (Bieńkowska, Kral & Zabłocka-Kluczka, 1998).

Looking at the other side of the Controlling Effectiveness Model, i.e., the impact of the studied variables on the organisational performance, it can be stated that the direct impact of both the job performance of managers and employees on the organisational performance was verified, which confirmed the statements contained in the literature (Forooqui & Negendra, 2014; Brewer & Selden, 2000).

Furthermore, the indirect impact of the job performance of managers on the organisational performance through the job performance of employees was also proved. In the above context, the Controlling Effectiveness Model should be considered validated. It should be noted that the quality of controlling has the strongest impact on the job performance of managers, and managers then influence the work performed by subordinates, which in turn translates into organisational performance. The verified Controlling Effectiveness Model is shown in Fig. 2.

5. Conclusions

The empirical research performed to verify the Controlling Effectiveness Model based on the literature review allowed confirming that:

- there was a statistically significant indirect impact of the quality of controlling on organisational performance;
- the job performance of managers and employees was a mediator of that relationship.

Hence, it seemed to be a valid conclusion that the quality of controlling was one of the factors influencing organisational performance. The developed model contributes to epistemological knowledge and also has practical significance. The quality of controlling in the process of shaping organisational performance is significant. In this context, organisations that decide to implement controlling should emphasise special care for the quality of this management support method. In this context, it is also relevant to properly shape functional, organisational and instrumental solutions of controlling (tailored to the characteristics of an organisation as a whole, as well as to the environmental conditions, under which these organisations operate), which determine the quality of controlling.

The performed research has some limitations. The sample was limited to organisations operating in Poland only. Therefore, conclusions could be drawn regarding the concept of controlling derived from German perception of controlling as a management-support method. However, in the future, there is a need to expand research to countries where US-based controlling is implemented. Moreover, the research should serve as a starting point for further analysis of controlling in an organisation. For example, as indicated in the literature, in the context of conditions (prerequisites) for effective implementation and efficient functioning of controlling in an organisation, it is important to indicate the moderating impact of individual conditions, which will be enabled by the Controlling Effectiveness Model. It can be assumed that some of the conditions will critically affect the relationship between the quality of controlling and organisational performance, such as the reliability of IT solutions in the organisation. Some others will have a smaller impact, such as the use of specific management techniques for controlling. Hence, the obtained results not only allowed filling in the indicated research gap but also created future directions of research.

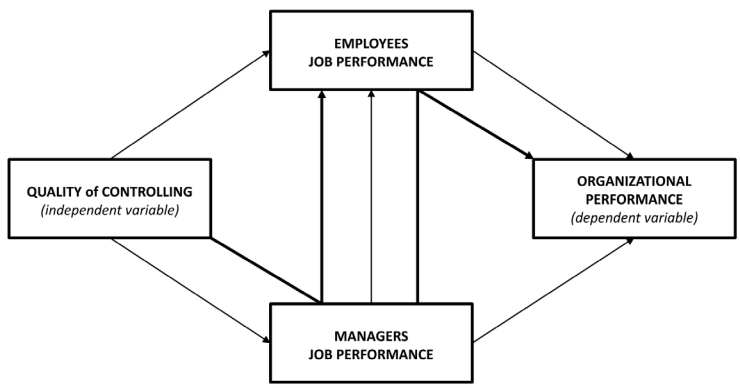

Fig. 2. Verified Controlling Effectiveness Model

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Appendix A

Tab. A1. Factor analysis for the variable "*quality of controlling"*

Factor analysis		
Quality of controlling	Before separation	After separation
Reports and analyses provided by controlling do not contain any errors	1.000	0.470
Reports and analyses of controlling are valid and delivered on time	1.000	0.582
The information contained in reports and controlling analyses is reliable	1.000	0.563
The information contained in reports and controlling analyses is indispensable in decision-making processes/improve decision-making	1.000	0.518
Budgets developed by controlling allow rationalising the costs in the company	1.000	0.567
Budgets developed by controlling are an effective control tool in the company	1.000	0.522
Budgets developed by controlling bring order to particular areas of the company	1.000	0.585
Controlling coordination has a positive effect on the objectives of the organisation as a whole	1.000	0.590

Tab. A2. Factor analysis for the variable "*job performance of employees"*

Factor analysis		
Job performance of employees	Before separation	After separation
Job quality	1.000	0.701
Job efficiency	1.000	0.699
Punctuality	1.000	0.679
Effectiveness of achieving goals at the workplace	1.000	0.668

Tab. A3. Factor analysis for the variable "*job performance of managers"*

Factor analysis		
Job performance of managers	Before separation	After separation
Decision-making effectiveness (accuracy of decisions in terms of substantive expectations, timeliness of decisions, etc.)	1.000	0.721
Work efficiency (saving the resources available to the company)	1.000	0.695
Speed and precision of information transfer	1.000	0.653
Effectiveness of achieving goals at the workplace	1.000	0.629

Tab. A4. Factor analysis for the variable "*organisational performance"*

Factor analysis		
Organisational performance	Before separation	After separation
Overall financial situation of the company	1.000	0.461
Job performance	1.000	0.484
Quality of products or services (reliability, diligence)	1.000	0.439
Innovativeness of products or services	1.000	0.438
Modernity of applied technological solutions	1.000	0.468
Efficiency of the organisation management	1.000	0.541
Reliability of business processes	1.000	0.471
Market share	1.000	0.490
Customers satisfaction	1.000	0.567
Employee satisfaction	1.000	0.517

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Knowledge management at Ukrainian industrial enterprises in the context of innovative development

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ABSTRACT

The research aimed to identify promising areas and outline problems associated with the transition of Ukrainian industrial enterprises towards advanced innovative development based on information and knowledge and to formulate recommendations for improving the knowledge management and commercialisation at these enterprises. The study used several methods for analysis, including a literature review; system, structural and statistical analyses; SWOT analysis; the inference method; and interpretation. The research efforts resulted in systemised major sources of knowledge in an enterprise and types of their utilisation. The performed analysis found the key ways to obtain and commercialise knowledge used by Ukrainian industrial enterprises. The results were compared with data of the EU countries. The analysis produced strengths and weaknesses of the existing knowledge management system used in Ukrainian enterprises. Strengths: growth in the number of enterprises producing new knowledge and implementing marketing and organisational innovations; intensified patent activity; and a rational structure of innovation-active enterprises by their size. Weaknesses: the new knowledge structure does not meet the needs of enterprises; an insignificant and unstable share of innovation-active enterprises in the total number of firms; and insignificant sales volumes of patents. The research revealed that Ukrainian enterprises had the potential ability to produce and commercialise new knowledge effectively and to use it as the basis to form, strengthen and implement relative competitive advantages, which would contribute to the innovative growth of the Ukrainian economy as a whole. Recommendations were designed for the formation of prerequisites necessary to improve the efficiency of knowledge management in the context of conditions required for the innovative development of domestic enterprises. The obtained results can be used as an information base for evaluating the system of knowledge production and commercialisation at Ukrainian enterprises to enhance the management and identify promising areas for innovative development.

KEY WORDS

knowledge production, knowledge commercialisation, knowledge management in industrial enterprises, innovative development, knowledge economy

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Introduction

Under modern economic conditions, information and knowledge have become the main means of social production, at the same time representing a significant deterrent to development (cf. for the industrial economics, it is capital) and replacing labour as a source of added value. The availability of relevant knowledge as well as the ability to use it determine the directions and rates of economic growth. The ability to produce and utilise (commer-

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cialise) new relevant knowledge is an important competitive advantage for enterprises, as well as the economy as a whole. Effective knowledge management allows enterprises to adapt to continuously changing conditions of the external macro- and micro-environment caused by waves of technological innovations (i.e. the transition from the 5th to the 6th) and the beginning of the Fourth Industrial Revolution. It also helps to find and implement new market opportunities for innovative development; to produce and commercialise innovative developments; and to compete successfully in national and foreign markets, segments or niches. In the case of the Ukrainian economics, which is based on the production activities representing the third and fourth patterns of technological innovations, the strategic directions of innovative development should be focused on the concept of innovative advancement.

The justification of these directions requires relevant knowledge about the trends in science and technology and the possibility to implement them into product and process innovations that meet consumer demands or shape new needs (for radical innovations). From the standpoint of advanced innovative development of enterprises, the following types of knowledge can be defined as a basis for technology of the Industry 4.0, which can provide innovative advancement: smart technologies (i.e., energy consumption, product informatisation, etc.); product life cycle management; augmented and virtual reality (in product design and testing); production management systems, etc.

However, in Ukraine, only some national producers and distributors of foreign companies sell these technologies. It is also necessary to have knowledge of trends in consumer demand, understand the current and future market opportunities for development, and counter threats.

Given the circumstances, it is relevant to address the problem of improving the efficiency of knowledge management in Ukrainian enterprises in the context of ensuring their innovative development. It becomes especially relevant for industrial enterprises as a leading industry, the development of which determines the pace of scientific and technological progress of the national economy as a whole. An answer to this problem will allow Ukrainian enterprises to purposefully choose the trajectories of advanced innovative development, form and strengthen their competitive advantages, create conditions for sustainable economic growth, and improve the quality of life of the residents of Ukraine.

The structure of the article includes sections that reflect the content of the stages use to solve this problem: a literature review on knowledge management of organisations as a basis for their innovative development; a systematisation of the main sources and areas of knowledge production (acquisition) and knowledge commercialisation in enterprises; the analysis of problems and prospects of the knowledge-centred innovative development of Ukrainian industrial enterprises; a set of recommendations for the creation of prerequisites required to improve the knowledge management system at industrial enterprises of Ukraine.

1. Literature review

Many scientists have focused on knowledge management in organisations, in particular, on possibilities to ensure their innovative development. Blanc and Bouillon (2012) explored the forms, tools, and methods of knowledge management in organisations, as well as matters related to appropriate communication support. They noted that the implementation of knowledge management systems in organisations required organisational change, especially from the perspective of providing the necessary communications. Landry and Amara (2012) explored issues of new knowledge and technology transfer, defined the peculiarities of value creation and transfer. Massingham (2014) evaluated the best practices of knowledge management in 2008–2013. Based on the results of the evaluation, the list of effective and ineffective knowledge management tools was formed, and recommendations for their application were developed. Borjigen (2015) explored the theoretical and methodological foundations of the organisational knowledge management in the context of a significant spread of modern computer information technology of mass cooperation. Khedhaouria and Jamal (2015) analysed the issues related to the motivation of project team members aiming to find knowledge sources as a basis for innovative development.

The problems related to knowledge commercialisation in organisations, as well as products created based on new knowledge, are popular topics among researches (Bandarian, 2007; Markman at al., 2008; Formánek, 2015; Maceika & Jančiauskas, 2012; Stankiewicz & Moczulska, 2015; Majewska & Sulczynska, 2014; Fitri et al., 2019; Aymen, 2019). Scientists pay considerable attention to the analysis of

factors influencing the success of knowledge commercialisation. Some authors (Zahra et al., 2018) emphasise the importance of scientific research as a source of knowledge but note that such scientific research receives little attention. Yahiaei and Hasanzadeh (2018) determined the factors of the external macro- and micro-environment that contribute to the commercialisation of information and computer technologies in IT. Other researchers (Fini et al., 2018) explored the theoretical aspects of the commercialisation of research results, as well as the impact of commercialisation on various aspects of social activities. In their article, Prokopenko et al. (2018) outlined a new role of universities in knowledge generation under the conditions of post-industrial society.

Naqshbandib and Jasimuddin (2018) analysed the activities of 172 multinational companies operating in the French market. In analysed companies, the authors substantiated a positive impact of knowledge-centred leadership on the effectiveness of knowledge management and innovative activity. Mardania et al. (2018) presented the results of the quantitative analysis into the impact of knowledge management on the innovative activity of a firm and the effectiveness of its work as a whole. A model was built and practically tested at 120 companies of the Iranian Energy Syndicate. The obtained results proved a positive impact of knowledge management on the effectiveness of innovation processes of a company, and ultimately — on the economic efficiency of its activities. Downs et al. (2019) developed conceptual principles of the approach to improving the business model of commercialisation of innovations in knowledge-intensive industries. Ringel et al. (2018) performed a retrospective analysis from 2006 to 2018 of the change dynamics in the positions of the most innovative companies in the world. Companies were divided into following categories: steady innovators — companies that appear on the list annually; movers — companies that have improved by ten positions or more in 2015–2016; new entrants — companies that first appeared on the list in 2016; returnees — companies that returned to the list in 2016 after elimination in 2015 or earlier. The analysis substantiated the dynamics of a market position held by innovative companies, indicated the options for strengthening the competitive position of existing market players and defined the possibility for new players to enter the innovative market, etc.

Ukrainian scientists study problems related to the improvement of knowledge commercialisation methods of enterprises in the context of ensuring their innovative development. Kovtunenko (2012) considered the essence and content of the commercialisation process for innovative developments in high-tech enterprises, the main stages, and participants of the commercialisation process, and existing ways for the commercialisation of innovations. Kuzmin and Kostsyk (2013) analysed the forms and methods for commercialisation of innovative products, related advantages and disadvantages. They developed a model that helps to choose methods for the commercialisation of innovative products. Olefirenko (2016, 2017) considered the peculiarities of sales as a component pertaining to the process of commercialisation of innovative products in machine-building enterprises. Rot-Sierov (2016) revealed the role and place of knowledge in the process of the commercialisation of industrial enterprise innovations.

However, despite significant developments, insufficient efforts have been made to investigate the issues related to the analysis into the effectiveness of knowledge management considering the specificity of Ukrainian industrial enterprises. Foreign solutions do not provide the desired result without proper adaptation to the conditions of Ukraine, and the Ukrainian solutions are fragmentary and consider only some aspects of knowledge management. Almost no studies are available that systematically consider the actual state of the processes of production (acquisition) and utilisation (commercialisation) of knowledge and their variety. Such a situation does not allow Ukrainian enterprises to perform their comparative analyses, identify the relative advantages and disadvantages, and on this basis, offer recommendations for improving the efficiency of knowledge management from the perspective of ensuring their innovative development.

2. Research methods

This research was based on a complex methodological approach; namely, a literature review, a comparative analysis, and a systems and structural analyses were used to systematise the methods for producing (acquiring) and utilising (commercialising) knowledge at an industrial enterprise, to develop a scheme for a compatible interaction of incoming and outgoing knowledge flows. The systems analysis based on data by the State Statistic Service of Ukraine contributed to the study regarding the main sources for the acquisition of knowledge used by Ukrainian

industrial enterprises and types of their utilisation. The analysis of data provided by the State Statistic Service of Ukraine and international organisations was used to determine the position of Ukraine in the system of innovation-active countries of the world and Europe. A SWOT analysis was made to assess market opportunities, threats, strengths, and weaknesses of the knowledge management system used by Ukrainian industrial enterprises. It also aimed to identify promising areas for gaining comparative competitive advantages that could serve as a basis for the transition to advanced innovations. Inference and interpretation methods were used to develop a set of recommendations for the design of prerequisites necessary to improve the management system of production and commercialisation.

3. Research results

The analysis into literature sources and innovative activities undertaken by enterprises allowed systematising the main methods of the production (acquisition) and utilisation (commercialisation) of knowledge used by industrial enterprises.

Fig. 1 presents the scheme for the production (acquisition) and utilisation (commercialisation) of knowledge at industrial enterprises, which was developed by the authors of this article based on the results of the analysis. The arrows in the scheme show the directions of knowledge flows (ordinary arrows indicate the sources of knowledge, bold arrows — the directions of knowledge utilisation). Fig. 1 shows that knowledge can be obtained from both internal and external sources (names of knowledge sources are indicated in regular font). Also, the directions are given for the knowledge utilisation at an enterprise, as well as externally (the names of directions of knowledge utilisation are indicated in italics).

It should be noted that the authors consider knowledge as a set of ordered rules and facts, which allows solving problems in a particular subject area. Knowledge is an intellectual commodity and an object of market exchange. From the whole set of knowledge, the authors explored the formalised documented knowledge (both theoretical and empirical), in particular, technical and technological knowledge presented as patents, algorithms, technologies, drawings, etc.; professional knowledge embodied in skills, know-how, work techniques, skills, experience, etc.; scientific knowledge presented in ideas, theories, hypotheses, patterns, laws, concepts, etc.

The proposed scheme provides a systems analysis of the main knowledge sources and areas of knowledge utilisation in Ukrainian enterprises. The authors used official data of the State Statistics Service of

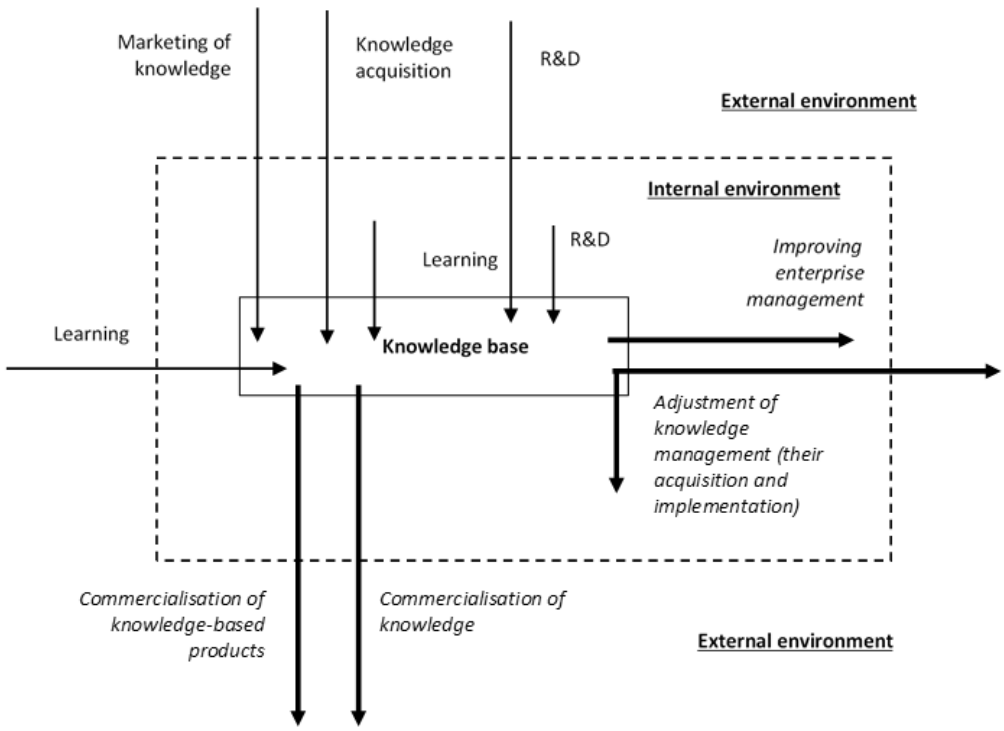

Fig. 1. Scheme depicting the production (acquisition) and utilisation (commercialisation) of knowledge at industrial enterprises

Ukraine (Scientific and Innovative Activity of Ukraine, 2018; 2019) as a basis for analysis. Information provided by the international analytical organisations was also used to compare the Ukrainian realities of innovative development with the European.

Fig. 2 summarises the results of the analysis, which defines the main sources of new knowledge used by innovative Ukrainian enterprises in 2012–2016.

Figs. 3 and 4 provide information on the new knowledge sources of Ukrainian industrial enterprises. The percentage in Figs. 3 and 4 represent shares of enterprises that received knowledge from these sources in the total number of firms that implement technological innovations. The diagrams were constructed according to the international methodology, using statistical data from the survey regarding the innovation activity in the economy of Ukraine (Scientific and Innovative Activity of Ukraine, 2018). In the total number of surveyed enterprises, the share of enterprises with technological innovations (2663 in 2012–2014; 3278 in 2014–2016; and 2937 in 2016–2018) was 9.5% in 2012–2014; 11.8% in 2014–2016; and 10.1% in 2016–2018.

A significant share of innovation-active enterprises that had technological innovations received knowledge via staff training in 2012–2014, but in 2014–2016, the priorities changed in favour of the R&D implementation.

However, according to the Annual Business Climate Assessment conducted by the Institute for Economic Research and Policy Consulting within the USAID Programme "Leadership in Economic Governance" (Annual Assessment of the Business Climate, 2016), the lack of skilled workers is one of the obstacles to the further development of domestic enterprises (this statement was confirmed by 20% of respondents).

According to another study (Industry 4.0 in the Machine-Building Industry, 2018), insufficient knowledge and skills of staff and management are the main factors that hinder the implementation of Industry 4.0 technologies.

Fig. 5 presents the expenditure volumes by areas of innovative activity in 2000–2019. According to

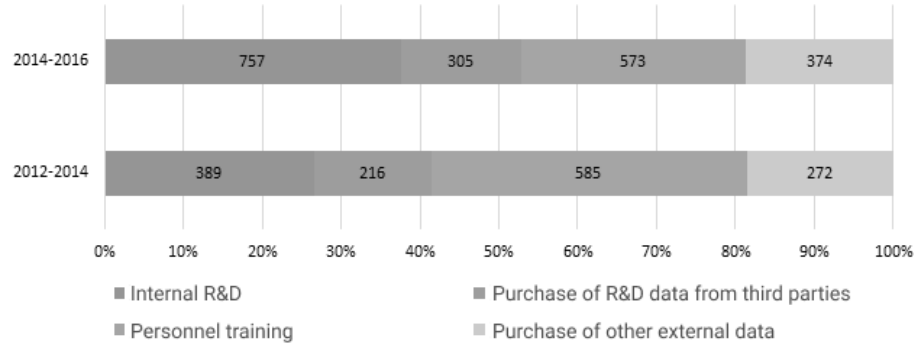

Fig. 2. Percentage distribution of innovation-active enterprises that create technological innovations (by the sources of knowledge)

Source: elaborated by the authors based on Scientific and Innovative Activity of Ukraine (2018).

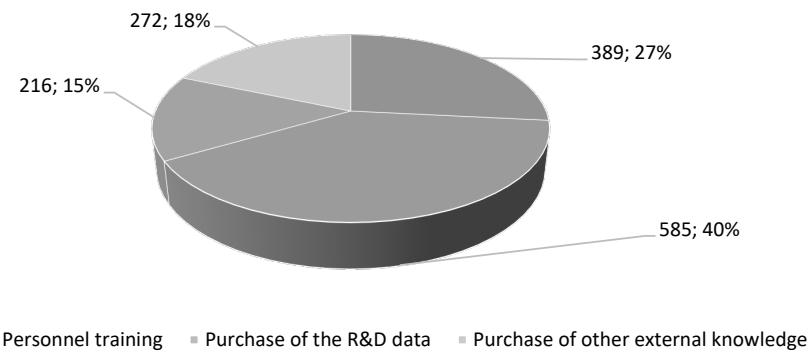

Fig. 3. Structure of Ukrainian enterprises that created technological innovations in 2012–2014 (by the sources of new knowledge)

Source: elaborated by the authors based on Scientific and Innovative Activity of Ukraine (2018).

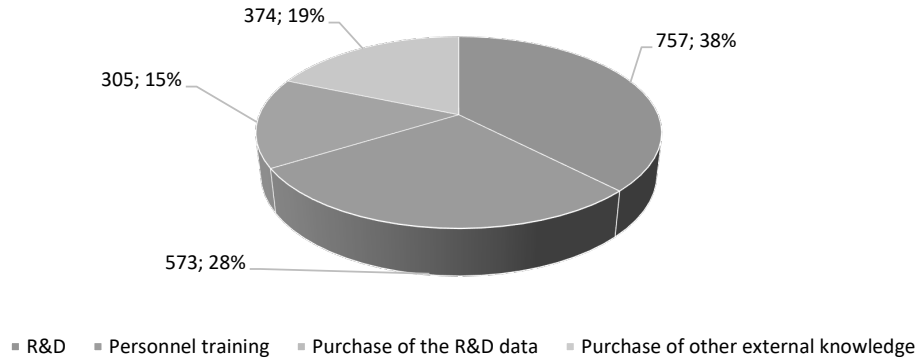

Fig. 4. Structure of Ukrainian enterprises that created technological innovations in 2014–2016 (by the sources of new knowledge)
Source: elaborated by the authors based on Scientific and Innovative Activity of Ukraine (2018).

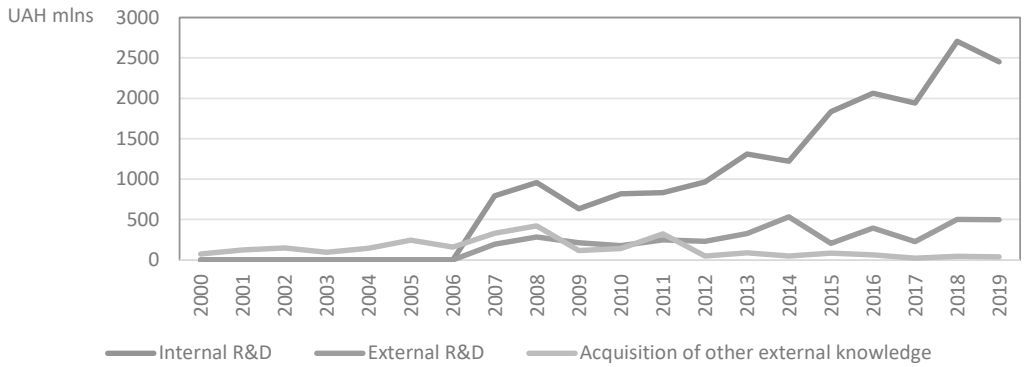

Fig. 5. Expenditures volumes by areas of innovative activity in 2000–2019
Source: elaborated by the authors based on the State Statistics Service of Ukraine (2019).

statistical reports, the cost of acquiring external knowledge is insignificant compared to other sources of knowledge, and it tends to decrease. It should be noted that in 2017, compared to 2016, the expenditure volumes decreased in all categories. Thus, the expenditures on internal research decreased by 6%, external research — by 42%, and the acquisition of external knowledge — by 66%. In 2018, the first two areas showed positive dynamics, while the expenditures on acquiring external knowledge remained substantially unchanged. 2019 saw a significant decrease in expenditures of all categories: the funding for domestic research decreased from UAH 2 706.2 million in 2018 to UAH 2 449.9 million in 2020 (almost 9.5% less), the funding for external research — by 1.3%, and the funding for the acquisition of other external knowledge — by 18.7%.

The use of marketing knowledge as a source of information for innovative activity can be described as follows. According to Scientific and Innovative Activity of Ukraine (2018), all enterprises that implemented technological innovations in 2014–2016 used the following knowledge sources (ideas were obtained using tools for knowledge marketing and innovative marketing): research finding employees; suppliers of raw and other materials, etc.; consumers; universities; state research institutes; conferences, fairs, exhibitions; magazines or advertising publications; professional or industrial associations. The allocation of enterprises by sources of innovative developments is shown in Fig. 6.

Knowledge commercialisation can have different purposes. The main areas of knowledge commercialisation at an enterprise can be suggested based on Fig. 1:

- the commercialisation of intellectual property objects/products (i.e., patents, licenses, utility models, industrial designs, etc.), which represent new knowledge;
- the commercialisation of new products/services, which represent new knowledge;
- improvement of the enterprise management system (organisational structure; personnel management; organisational culture; supply system of raw materials, materials, and components; innovation activities; financial and economic activi-

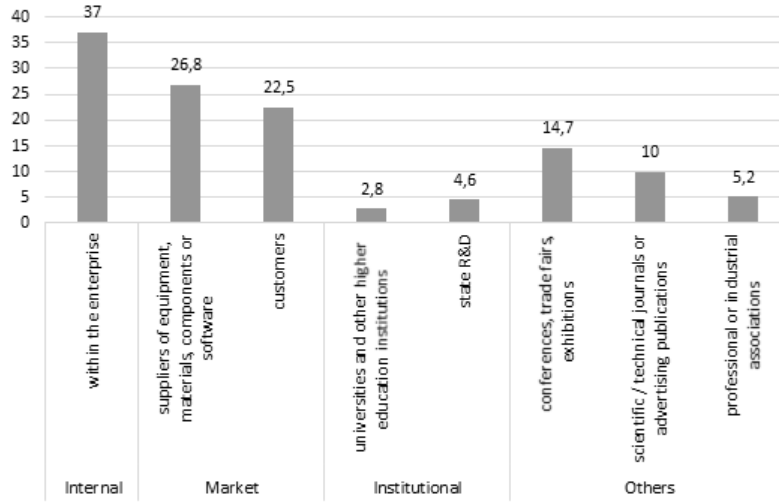

Fig. 6. Innovative development sources used by Ukrainian enterprises that created technological innovations in 2014–2016, %
Source: elaborated by the authors based on Scientific and Innovative Activity of Ukraine (2018).

ties; marketing, etc.), which increases the competitiveness and efficiency of commercialisation of products on traditional or new markets;

- a combination of the above-mentioned options.

It is also important to consider the domestic realities of knowledge commercialisation (as a factor contributing to the development of enterprises) in the framework of the above-mentioned areas.

3.1. Commercialisation of intellectual property objects/products

According to Bloomberg (2019), in 2018–2019, Ukraine ranked 35th in the world by the number of granted patents; this means that according to this indicator, Ukraine was in the top-50 of most innovative world economies.

In 2017, a record number of patent applications (3.17 million) was filed worldwide. China and Turkey showed an increase in the number of applications (increasing by 14.2% and 24.9%, respectively), becoming the only two countries to achieve double-digit growth. Turkey ranked 20th in 2017 and improved its ranking compared to 2016 (+3 ranking places) (Turkey: WIPO Releases, 2018).

According to the World Intellectual Property Organization (2019), in 2017, Ukraine ranked 4th in the world (falling behind China, Germany, and the Russian Federation) by the number of applications for registration of utility models, and 15th by the number of applications for registration of industrial designs.

The dynamics of patent activity in Ukraine is presented in Table 1.However, the sales of patents are much worse. According to Scientific and Innovative Activity of Ukraine (2018), only 59 new technologies were transferred on a commercial basis within

Tab. 1. Patent activity of Ukrainian applicants: legal entities and individuals

Objects of intellectual property		A number of applications/patents per year			
		2010	2015	2016	2017
Inventions	Applications	2554	2273	2232	2285
	Patents	2034	1510	1277	1224
Useful models	Applications	10528	8490	9473	8977
	Patents	9229	8035	8931	9365
Industrial designs	Applications	1442	1811	2016	2249
	Patents	1258	1957	2134	2113
Trademarks	Applications	1671	21245	26064	26276
	Patents	13058	9539	11007	12989

Source: elaborated by the authors based on Scientific and Innovative Activity of Ukraine (2018).

Ukraine in 2017 (in addition to patents, they also include other intellectual property objects, in particular, know-how).

Information regarding the export of intellectual property is closed and not covered in statistical reporting.

An assumption can be made that intellectual property objects were implemented at applicant companies, but no data is available regarding their number.

3.2. Commercialisation of knowledge in the form of new products, technologies, and methods of market promotion

Fig. 7 shows the allocation of Ukrainian innovation-active enterprises engaged in the manufacture and promotion of innovative products on the market, improvement of management methods at all stages of creation, and the commercialisation of products.

In 2016–2018, the number of innovation-active enterprises continued growing in all three categories and reached 5097 (62.4%) small, 2140 (26.2%) medium, and 936 (11.4%) large firms. At the same time, the share of small and medium-sized enterprises was constantly growing while the share of large firms was decreasing.

According to Eurostat (2019), the share of small enterprises in the total number of innovation-active firms was 68%, while medium companies comprised 24% and large — about 7%.

Table 2 shows the allocation of Ukrainian innovation-active enterprises engaged in technological innovations (Scientific and Innovative Activity of Ukraine, 2018, 2019). In 2012–2014, 1421 enterprises implemented organisational and marketing innovations(34.5% of the total number of innovative firms); in 2014–2016, this figure amounted to1817 (35.7%); and in 2016–2018, it was 5236 (64.1%).

Thus, there is an increase in organisational and marketing innovations and a decrease in the share of technological innovations. This indicates an improvement in the organisation of market-centred activities of innovative enterprises. These data also indicate trends in the technological backwardness of Ukrainian enterprises.

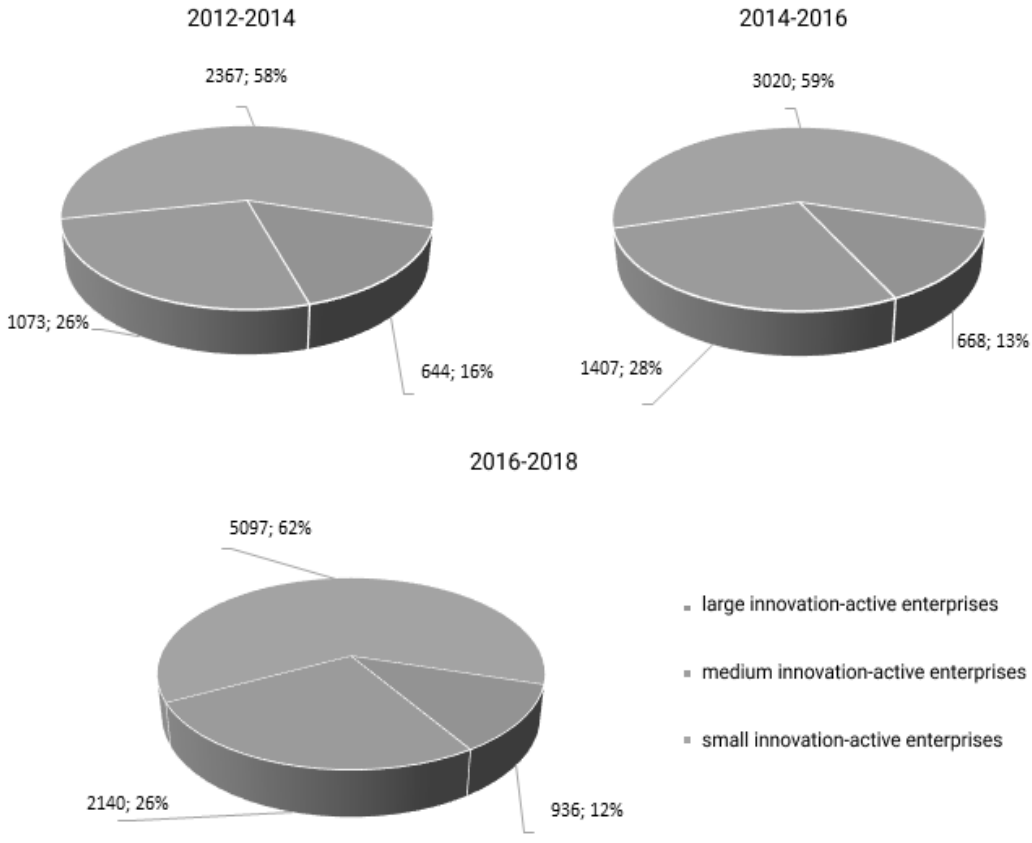

Fig. 7. Innovation-active enterprises of Ukraine grouped by their size
Source: elaborated by the authors based on Scientific and Innovative Activity of Ukraine (2018).

Tab. 2. Types of technological innovations implemented by Ukrainian enterprises

Indicators of innovative activity		Years		
		2012–2014	2014–2016	2016–2018
Enterprises that implemented technological innovations, total number		2663	3278	2937
Product innovations only	Number	446	347	765
	%	16.7	10.6	26.0
Process innovations only	Number	1003	1601	1038
	%	37.7	48.9	35.3
Product and process innovations	Number	1008	1260	1134
	%	37.9	38.4	38.7
Continuous and interrupted innovations	Number	206	70	-
	%	7.7	2.1	-

Source: elaborated by the authors based on Scientific and Innovative Activity of Ukraine (2018, 2019).

3.3. Problems and prospects of knowledge-centred innovative development of Ukrainian enterprises

According to Scientific and Innovative Activity of Ukraine (2018, 2019), the total number of innovation-active industrial enterprises in 2012–2014 was 2492 (60.0% of all innovation-active enterprises); in 2014–2016, the figure amounted to 2598 (51.0%); and in 2016–2018, it was 4060 (49.7%). In other words, there was a constant decline in the share of innovation-active industrial enterprises in comparison with the increase in the total number of enterprises. For comparison, in the EU, more than 50% of the total number of enterprises are innovation-active, and in the leading countries, this figure can be as high as 70% and more (Eurostat, 2019).

2387 innovative products were introduced by Ukrainian innovation-active industrial enterprises, namely, 477 exclusive innovations that were new for the market and 1910 innovations that were only new for the enterprise. Of the total number of introduced products, 751 were new types of machines, equipment, devices, machines, etc., 229 of which were new to the market (Scientific and Innovative Activity of Ukraine, 2018). Compared to 2015, the indicators decreased almost twice, which indicates the growing lag of Ukraine in innovations. In 2018, there was a slight increase in these indicators (3848 innovative products were introduced to the market, 968 of which were new to the market). 920 types of new machines, equipment, etc. were introduced to the market, 271 of which were new to the market. Such fluctuations indicate the lack of clear trends in the commercialisation of innovations of domestic industrial enterprises, as well as the ambiguity in the development of the knowledge management system that underlies these innovations.

This can be corroborated by data of international organisations describing Ukraine's position in the ranking of innovations. According to the European Innovation Scoreboard (2018), all European countries belong to four groups according to the innovation performance: 1 — innovation leaders; 2 — strong innovators; 3 — moderate innovators; and 4 — modest innovators. Switzerland demonstrated the best innovation performance by scoring 169.43 points, while Ukraine showed the worst result with 28.63 points. The average level of innovation activity was 105.8 points. However, according to Cornell University, INSEAD Business School, and the World Intellectual Property Organization, Ukraine was ranked 43rd out of 126 in 2018 (The Global Innovation Index, 2019). The ranking of Ukraine increased by 13 positions compared to 2016 (Ukraine in the Global Ranking of Innovations, 2016).

However, there are some reasons to be cautiously optimistic. According to one indicator (i.e., the percentage of the population aged 30–34 who have completed higher education), Ukraine is above the European average. According to Bloomberg (2019), Ukraine has fairly high scores for two indicators (out of 6) that affect the country's innovative development trends, i.e., 21 for the effectiveness of higher education; and 32 for a concentration of high-tech and research enterprises and companies. This indicates the potential ability to produce and commercialise new knowledge that is the basis for innovation.

4. Discussion of the results

External and internal conditions had to be analysed to identify promising areas and potential problems related to the transition of Ukrainian industrial

enterprises towards advanced knowledge-centred innovative development. The SWOT analysis was used for this purpose. The degree of conformity was estimated between internal conditions of the advanced knowledge- centred innovative development and external conditions.

The generalisation of the analysis results indicates the presence of both positive and negative characteristics of the production system and the use of knowledge at Ukrainian industrial enterprises. Table 3 presents the most significant findings for the transition of industrial enterprises towards advanced innovative development.

Table 4 presents the main market opportunities and threats pertaining to the innovative development of domestic industrial enterprises based on the results of the analysis into the Ukrainian innovation system as well as global economic trends.

The research findings presented in Tables 4 and 5 indicate the presence of external and internal opportunities for the advanced knowledge-centred innovative development of Ukrainian industrial enterprises. The most promising external (market) opportunities are listed in Table 5 (opportunities 1, 2, and 3). Their implementation is facilitated by the strengths of the knowledge management system (Table 4, strengths 1 and 4).

Illiashenko and Rot-Sierov (2016) noted that the possibility for the domestic economy to transit towards advanced innovation was based on the production and commercialisation of new knowledge as a major factor in the formation, strengthening and implementation of competitive advantages. It contributes to the growth of the domestic economy, and consequently, the well-being and quality of life of the Ukrainian population. This fact was confirmed by Shypulina (2017), who's research substantiated the close stochastic convergence between the country's Global Innovation Index and GDP per capita (Fig. 8).

Nevertheless, the presence of relatively strong external market threats (Table 5, threats 1, 2), as well as the weaknesses of the knowledge management system (Table 4, weakness 3) indicate the difficulties related to the implementation of strategies for transit

Tab. 3. Strengths and weaknesses of knowledge management in industrial enterprises of Ukraine

Strengths	weaknesses
1. A growing number of enterprises with technological innovations that actively produce (acquire) new knowledge. There is an increase (unstable) in the cost of producing (acquiring) new knowledge	1. The share of innovative firms in the total number of enterprises is insignificant
2. The patent activity has positive trends, especially concerning applications for registration of utility models and industrial designs	2. The sales of patents are insignificant
3. The structure of innovation-active enterprises by their size corresponds to the average European trend. There is an increase in the number of all categories of innovative enterprises	3. The structure of the acquired new knowledge is irrational, given the existing needs of enterprises
4. The number of enterprises implementing marketing and organisational innovations is growing	4. The fluctuations occur in the number of enterprises implementing technological innovations. There are no tendencies showing their growth

Tab. 4. Opportunities and threats of knowledge management in industrial enterprises of Ukraine

Opportunities	Threats
1. The needs of production and commercialisation of new knowledge that serve as the basis for innovation: intellectual property, innovative products, and technologies	1. The weakness of the national innovation system: low effectiveness of state regulation and stimulation of innovative activities; an underdeveloped innovation infrastructure, etc.
2. The existence of competitive advantages in certain industries, which will allow implementing the strategy of advanced innovation development	2. Almost no state industrial policy, the tendency to deindustrialise the country
3. Enhancing problems that cannot be solved with the help of existing equipment and technologies and management methods. This creates opportunities for innovative breakthroughs as a way to solve problems	3. The growing technological gap between Ukraine and the developed countries
4. Encouraging the return of qualified personnel who have knowledge, experience, and connections abroad; encouraging the creation of small and medium-sized industrial enterprises	4. Threats of the global economic crisis and economic recession in world markets

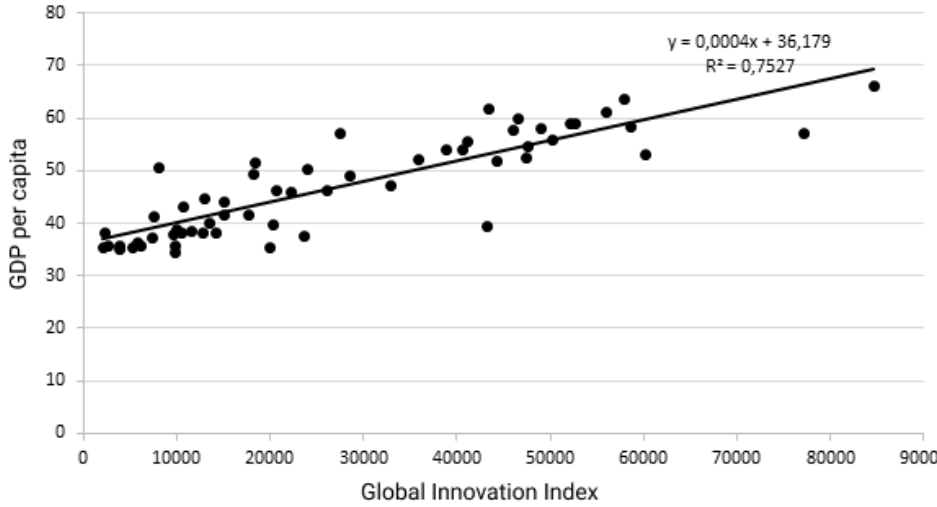

Fig. 8. Stochastic convergence between the country's Global Innovation Index and GDP per capita
Source: Shypulina (2017).

towards advanced knowledge-centred innovative development.

The transition of domestic enterprises towards advanced innovative development requires significant adjustments to the mechanisms shaping the innovation-friendly environment both at the state level and at the level of individual enterprises. This is evidenced by the results of the analysis into monographs devoted to the search of ways to transition the Ukrainian economy (with the industrial sector as the leading industry) towards sustainable innovations. The results reveal various aspects of this problem: institutional and structural changes in the country's economy (Soskin, 2014); the development of innovative culture for industrial enterprises as a mechanism for the socio-cultural regulation of staff behaviour (Shypulina, 2017; Bučková, 2015); the improvement of intellectual capital management mechanisms of the enterprise, including such components as knowledge; the management of the commercialisation of innovative engineering products; theoretical and methodological approaches to the management of potential sales of machine-building enterprises (Olefirenko, 2017); the management of marketing channels for the promotion and distribution of innovative products of industrial enterprises (Bilovodska, 2018) etc.

Accordingly, the improvement of mechanisms used by the state to encourage and regulate innovative activities, should be aimed at the elimination or minimisation of market threats, which are listed in Table 5.

The analysis of Tables 4 and 5 enables to form a set of recommendations for improving knowledge management at the level of individual enterprises in the context of conditions required for their advanced innovative development. In particular, a set of the following measures is proposed to rectify the weaknesses of the knowledge management system (Table 4):

- monitoring consumer problems of a specific enterprise and within the related industries (using methods and tools of knowledge marketing; Fig. 1);
- monitoring the recent achievements in science and technology that affect the performance of the enterprise and related industries; analyse their use and create product and process innovations that can solve consumer problems and strengthen the market position of the enterprise (monitor printed and electronic publications, R&D reports, training deliverables; Fig. 1).

The implementation of the measures will help to place consumer needs and the needs of the enterprise-innovator at the centre of the system for the acquisition and commercialisation of knowledge. It will also help to reduce the technological backlog of Ukrainian enterprises (Table 5, market threat 3).

The above-mentioned actions and activities aimed at the improvement of mechanisms for state regulation and incentives strive to reduce the weaknesses in the knowledge management system of industrial enterprises.

Consequently, the choice of knowledge-centred areas for the advanced innovative development of industrial enterprises of Ukraine should be based on the possibility to implement the existing relative competitive advantages (Table 5, market opportunity

2). The set of competitive advantages is rather significant for certain industries, such as aerospace; shipbuilding; mechanical engineering (equipment for energy and petrochemical industries); military industry, etc. Enterprises representing these industries (having a highly dynamic allocation of market forces) have a significant opportunity to use innovative products and occupy strong positions in regional and global markets. The results of the BCG analysis into the dynamics of market positions of the most innovative companies in the world (Ringel at al., 2018) testify in favour of the possibility to implement these changes. Their implementation requires legislative consolidation of the State Industrial Policy as one of the main priorities, as well as the improvement of the National Innovation System (Illiashenko, 2019) etc.

Conclusions

In summary, it should be noted that the results of the analysis into the main ways used by domestic enterprises to acquire and utilise (commercialise) knowledge indicate contradictory trends. On the one hand, they show a still significant but declining potential for innovative development of Ukrainian enterprises (especially industrial) in terms of the ability to acquire (produce) new relevant knowledge, which serves as a basis for competitive advantages and implement strategies of advanced innovative development. This is especially true for knowledge in the form of industrial property. On the other hand, the results indicate a lag in the realisation of the existing potential of innovative development, which manifests as the deterioration of the innovation activity in domestic enterprises.

The research results can be used as the base of information for estimating the vector of influence made by an existing system for the production (acquisition) and utilisation (commercialisation) of knowledge by enterprises on the innovative development of the Ukrainian economy. They can also serve as the base of knowledge for the management system aimed at choosing the promising areas of innovative development of these enterprises.

The SWOT analysis allowed authors to identify the strengths and weaknesses of the knowledge management system in industrial enterprises, as well as to outline the existing market opportunities and threats. The results of the analysis were considered to develop recommendations for the formation of prerequisites required to improve the efficiency of knowledge management both at the state level and at the level of individual enterprises. The recommendations consider conditions required for the knowledge-centred and advanced innovative development.

Further research should be aimed at the accumulation, systematisation, and analysis of statistical data that characterise innovative processes in Ukraine according to international methodology, to build econometric models that characterise the relationship between the production (acquisition) and utilisation (commercialisation) of knowledge. Their results can be used as a basis to design methodological tools for organisational and economic management of domestic enterprises based on formalised knowledge management procedures to ensure innovative development.

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Marketing and branding-oriented goals for the development of Functional Urban Areas: evidence from Poland

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ABSTRACT
The European Union currently uses Functional Urban Areas (FUAs) as basic units for planning local development activities under its financial support. An important issue in terms of managing such areas is branding. FUAs are made of at least several territorial units (covering a dense urban area and a functionally related urbanised zone). Such composition poses a particular challenge in terms of developing a brand that covers all of the units. Therefore, it is essential to select the core around which the target image will be created. This publication aims to identify marketing and branding goals for the development of FUAs and determine activities facilitating the achievement of these goals by entities that manage the functional areas. The research method used in the article was a content analysis of documents outlined as Strategies for Integrated Territorial Investments developed for FUAs in Poland. The authors of the article undertook preliminary exploratory research. The obtained results show that most of the marketing and branding goals for the development of FUAs correspond with the objectives specific to city marketing and branding. Moreover, "integration" and "strengthening the metropolitan area function" were recognised as goals specific to FUAs.

KEY WORDS
city marketing, city branding, Functional Urban Area, FUA, Poland

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Introduction

Extensive urbanisation has led to the introduction of the urban marketing concept. This concept became widely used after 1990 as a result of increased competition among cities aiming to attract as many tourists, residents or investors as possible (Alexa, 2010). Since then, the level of competitiveness has been steadily increasing. Over two decades, it became relevant not only to cities but also to regions and nations that regularly assess the improvement and

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promotion of their image against those of their competitors (Metaxas, 2010). One of the ways to compete for residents and investors is to create a development strategy. Such projects enable FUAs to compete on an international level (Alperytė & Išoraitė, 2019). However, it is also important to act on a national level, to which local or regional development strategies contribute.

The first tangible attempts to define the term "Functional Urban Areas" can be found in the document created in 2004 by the European Spatial Planning Observatory Network (ESPON 111 — Final Report, 2004). The first Polish references can be found in the Concept of Spatial Development of the Country 2030 (NSDC: 2030, 2011). According to these definitions, a FUA can be defined as a spatially continuous settlement system consisting of separate units covering a dense urban area and a functionally-related urbanised zone (Kurek et al., 2020). Due to the evident measures undertaken by Functional Urban Areas within frameworks included in their Strategies for Integrated Territorial Investment, they have gained considerable recognition both in Poland and abroad (Kociuba, 2015).

A region that aims to become attractive for inhabitants and visitors must create a brand using marketing activities regardless of the size and type of an administrative unit. The marketing of places is primarily a philosophy whose principal purpose is to develop, communicate, convey and exchange urban offers that have a particular value for the community and visitors of a city. Such activities require the coordinated application of marketing tools (Braun, 2008). At this stage, building brand awareness goes beyond the previously known traditional methods of place promotion. A more effective approach involves the ability to combine symbolic and functional values, which is proof of a robust and modern image of the place (Boisen et al., 2018). Branding can be considered a complex management strategy that aims to go further than just managing the image or its perception (Ye et al., 2018). The development of the brand concept also led to changes in related assumptions and objectives. They became more dependent on emotional and functional benefits, on a process and relational approach linked by the fact that the brand is co-created by all involved parties (Daszkiewicz & Wołosecka, 2019). Thanks to the development of place branding, it has become possible to expand the related research areas, including such disciplines as marketing, urban planning, sociology or public policy (Glińska & Rudolf, 2019; Lucarelli & Berg, 2011).

The main objective of marketing activities in terms of place promotion is the positioning of presence and strengthening the awareness of residents, tourists and investors (Klijn et al., 2012). The region's brand consists of various elements, including FUAs. Some of these elements cannot be modified (e.g., location), while others can (e.g., the development of modern infrastructure) (Papademetriou & Sumption, 2013). From a different perspective, a brand can be considered as a kind of relationship between the owner and the user (Raganowicz, 2018; Juščius et al., 2005). Strengthening of the relationship also strengthens the brand (Klijn et al., 2012). The unpredictable character of the ever-changing environment, which is particular to European cities, is gaining greater interest among researchers and practitioners (Kavaratzis, 2004). The urbanisation of a growing number of areas makes it increasingly more important to monitor the local amenities that affect the quality of life of urban residents (Daams et al., 2016). On a global scale, city councils strive to manage their territorial brand and correctly identify their niche to increase the visibility of their areas (Judd, 1995; Markusen & Schrock, 2006; quoted in: Hultman et al., 2016).

The paper aimed to identify the marketing and branding goals for the development of FUAs in Poland and determine activities that facilitate the achievement of these goals by the units. The aim was achieved by an empirical content analysis of documents outlined as Strategies for Integrated Territorial Investments of 17 FUAs in Poland.

For many years, organisational and institutional documents have been the core of qualitative research. In recent years, there has been an increase in the number of journal articles that mention document analysis as part of methodology (Bowen, 2009) in the context of both region branding (Daszkiewicz & Wołosecka, 2019) and city branding (Raganowicz, 2018). Consequently, such research can be used as part of the planned methodology.

This article consists of the following parts: in the first chapter, the authors cover the essence of FUAs and the principal theoretical aspects of place branding; in the second chapter, they explain the proposed methodology, and in the third, they analyse the strategic plans of FUAs with a focus on their marketing components.

The last chapter presents a discussion and formulates conclusions. It should be noted that the authors undertook preliminary exploratory research.

1. Literature review

1.1. Functional Urban Areas

The concept of a Functional Urban Area (FUA) has been known for a long time under different names. Modern cities encounter a wide range of challenges, which can be perceived as either profitable or harmful depending on the way they are resolved. A city and associated areas are a field of interest for many articles and other scientific outputs. So far, however, they have concerned such issues as a commercial city, urban complex, economic areas or a city's sphere of influence but not FUAs as such (Bartosiewicz, 2016). The most efficient functioning of a FUA can be ensured by addressing such issues as the ageing of the population, technical infrastructure, waste management, environmental pollution, urban logistics, areas of poverty and wealth, low level of citizen participation in public affairs and urban sprawl (Winkowska et al., 2019; Szpilko, 2020; Szpilko et al., 2020). As frequently emphasised by the literature, a city can be considered urbanised, provided it meets certain conditions regarding the proximity of the main urban areas and population (Harris et al., 2019). To be recognised as a FUA, the place must be spatially continuous and consist of separate administrative units as well as meet population requirements (Kurek et al., 2020).

The OECD, in cooperation with the EU (Eurostat and EC-DG Regio), created the definition of a FUA due to problems with the earlier term "metropolitan areas". This definition did not allow to compare individual metropolitan areas with one another. Metropolitan areas were a subcategory with a population between 500 000 and 1.5 million inhabitants (OECD, 2013).

In Poland, FUAs are mostly created around voivodship capitals, although not in all cases (Śleszyński, 2013). According to the Concept of National Spatial Planning 2030 (MRD, 2012), there are four basic types of FUAs which are distinguished by their cores and adjacent zones. The first type is presented in this article, i.e. voivodship centres (with the capital of the voivodship as the core). The other distinguished types are regional, sub-regional and local centres (NSDC, 2030).

There is a functional relationship between the FUA core and related urban zones, which is regulated by the OECD. According to the definition, "a FUA consists of urban cores with a population density of more than 1500 inhabitants per square kilometre (and 1000 inhabitants per square kilometre for the USA and Canada) and at least 15% of the working population in the city centre". Historically, the creation of a FUA is associated in particular with the increased number of commutes as a result of unsatisfied demand for work within its boundaries, characteristic in the conditions of accelerated industrialisation (Busłowska et al., 2017). Such cooperation, however, does not exclude natural competition that occurs between the units within a FUA.

This study considers essential the fact that most FUAs are obligated to create Strategies for Integrated Territorial Investments (ITI). Such documents are particularly important because their creation supports the sustainable development of each unit within a FUA. The strategies promote cooperation and strengthen the territorialisation of constituent units; they help to streamline and enhance financial programming. In the case of Poland, each FUA created around a voivodship capital is required to create such a document (Kociuba et al., 2018).

In Poland, the concentric spatial system is the most common type of urban arrangement. The significance of FUAs that have a voivodship capital at their core (e.g., Warsaw or Krakow) allow concluding that FUAs undergo the most substantial development processes. This development affects the surrounding area of the entity, which proves the diffusion of distance-dependent development processes (Szafranek, 2018).

The creation of a FUA must be accompanied by premises that unambiguously indicate possible benefits for the component units. Such benefits include, among others, cheaper transport, lower costs of living and maintenance in the city, cheaper production and logistics. The membership in a FUA increases the level of satisfaction of residents by improving their quality of life. It begins to attract more and better-educated people (including farmers) who want to live in supported areas. Increased national and international competitiveness can be considered the overall benefit and goal of a FUA (Yunfeng & Yueqi, 2019). FUAs, as important centres of social activity, above all, follow the path of sustainable urban development (Paradowska & Platje, 2015).

Poland was chosen for this analysis primarily because of dynamically developing and widely functioning FUAs in the country. This decision is supported by the fact that in Poland (as well as in other countries of Central and Eastern Europe), changes in areas, such as the demographic structure, occurred exceptionally quickly after the collapse of the com-

munist system (Kurek et al., 2020). A dominating reason for selecting Poland for the analysis was the rapid change in views from the post-socialist belief that urban planning is contrary to the market to the adoption of the idea of a free market (Slach et al., 2019).

Poland is located in the centre of Europe and shares borders with seven countries: Russia, Lithuania, Belarus, Ukraine, Slovakia, the Czech Republic, and Germany. Poland has a three-tier territorial division into voivodships, counties and municipalities (Kaczmarek, 2016). According to data available on the website of the Central Statistical Office as of 1 January 2019, Poland had 16 voivodships, 314 counties and 66 towns with county rights, and 2 477 municipalities (including 302 urban municipalities, 638 urban-rural municipalities and 1 537 rural communes) (Central Statistical Office, 2019).

It is worth noting that various scientific studies use the term "Functional Urban Area" interchangeably with "Urban Functional Area". This article uses the term "Functional Urban Area" following the definition by the OECD, to which Poland, and therefore the analysed territorial units, belong.

1.2. City marketing and branding

As an area of scientific research, place marketing appeared in the literature at the end of the 1980s and the beginning of the 1990s (Ashworth & Voogd, 1990; Kotler et al., 1993; Ward, 1998). In the late 1990s, discussions extended to the broader context of structural changes in cities and regions. Also, place marketing became more important in light of growing competition among territories (Zenker & Braun, 2010).

Territorial marketing should be considered as a concept of managing a territorial unit according to its marketing orientation, which is intricately linked to the strategic planning approach (Florek, 2013). It defines territorial marketing as a social and managerial process aimed at achieving the objectives of local actors, focused on ensuring the long-term prosperity of inhabitants by meeting the needs of local partners (Florek, 2013).

The application of place marketing became necessary as a result of technological progress as well as increased mobility of people and resources in the 21st century. As globalisation trends progressed, there emerged a need to develop more advanced theories of territorial marketing. Nowadays, places that aim to stand out on the market must have a distinctive image, i.e., strive to eliminate negative features while exposing their unique resources, such as cultural heritage, architecture, local skills, etc. (Maheshwari et al., 2012). Similarly to other marketing concepts, place marketing evolved, accompanied by the emergence or development of new interesting issues in this area of study. According to Kavaratzis (2004), place branding is the current developmental stage of place marketing. Consequently, in the process of building a brand, territorial units increasingly focus their place-marketing efforts on evoking emotional, mental and psychological associations as opposed to functional associations, which, however, is not the same as ignoring them (Florek, 2014).

Nowadays, place brands operate in various forms (national, regional, tourist, urban branding) and there is no doubt that place branding is somewhat a well-established area of academic research (Hankinson, 2015). Now, it is not only a growing academic discipline but also an increasingly common practice used by local governments (Kavaratzis & Hatch, 2013).

Historically, branding existed as a way of differentiating products offered by manufacturers; however, nowadays, this term has evolved and become more sophisticated (Room, 1992). Branding is integrated into the functioning of economic entities of different types and levels. The role of branding in local and regional development is recognised as a relevant topic (Zenker & Jacobsen, 2015). Territorial units of different categories actively use marketing and branding tools to intensely compete for tourists and new residents (Gilboa & Herstein, 2012). Over the years, the significance of cities as territorial units has been growing; however, now, the power concentration at the national level gives way to the regional, metropolitan and city levels (Ye & Björner, 2018). City branding is used for different purposes: (a) to communicate the competitive advantage; (b) to attract investors, tourists, and labour force; and (c) to focus on residents and other internal audiences (Ye & Björner, 2018).

Gilboa and others emphasise that by implementing branding techniques in the management process, city authorities gain the opportunity to integrate their stakeholders around a new competitive identity, which they then communicate to their target audience (Gilboa et al., 2015). Therefore, branding is becoming an increasingly common practice used to "sell" certain characteristics of a city (e.g., its history, lifestyle or culture) to gain new opportunities, prestige or advantage in a competitive environment (Zhang & Zhao, 2009).

Strategic marketing and territorial branding aim to provide a position in the perception of customers by having a recognisable image. Therefore, a city must identify and define a combination of offers and benefits that meet the expectations of different target groups (Kotler et al., 1999). When deciding on a strategic approach to shaping the city's brand, municipal authorities look for the distinguishing features of its identity to build an image that would be attractive externally and internally (i.e., for its habitants) (Glińska & Florek, 2013). For example, territorial units aspiring to boost tourism may base their strategies on such distinguishing features as tourist attractions, leisure activities, high-quality services, natural, cultural and social values, climate, infrastructure, accessibility and quality of transport, attitudes of inhabitants towards tourists, price levels, economic and social relations, etc. (Prayag, 2011).

The implementation of city-branding policies aims to support the city in its appropriate reaction to current social and economic challenges (Glińska & Rudolf, 2019). City branding is a complex process that must account for many factors and associations while shaping a brand of a specific territory (Fan, 2006). The implementation of branding strategies allows cities to meet the requirements of their stakeholders more efficiently, whether they are citizens, business people or visitors (Gilboa et al., 2015).

A recognisable brand of a city attracts tourists, new inhabitants and businesses, while reassuring current residents of the correctness of their decision to stay in their city (Merrilees et al., 2013). A city with a strong and recognisable brand can offer many benefits. These include the ability to attract external investment, increased inbound tourism rates, greater credibility and trust on the part of investors, increased political influence, better and more effective partnerships with other cities, institutions, public and private organisations, the effect of the "city of origin" on goods and services, as well as civic pride (greater satisfaction of residents) (Middleton, 2011; Bartosik-Purgat, 2018).

Since FUAs merge the features of several territories, the approach for their marketing and branding becomes more sophisticated. Strategies for Integrated Territorial Investments are created to highlight the partnership of territorial units within a FUA through common objectives and the agreed use of financial resources. Branding and marketing are one of the tasks. Metropolitan areas are particularly advanced in the development of a territorial brand. As larger cities have an extended history of connections with neighbouring local governments, their work on the branding concept is much more advanced (Glińska et al., 2016). Even though the concept of a territorial brand can be considered interdisciplinary, in Poland, it has been used mainly from a marketing perspective. Thus, the concept is excluded from the field of public management with some exception of Strategies for Integrated Territorial Investments (Florek et al., 2017).

1.3. FUA versus city branding issues

The chosen topic of the article justifies the authors' focus on the analysis of Functional Urban Areas and city branding issues. A preliminary analysis was carried out, establishing 217 scientific studies on FUAs in the Scopus database. Noticeably, city branding and marketing are not a new topic among scientists. In the Scopus database, keywords "city marketing" or "city branding" appear in 697 publications. However, the database seems to have no publication addressing both topics — FUAs and city marketing/branding — at the same time. Therefore, as this article concerns FUAs and city marketing/branding, it can help to fill the gap.

VOSviewer analysis was conducted on FUA issues subsequent to a niche in the literature that was found comparing topics on FUAs and city branding (Fig. 1).

The Scopus database offers 217 publications with the keywords "functional urban area", "functional urban areas", "Functional Urban Area" or "Functional Urban Areas". The first publication is dated 1973. Before that date, the topic was not popular, and publications were rare in 1973–2008. The frequency of publications was one per year, except for 2007 that had two publications. In 2009–2015, up to 9 manuscripts per year were published on the subject. In 2016–April 2020, the topic became more widespread, and the number of publications varied from 24 in 2017 to 51 in 2019. In total, 1 912 keywords were used in 217 publications.

VOSviewer software helped to identify three clusters based on the keywords that occurred at least five times in the publications. The total number of keywords that met the limitation was 87. The first cluster (red) was made based on the main keywords "functional urban area", "urban area" and "urban development"; it covers the aspects of accessibility, agglomeration, commuting, Europe, European Union, France, functional urban area, functional urban areas, Germany, groundwater, groundwater pollution, groundwater resources, integrated

approach, Italy, Lombardy, metropolitan area, Milan, Milano (Lombardy), mobility, Poland, Poland (central Europe), polycentrism, socioeconomic conditions, Spain, spatial analysis, spatial planning, suburban area, urban area, urban development, urban growth, urban policy, urban sprawl, urban transport, and urbanisation. The second cluster (green) was created using the main keyword "China"; it covers the aspects of air pollutant, air pollution, air quality, article, atmospheric pollution, chemical analysis, china, cities, city, concentration (composition), dust, ecology, environmental monitoring, heavy metal, heavy metals, housing, human, humans, particulate matter, pollution, polycyclic aromatic hydrocarbons, principal component analysis, roads and streets, rural areas, soil, and soils. The third cluster (blue) was made using the main keywords "urban planning" and "functional areas"; it covers the aspects of big data, cluster analysis, data mining, economics, environmental management, functional areas, functional regions, GIS (Geographical Information System), Guangdong, Guangzhou, land use, point of interest, population statistics, remote sensing, satellite imagery, spatial distribution, spatiotemporal analysis, statistics, sustainable development, trajectories, urban areas, urban ecosystems, Functional Urban Area, urban planning, and urban transportation.

In general, the clusters are not significantly related to each other. The main focus is on urban planning and ecological issues. The marketing-related topics from the perspective of FUAs are not popular among researchers; therefore, this article contributes to the less investigated thematic scope within the subject area of FUAs.

2. Research methods

2.1. Method

Document analysis — namely, the systematic procedure for reviewing or evaluating printed and electronic (computer-based and distributed via the Internet) documents — was used as a research method to achieve the aim of the article. Similarly to other analytical qualitative research methods, document analysis focuses on data examination and interpretation to get a sense as well as understand and develop empirical knowledge (Bowen, 2009). It can be used as a basic or a complementary method to the research process (Bowen, 2009). In the latter case, document analysis is used in combination with two or more qualitative research methods for triangulation — "the combination of methodologies in the study of the same phenomenon" (Denzin, 1970). This

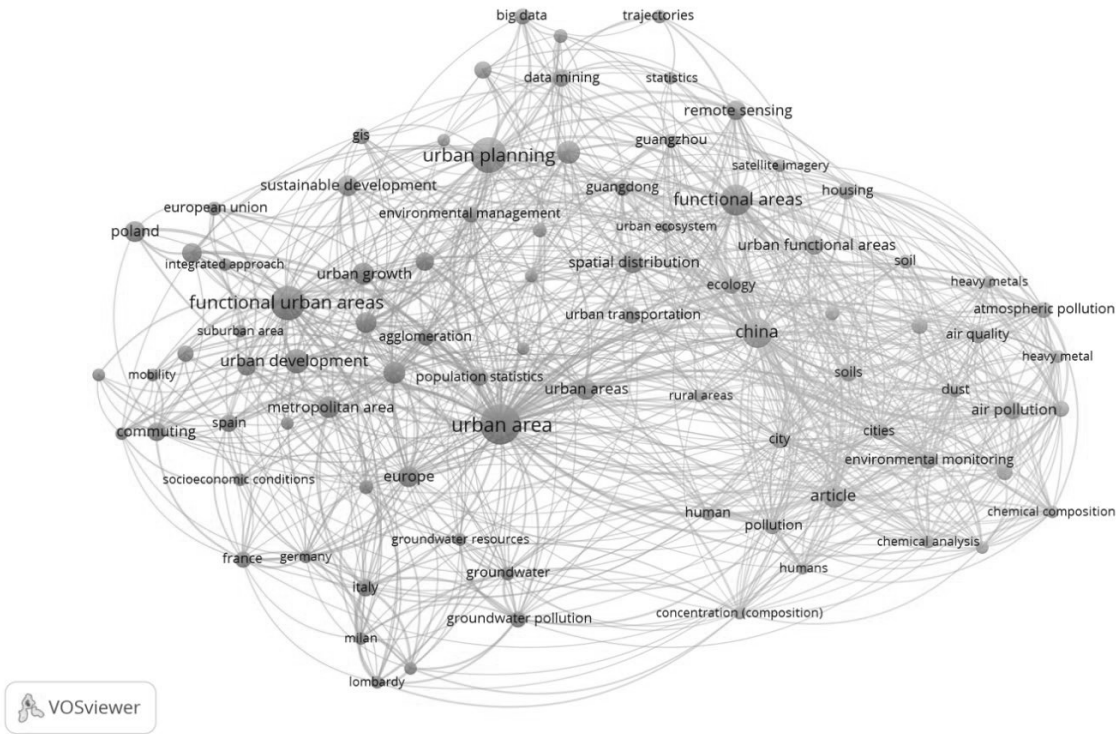

Fig. 1. Map of keywords resulting from the search on topics concerning Functional Urban Areas in the Scopus database
Source: elaborated by the authors based on the Scopus database and using VOSviewer software.

article also treated the results of the document analysis as an introduction to individual in-depth interviews. The empirical data obtained from the document analysis was used by the authors to support the formulation of questions for in-depth interviews, which are planned in the next phase of the research project.

Document analysis may cover different categories of documents, including those owned by public institutions (Bowen, 2009), such as the central or local government. Such documents are analysed to determine policies implemented by these organisations (Alsalloum & Brown, 2019; Huang et al., 2010). They may also include strategic studies created by entities that coordinate the activities of local government units or their partnerships (Rogacewicz, 2018). Such types of documents became the subject of analysis for this article.

The analysis of the content of documents is widespread. It seeks to quantify the content in terms of categories in a systematic and replicable manner (Kolbe & Burnett, 1991). At the same time, this process allows organising information into categories related to the central questions of the research (Bowen, 2009).

2.2. Sample

The analysis focused on the content of strategic documents drafted by the offices of management boards of Polish FUA associations. The typology of functional urban areas dates back to the 1990s when the collection of data began for European cities with at least 100 000 inhabitants under the projects of Urban Audit and Large City Audit (official GUS site accessed on 18 April 2020). According to data available on the official website stat.gov.pl, Poland had 58 FUAs in 2018. 17 FUAs were selected for the analysis. Table 1 presents the names and the most important characteristics of the selected areas. The information was gathered from official websites of FUAs that contain centres of voivodships.

The analysis focused on FUA cities that are also Polish voivodship capitals because of two interconnected facts: 1) according to the National Urban Policy, voivodship authorities are obligated to create ITI strategies for an integrated approach to development; and 2) the strategies must be created by territories within such FUAs to receive support from the EU Funds (KPM, 2015). Such requirements made FUAs with voivodship centres the best-developed FUAs in

Tab. 1. General characteristics of Polish FUAs that cover voivodship centres based on current Strategies for Integrated Territorial Investments until 2020

Name of a FUA	Area (km^2)	Number of members	Population (approx.)	Working age population (%)
Białystok	1 728	10	411 531	65%
Bydgoszcz-Toruń	3 744	25	852 705	70%
Gdańsk-Gdynia-Sopot	5 500	57	1 500 000	62%
Gorzów Wielkopolski	770	5	153 300	65%
Katowice	5 577	81	2 784 951	54%
Kielce	1 341	12	339 549	50%
Kraków	4 065	15	1 508 900	62%
Lublin	1 582	16	545 007	61%
Łódź	2 500	30	1 100 000	60%
Olsztyn	1 600	7	232 267	65%
Opole	2 370	21	339 269	66%
Poznań	3 082	23	1 014 194	65%
Rzeszów	1 047	13	363 680	66%
Szczecin	2 795	15	687 247	64%
Warszawa	2 932	40	2 714 987	60%
Wrocław	2 338	19	887 943	64%
Zielona Góra	964	5	185 209	68%

Source: elaborated by the authors based on official FUA websites and individual Strategies for Integrated Territorial Investments.

Poland with ITI strategies that are widely available for analysis.

The document analysis covered 17 Strategies for Integrated Territorial Investments for 2014–2020 prepared for FUAs with voivodship centres (Table 1). The basic documents define development objectives and directions of activities of particular functional areas. On the EU level, the strategies are imposed by Regulations (EU) of the European Parliament and of the Council No 1301/2013 of 17 December 2013, No 1303/2013 of 17 December 2013 and No 1304/2013 of 17 December 2013. At the national level, the obligation is established in Article 74 of the Act on Municipal Self-Government of 8 March 1990 (i.e. Polish Dz. U. of 2015, item 1515), relevant agreements of individual FUAs concerning joint implementation of Integrated Territorial Investments of the Municipal Functional Area, and other legislation. These documents were accessed in pdf on websites of associations coordinating the activities of various FUAs (Table 2).

Each of the analysed strategies had a similar structure which allowed to separate the diagnostic part from the strategic part. In each document, the latter was analysed in detail, with an emphasis on objectives, priorities and actions planned for 2014–2020.

The analysis of 17 Strategies for Integrated Territorial Investments showed that the documents have a generalised structure. Each document contains a table of contents, a list of used abbreviations and an introduction. The following chapters describe the methodology for strategy development, the legal basis for the implementation and the diagnosis of the supported area (demography or infrastructure). This part also provides basic findings from diagnostic conclusions and SWOT analysis. Then, documents present a section on development objectives to be achieved within the established ITI, selected priorities and planned actions. Next, the document evaluates the coherence of the ITI strategy with other strategic and operational documents, provides the financial framework and financial plan. The following sections provide conditions and procedures to be followed in the implementation of the ITI strategy and the selection criteria for projects in the ITI. Finally, the list of figures, tables, diagrams and appendixes is attached.

Individual documents differ by the sequence of chapters and their names, but the presented structure can be perceived as generalised and applicable to all of them. Some strategies (e.g. for Zielona Góra or Gdańsk–Gdynia–Sopot) include a separate section devoted to cultural heritage, natural assets and tourism. Others discuss human capital and health infrastructure (Kraków), low-carbon economy (Białystok), innovation (Gdańsk–Gdynia–Sopot), education (Gdańsk–Gdynia–Sopot) and transport (Łódź) in separate subsections. Several documents also include such points as principles and procedures for project selection and identification; description of undertaken public consultations; the implementation schedule; the implementation and monitoring system; the effectiveness of the ITI Strategy; results of the Strategic Environmental Assessment; reference to the Low Carbon Economy Plan; complementary projects; and social projects complementary to the interventions under ITI.

Data on marketing and territorial branding goals planned for each FUA were retrieved from corresponding Strategies for Integrated Territorial Investments.

2.3. Procedure

The conducted document analysis involved skimming (superficial examination), reading (thorough examination), and interpretation (Bowen, 2009). Results of the content analysis were examined considering the exploratory and interpretative character of the research material (Flick, 2012). The analytical procedure consisted of finding, selecting, appraising (making sense of), and synthesising data contained in documents. Then, the data (excerpts and quotations) were organised into major themes, categories and case examples (Labuschagne, 2003). In the selection and analysis of data, the research authors attempted to demonstrate objectivity (to represent the research material fairly) and sensitivity (to respond to even subtle cues of the meaning) (Bowen, 2009).

The analysis of Strategies for Integrated Territorial Investments for particular FUAs consisted of the following steps: (i) the identification of development goals for FUAs related to their marketing and branding activity (including strategic and operational goals), (ii) creating categories of development goals for FUAs related to their marketing and branding efforts.

2.4. Coding

The aims of the article were achieved by directed content analysis (Hsieh & Shannon, 2005, p. 1281). During the coding process, researchers used both

Tab. 2. List of analysed documents

Document compiler	Title of the document	Pages	Access
Białystok Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Białystok for 2014–2020	393	http://www.bof.org.pl/images/Strategia_w5.pdf
Bydgoszcz–Toruń Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Bydgoszcz–Toruń	290	http://zit.btof.pl/attachments/article/330/Strategia_ZIT_BTOF%202019.pdf
Metropolitan Area Gdańsk–Gdynia–Sopot	Strategy for Integrated Territorial Investments in the Metropolitan Area of Gdańsk–Gdynia–Sopot up to 2020	153	https://www.metropoliagdansk.pl/upload/files/Za%C5%82%C4%85cznik%20nr%202%20-%20Strategia%20Zintegrowanych%20Inwestycji%20Terytorialnych_tekst_jednolity_080118(1).pdf
Gorzów Wielkopolski Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Gorzów Wielkopolski	202	http://www.gorzow.pl/system/obj/7653_Strategia_ZIT_MOF_GW_wersja_2_kwiecien_2017_Zarzadzenie_PM.pdf
Katowice Functional Urban Area	Strategy for Integrated Territorial Investments in the Central Subregion of Śląsk Voivodship for 2014–2020	332	http://www.subregioncentralny.pl/download/strategia-zit-sc-wersja-ix-obowiazujaca.pdf
Kielce Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Kielce for 2014–2020	475	https://zitkof.kielce.eu/dam/jcr:c380fd58-32f3-489f-bcf3-51968dca0300/Strategia%20ZIT%20KOF%202014-2020%20-%20aktualizacja%20marzec%202018.pdf
Kraków Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Kraków	135	http://metropoliakrakowska.pl/wp-content/uploads/2019/08/Strategia-ZIT-KrOF_wer.-4.0-zm.-6.pdf
Lublin Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Lublin for 2014–2020	153	https://lublin.eu/gfx/lublin/userfiles/_users/r-kasprzyk/strategia/strategia_zit.pdf
Łódź Functional Urban Area	Strategy for the Development in the FUA of Łódź 2020+	279	http://www.lom.lodz.pl/wp-content/uploads/Za%C5%82%C4%85cznik-nr-1-do-Uchwa%C5%82y-nr-4_2019-Strategia_Rozwoju_LOM_2019.pdf
Olsztyn Functional Urban Area	Strategy for the FUA of Olsztyn	215	https://zit.olsztyn.eu/fileadmin/ofe/Strategia_MOF_Olsztyna.pdf
Opole Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Opole Agglomeration	148	https://aglomeracja-opolska.pl/sites/default/files/u195/dokumenty_strategiczne/strategia_zit/wersja_2/Strategia%20ZIT%20Aglomeracji%20Opolskiej%20%28wersja%202%29.pdf
Poznań Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Poznań	182	http://www.zit.metropoliapoznan.pl/media/A-STRATEGIA-ZIT-Aktualna/Aktualizacja_18.11.2019/Strategia_ZIT_w_MOF_Poznania_w._1.5.pdf
Rzeszów Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Rzeszów	319	https://rof.org.pl/wp-content/uploads/2019/05/Strategia-ZIT-ROF.pdf
Szczecin Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Szczecin	300	http://zit-som.szczecin.pl/images/dokumenty/Strategia_ZIT_SOM_v_19_11_06-2.1.pdf
Warszawa Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Warsaw 2014–2020+	173	http://omw.um.warszawa.pl/wp-content/uploads/2020/02/Strategia-ZIT-WOF-VIII.pdf
Wrocław Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Wrocław	327	https://zitwrof.pl/wp-content/uploads/2016/03/Strategia-ZIT-WrOF_sierpie%C5%84-2018_z-pozytywnymi-opiniami.pdf
Zielona Góra Functional Urban Area	Strategy for Integrated Territorial Investments in the FUA of Zielona Góra	206	http://rpo.lubuskie.pl/documents/10184/77017/Strategia+ZIT+MOF+Zielona+G%C3%B3ra+sierpie%C5%84+2016/db443add-d84e-40a2-8dd2-1f0244d312b0

codes formulated based on the existing theory as well as codes which they developed themselves, relying on the obtained results. Additional categories were created in the process of content analysis. This information enriched the existing theory of territorial marketing and branding with new issues related explicitly to FUAs. The directed content analysis allowed the coders to formulate new directions of initiatives related to the marketing activity of FUAs.

As researchers play an indispensable role in qualitative methods (Researcher-as-Instrument) (Archibald et al., 2015) and their work is related to coding, it is worth mentioning that the work of the coder was performed by the authors of the article who have experience in carrying out qualitative research projects.

Therefore, they have relevant knowledge and are also methodologically well-equipped, which was necessary to carry out the research process. The ultimate decision on the creation of the final categories was discussed among all authors of the article.

3. Research results

In Poland, FUAs integrate marketing components into their development strategies; however, different terms are used to describe those activities. In total, the content analysis of documents allowed to identify five main terms describing marketing-related activities: advertisement, brand, image, marketing, promotion. Each FUA develops its marketing strategies based on the current challenges posed by the environment using its material and immaterial means to solve as many problems as possible (Table 3). It can be observed that although the main marketing goals of FUAs are different, their operational goals are similar. The categories of goals assigned to them often overlap.

Kielce was the only surveyed FUA that did not provide a clear strategic marketing goal in the ITI Strategy. More information can be found on the official website of the FUA.

The content analysis of provisions related to the strategic and operational marketing objectives (which specify the former), resulted in eight categories of goals, listed in the last column of Table 3: image/brand (e.g., Gorzów Wielkopolski, Bydgoszcz–Toruń), support for entrepreneurship (e.g. Szczecin, Katowice), attractiveness for tourists (e.g. Poznań, Gdańsk–Gdynia–Sopot), quality of life (e.g. Olsztyn, Rzeszów), integration (e.g. Łódź, Warszawa), attractiveness for investments (e.g. Białystok, Kielce), relations (e.g. Bydgoszcz–Toruń, Lublin) and the metropolitan area function (Lublin, Katowice and Poznań). Image/brand can be considered the most common goal among the surveyed FUAs. Although Table 3 lists the principal distinctive features of regional marketing strategies, they also have similarities. Every metropolis aims to build a marketing strategy on regional specialities, cultural heritage and unique natural resources. Apart from the essential promotion goals, FUAs intend to increase the awareness and popularize measures aiming to solve the problems of ecological and social inclusion. Such plans reflect the European tendency to work towards increased awareness of natural environment and equality. Although for the current study, the authors classified FUAs according to their geographic position, the analysis shows that the regions have common features regardless of their location. Specific goals are unique for each area. Metropolitan areas are a particular kind of FUAs that primarily focus on creating core branding concepts common with the neighbouring local governments. Such cooperation is possible due to the extended shared history of neighbouring municipalities. In the case of metropolitan areas, the largest agglomerations have the most consistent brand concepts, e.g., Poznań FUA (Glińska et al., 2016).

According to goal categories (Table 3), almost all FUAs focus on their image or brand. On the other hand, specific objectives concern such aspects as attractiveness for investments or residents (i.e. FUA inhabitants, their social inclusion and satisfaction with the quality of life), integration, attractiveness for tourists (which also means the protection of heritage sites), support for entrepreneurship, building relations, and strengthening the metropolitan area function.

Table 4 clearly presents and summarises the frequency, at which a particular goal category appears in strategies of the listed FUAs. The table lists goal categories in descending order by the frequency of appearance.

The most common category of goals is the image/brand (14 FUAs) followed by the support for entrepreneurship (8 FUAs). The attractiveness for investments, residents and tourists was considered significant enough by 6 FUAs to be included in strategies. The least frequent category was the strengthening the metropolitan area function (3 FUAs).

Tab. 3. Strategic and operational marketing goals of the FUA development

FUA	Strategic marketing goal(s)	Operational marketing goal(s)	Goal category
Bialystok	Attractiveness of investments	Support of the investors and the network of investment areas	Attractiveness for investments
Bydgoszcz–Toruń	Building the image of the region for various relations	Support for the process of internationalisation of enterprises	- Image/brand, - Relations, - Support for entrepreneurship
Gdańsk–Gdynia–Sopot	Implementation of integrated projects responding to the needs and problems of the FUA	- Promoting the region as ecological, - Support for entrepreneurship, - Supporting cultural events	- Image/brand, - Integration, - Attractiveness for tourists, - Attractiveness for residents, - Support for entrepreneurship
Gorzów Wielkopolski	- Creation of a positive image, - Development of economic relations	- Intensified economic promotion, - Greater involvement of external communes	- Image/brand, - Relations
Katowice	Promotion of the FUA as an important metropolitan area	- Promoting the region as pro-ecological, - Promoting entrepreneurship, - Equal opportunities	- Strengthening the metropolitan area function, - Support for entrepreneurship, - Image/brand, - Attractiveness for residents
Kielce	- Development of territorial marketing instruments, - Shaping the Voivodship brand	- Promoting as an ecological region, - Spatial integration and polycentric structure, - Openness to modern solutions, - Protecting natural and cultural heritage	- Image/brand, - Attractiveness for investments, - Attractiveness for tourists
Kraków	- Improvement of the quality of life, - Creation of the ecological image	Reinforcement of science, culture and sport, participation in metropolitan networking	- Attractiveness for residents, - Image/brand
Lublin	- Improvement of the external contacts, - Creating new opportunities for development	- Development of external relations and metropolitan links, - Strengthening cultural openness, - Improving a bad image	- Relations, - Image/brand, - Strengthening the metropolitan area function
Łódź	- Integrated revitalisation measures in various dimensions	- Increase in economic attractiveness and competitiveness	- Attractiveness for investments, - Integration
Olsztyn	- Promoting the FUA outside its area	- The image of the FUA as pro-ecological, - Promoting social inclusion	- Image/brand, - Attractiveness for residents
Opole	- Building a trans-regional cultural brand	- Sustainable use of existing resources, - Infrastructure preparation of investment areas, - Supporting cultural events	- Image/brand, - Attractiveness for investments
Poznań	- Development of an innovative economy, - Improving the attractiveness of the city's space, - Promoting the FUA as highly-developed, - Improving the quality of life	- Creation of a recognisable "Poznań Metropolis" brand, - Creation of an offer for tourists, - Joint economic promotion, - Creating the image as pro low carbon	- Image/brand, - Attractiveness for investments, - Attractiveness for tourists, - Strengthening the metropolitan area function
Rzeszów	The development of the FUA's partnership in various spheres of activity	- A culture-oriented image. Promoting low-carbon image, - Good working and living conditions, - Protecting heritage, - Promoting entrepreneurship	- Image/brand, - Integration, - Attractiveness for residents, - Attractiveness for tourists, - Support for entrepreneurship
Szczecin	- Spatial and functional integration, dynamic development, - Raising the standards of living	- Implementation of the "Floating Garden" brand, - Marketing of water tourism, - Promotion of entrepreneurship and ecology, - Protection of heritage, - The partnership model of cooperation	- Image/brand, - Integration, - Attractiveness for residents, - Attractiveness for tourists, - Support for entrepreneurship

FUA	Strategic marketing goal(s)	Operational marketing goal(s)	Goal category
Szczecin	- Spatial and functional integration, dynamic development, - Raising the standards of living	- Implementation of the "Floating Garden" brand, - Marketing of water tourism, - Promotion of entrepreneurship and ecology, - Protection of heritage, - The partnership model of cooperation	- Image/brand, - Integration, - Attractiveness for residents, - Attractiveness for tourists, - Support for entrepreneurship
Warszawa	- Promotion of functional integration and development factors, - Exploiting the potential of all territories	- Promoting entrepreneurship, - Support for the cultural area	- Relations, - Support for entrepreneurship, - Integration
Wrocław	- Development based on the improvement of innovation, competitiveness and image of the FUA	- Promotion of local entrepreneurs, - Improvement of communication	- Attractiveness for investments, - Image/brand, - Support for entrepreneurship
Zielona Góra	- Creating the brand and making it more attractive to visitors	- Promotion of companies' investments in R&D	- Image/brand, - Attractiveness for tourists, - Support for entrepreneurship

Tab. 4. Summary of the frequency of appearance of different goal categories

Goal category	Frequency of appearance	FUAs
Image/brand	14	Bydgoszcz-Toruń, Gdańsk-Gdynia-Sopot, Gorzów Wielkopolski, Katowice, Kielce, Kraków, Lublin, Olsztyn, Opole, Poznań, Rzeszów, Szczecin, Wrocław, Zielona Góra
Support for entrepreneurship	8	Bydgoszcz-Toruń, Gdańsk-Gdynia-Sopot, Katowice, Rzeszów, Szczecin, Warszawa, Wrocław, Zielona Góra
Attractiveness for investments	6	Białystok, Kielce, Łódź, Opole, Poznań, Wrocław
Attractiveness for residents	6	Gdańsk-Gdynia-Sopot, Katowice, Kraków, Olsztyn, Rzeszów, Szczecin
Attractiveness for tourists	6	Gdańsk-Gdynia-Sopot, Kielce, Poznań, Rzeszów, Szczecin, Zielona Góra
Integration	5	Gdańsk-Gdynia-Sopot, Łódź, Rzeszów, Szczecin, Warszawa
Relations	4	Bydgoszcz-Toruń, Gorzów Wielkopolski, Lublin, Warszawa
Strengthening the metropolitan area function	3	Katowice, Lublin, Poznań

4. Discussion of the results

Based on the analysis of Strategies for Integrated Territorial Investments developed by 17 Polish functional urban areas that contain voivodship capitals, all of the urban areas emphasised issues related to marketing and territorial branding. This conclusion is consistent with the results of the study conducted by Raganowicz (2018). Based on the content analyses of voivodship city development strategies, Raganowicz stated that all of them considered the city brand to be an important development factor. Also, they prioritised efforts to build brand awareness and marketing activities. It should be stressed, however, that this research concerned only the activities undertaken by local governments of voivodship cities rather than entities coordinating functional urban areas.

The content analysis of provisions related to the strategic and operational objectives aimed at FUA development in terms of branding resulted in eight categories of goals. The categories define the main areas (directions) of activity undertaken by individual cities in collaboration with their functional areas. These eight categories can be divided into two types: 1) a general objective, which functions as an umbrella to all marketing/branding activities, named "image/branding" by the authors, and 2) objectives related to marketing and branding activities of FUAs and targeted at particular groups (investors, tourists, residents, local entrepreneurs). The authors named the latter "attractiveness for investors", "attractiveness for tourists", "attractiveness for residents", and "support for entrepreneurship" support'. Also, some goals can be considered horizontal as they concern the focus points of FUA marketing activities and include such

issues as integration, relations and the strengthening the metropolitan area function (Fig. 2). It should be stressed that these separate types of categories not only differ from each other by the degree of generality but also are connected (overlapping). However, this is a deliberate effect, which results from the theory of place branding and the observation of the branding practice applied by cities.

The distinction of the "image/brand" category of objectives is consistent with the place branding theory, which emphasises that branding is an umbrella for all marketing processes rather than an ancillary tool, used mainly for the promotion of the city (Vermeulen, 2002). The idea of an umbrella brand, which is usually used in corporate branding, is applied in city branding as well (Kavaratzis & Ashworth, 2006; Daszkiewicz & Wołosecka, 2019). In the latter case, it concerns assigning different categories of products (such as tourism, investments, housing, etc.) to one brand to create a common set of associations (Florek, 2014).

According to Florek and Janiszewska (2011), a territorial brand, which functions as an umbrella brand, targets many diverse segments of audiences, including current and potential residents, tourists, investors, and customers. The second group of branding objectives of FUAs refers to the previous statement and includes all activities aimed at improving the attractiveness of these areas for residents, tourists and investors.

The third group of objectives was distinguished due to a broader recognition of benefits that cities can derive from having a strong brand. According to Middleton (2011, p. 16), a strong brand not only improves the city's attractiveness for investments, tourists or residents but also facilitates the creation of better and more effective partnerships with other cities, institutions, public and private organisations. Besides, it may increase the political influence of the city. Based on this approach, categories of horizontal objectives were identified as "relations", "integration" and "strengthening the metropolitan area function".

The analysis of FUA strategies also helped to distinguish specific categories of branding objectives, which seemed typical of such territorial units. These were 'integration' and 'strengthening the metropolitan area function". "Integration" refers to the opinion by Ashworth et al. (2015, p. 4) that a strong brand not only provides strategic guidelines for the development of territorial units but is also an instrument for creating an aspirational vision of the city's future; it is a platform for cooperation between stakeholders. The category "strengthening the metropolitan area function" is important from the point of view of the necessity to overcome social barriers related to thinking and acting beyond administrative divisions. Despite the declared willingness to cooperate, the units/communities comprising the functional area may present competitive attitudes and put particular objectives above the strategic ones that may have resulted from

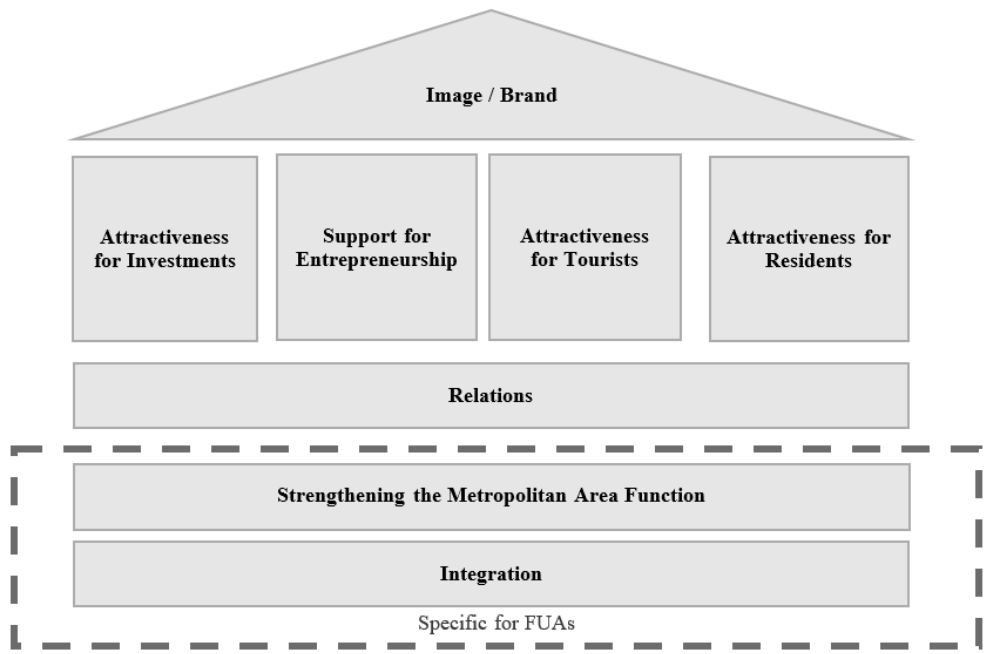

Fig. 2. Categories of FUA development goals related to marketing and city branding — universal and FUA-specific

the cooperation. Functional Urban Areas are often treated as "artificial constructs" resulting from imposed requirements related to the EU funding (Glińska et al., 2016). The distinction of those two categories as specific to the FUA brand is consistent with the opinion by Pasquinelli (2013) regarding the process of inter-territorial branding, which should cross administrative borders and consider inter-territorial collaboration. The pooling of resources and cooperation may result in a positive-sum game serving the brand of the region as well as individual place brands (Pasquinelli, 2013; Maráková & Kvasnová, 2016).

The three categories of FUA branding objectives that were selected in this publication also have a hierarchical relationship. The categories of goals related to particular target groups are included in a more detailed "image/brand" goal. Due to the horizontal nature, the remaining ones permeate marketing activities undertaken by FUAs to target specific groups and build awareness of the umbrella brand.

Conclusions

Modern cities are much more than just residential spaces. Since different groups of stakeholders with a variety of interests operate in the same territory, the structure of cities is becoming more sophisticated. Consequently, local governments must strive to satisfy the demands of all stakeholders groups. Due to various socio-economic reasons, cities grow and go beyond their formal borders, constructing new territorial units such as FUAs. Strategies for Integrated Territorial Investments are among key documents predetermining the directions of FUA development in Poland. They cover the most important aspects, including marketing and branding.

Topics related to FUA marketing are of great concern as the modern world places cities at the centre of power rather than states, providing the basis on which the future world order will be constructed (Khanna, 2011).

The selected content analysis as a research method allowed achieving the aim of the paper and identifying groups of goals for FUAs. In the field of marketing and branding, three groups of main goals were detected: 1) a general objective functioning as an umbrella and relating to all marketing/branding activities; 2) objectives relating to FUA marketing and branding activities targeted at specific groups, namely, investors, tourists, residents, and local entrepreneurs; and 3) goals that can be considered horizontal because they concern the focus points of FUA marketing activity and include such issues as "integration", "relations" and "strengthening the metropolitan area function". Most of these objectives overlap with those identified as characteristic of city marketing and branding. However, the two categories of objectives — "integration" and "strengthening the metropolitan area function" — that emerged as a result of content analysis, proved to be specific to this type of territorial units.

The conducted research is based on qualitative studies and provides a ground for the proposal of a research hypothesis, the verification of which is planned in the subsequent stages of the research.

The adaptation of the concept of city marketing and branding to the management of FUAs requires its expansion to include new aspects related to the integration of the interests of individual territorial units within FUAs and the strengthening of FUA metropolitan functions.

The significance of the study is multifaceted. The first implication comes from the fact that city branding is becoming an increasingly popular governance practice. Hence, the literature on the subject suggests an appeal that city branding can be used to stimulate urban development and growth, manage perceptions about places and formulate city identities (Ye & Björner, 2018; Eshuis & Edwards, 2012). This study and its results address this particular appeal. The results of the presented research may be useful for municipalities to estimate what aspects of marketing and branding activities are explicit enough and which of them should be elaborated further. From the perspective of academic literature on the topic, the current paper contributes to marketing and branding activities of FUAs. The second implication emerges from the gap in the literature concerning the theory of branding FUAs. Efforts to address this topic are essential for the functioning of modern cities and its derivatives which cannot be confined within their borders as an individual place may need to belong to a "larger location" for place branding purposes (Moilanen & Rainisto, 2009). The findings of the presented research contribute to the investigated field. The results may be useful for making associations of units managing FUAs within the largest cities in Poland.

The key limitation of the paper is its focus on one type of documents, namely, Strategies for Integrated Territorial Investments of Polish FUAs. The decision can be explained by the uniqueness of such bodies. In the opinion of the authors, the results of the research

presented in this paper present further research opportunities. The content analysis resulted in better knowledge about specific characteristics of marketing and branding activities of FUAs. This information will help to prepare a better script for in-depth interviews with representatives of FUA managers. Another limitation is related to the specificity of the method, which is the analysis of document contents. One should remember that documents are developed for a purpose other than the research goal; they are created independently of a research agenda (Bowen, 2009). The last limitation of this study is associated with a subjective evaluation of the text by the coder. The authors attempted to minimize this impact with the help of certain, earlier accepted coding procedures. However, these are rather potential flaws than major disadvantages. Given its efficiency and cost-effectiveness, the document analysis offers advantages that clearly outweigh its limitations (Bowen, 2009).

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Performance and causes of development problems among Latvian grain cooperatives

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ABSTRACT
The research aimed to examine Latvian grain cooperatives in terms of their performance and causes of development problems. The research employed several approaches, including a monographic method, induction and deduction, comparison, graphical method, statistical analysis, cause and consequence analysis and a sociological research method in the form of structured expert survey and interviews. The research examined the theory on cooperative development in Latvia and the world, analysed the Latvian grain production industry and made a statistical analysis of the performance of grain cooperatives. The total output of cereals was affected by the total area cropped with cereals, which was proved by the correlation coefficient r = 0.90. An increase in the area used for cereals leads to an increase in the total cereal output. The correlation coefficient showed a strong relationship between independent and dependent variables. Structured interviews with experts allowed the authors to identify the factors that hinder the development of grain cooperatives in Latvia. The industry experts identified the technological factor, i.e., poorly developed agricultural processing. As possible causes of the previously identified problem, experts identified a lack of financial resources, the unclear market situation, workforce problems, additional costs, and a lack of initiative in identifying new opportunities. The expert method helped to identify the most significant problem for the development of Latvian grain cooperatives and the underlying causes. The research allows drawing the attention of policymakers to the main problem regarding the development of grain cooperatives, namely, the technological factor of underdeveloped grain processing. The cooperatives did not own processing enterprises, which was mainly due to an unclear situation in the sales market.

KEY WORDS
cooperation, grain production, cooperatives

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Introduction

Economic globalisation makes it increasingly more important for companies to cooperate with the aim to contribute to the competitiveness of their products or services in the worldwide market. The cooperation should be developed considering relatively limited resources of Latvia, which is a small country. One of the potential forms of cooperation is the establishment of cooperatives and the expansion of their activities. The Sustainable Development

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Strategy of Latvia until 2030 emphasises cooperation as one of the strategic principles to promote and ensure the sustainable development of Latvia (Sustainable..., 2010).

The research topic is relevant and important, as cooperation promotes the development of domestic agriculture, which is affected by various factors.

Based on the National Development Plan of Latvia 2014–2020, the promotion of cooperation in agriculture is one of the national priorities, which means that domestic agricultural policies focus on the development of cooperation (National..., 2012).

A conference organised by the European Research Institute for Cooperatives and Social Enterprises and the International Alliance for Cooperatives noted a vital role of cooperatives in the socio-economic development of society. Cooperatives contribute to employment, introduction and spillover of innovations as well as rural development. Cooperatives operating in the agricultural industry encourage crop insurance and the increased availability of cheap loans among the farmers, which would be rather unlikely otherwise. Cooperatives are believed to be more successful than classical businesses in overcoming periods of crisis and post-crisis (Borzaga & Galera, 2012; Development..., 2015).

Italian professor Giovannini pointed out that cooperatives could play a key role in raising public awareness of a sustainable and viable future (World..., 2018).

Cooperation allows establishing prerequisites for a successful business, which is difficult for a single individual to achieve.

This research aimed to examine the performance and causes of development problems among Latvian grain cooperatives.

Specific research tasks were set to achieve the aim:

- to examine the theoretical aspects related to the performance of cooperatives;
- to analyse the grain production industry in Latvia, performing statistical analysis of the performance of grain cooperatives; and
- to identify the most significant problem for grain cooperatives and the causes that hinder their development.

The research used scientific research papers from various databases, reports on agriculture, statistical databases, European Union and national policy documents, as well as the results obtained from expert questionnaires, and other public information available at a library and Internet resources.

1. Theoretical aspects related to the performance of cooperatives

The term "cooperation" comes from Latin "cooperationem", which means "working together", participation or collaboration (Vedļa, 2000). The concept of cooperation has been widely researched, and various explanations for it could be found (Kundríková & Holubčík, 2016; Domańska, 2018; Soviar et al., 2016; Bednarz & Markiewicz, 2015; Havierniková et al., 2016). Kučinskis (2004) compiled definitions of the concept given by authors from various European countries. All the definitions emphasise the idea of mutual benefit for the members, the adherence to the principles of volunteering and the aim to increase the level of material wellbeing (Kučinskis, 2004). In their research paper Development of Agricultural Cooperation in Zemgale Region, Buģina and Pabērza (2007) pointed out that Miglavs gave a comprehensive and complete explanation of the term. Miglavs stressed that cooperation is an activity where several persons with common interests come together to achieve a common goal (Buģina & Pabērza, 2007, pp. 115-123; Lismanis et al., 1999).

Gyulgyulyan and Bobojonov (2019) examined the definitions of the concept "cooperation" given by several international organisations. According to a definition by the International Cooperative Alliance, an agricultural cooperative is an autonomous association of persons who voluntarily unite to meet their common economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise. The authors emphasised that many international organisations indicated similar basic principles of cooperation (Gyulgyulyan & Bobojonov, 2019, pp. 121-134).

One of the founders of the theory on cooperation, Chayanov, believed that cooperation was the most appropriate way and practically the only way for agricultural development (Čajonovs et al., 2001).

In his research, Kaupušs emphasised that cooperation played an important role in the existence and development of small and medium farms that performed two functions:

- social — to ensure the protection of farmers and small producers from large companies, lenders and monopolies and provide social support and assistance; and
- economic — to provide the support that is not available to any small farm in the fields of pro-

duction, supply, transport, storage, processing and produce sales (Kaupušs, 2001, pp. 24-25).

Vedļa (2000) defined the following objectives of cooperation:

- joint sales of products. Cooperation helps to sell more products, thereby creating competition among intermediaries and receiving the maximum price for the products;
- maximum use of machinery, equipment, processing lines and buildings, which could be achieved by investing in shared rather than individual units;
- joint use of qualified agricultural specialists, i.e. agronomists, veterinarians, accountants and consultants, to make the most of their services;
- the availability of cheap and easily accessible loans to members;
- the representation of common interests at the national level through achieved favourable amendments to relevant legislation; and
- the creation of a favourable living environment in the areas of business activity, as well as the promotion of the idea of cooperation and education of members.

The ideas of cooperation are implemented in practice through cooperative societies (CS), which help to achieve the goals set by their members.

According to the definition given by the political organisation Cooperatives Europe, a cooperative is a company owned by its members who have equal opportunities to express their opinions on the management and who share the profits earned. Cooperatives are considered to be key partners in achieving sustainable development goals. A cooperative is a company that is owned and controlled by the people who use its services and receive the revenues earned distributed according to their investments (Dunn et al., 2002).

Vedļa (2002) defined cooperatives as voluntary associations whose members work to pursue common economic interests, which they would not be able or would have difficulty to implement individually. Cooperation allows members to achieve their common goals without losing the economic and legal independence of individual enterprises.

A cooperative is an autonomous association of persons voluntarily grouped together to meet their common economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise (The Role..., 2001).

According to the Cooperative Societies Law, a cooperative society is a voluntary association of persons, the purpose of which is to contribute to the effective implementation of the common economic interests of the members (Cooperative, 2019). The term "cooperative" is widely used in daily language.

Cooperatives are organisations that set certain economic goals for themselves or represent joint economic activities (Balodis, 1934). This statement is in line with the opinion of authors underlining that cooperatives are made of population groups working in one field of economy. In essence, a cooperative helps all members regardless of their size, to gain advantages that are normally only available to very large companies.

A cooperative is an economic organisation characterised by a business relationship (benefit), a decision-making relationship (control) and a financial relationship (ownership) (Dunn et al., 2002).

Kučinskis (2004) pointed out that the purpose of a cooperative was not to make a profit or to pay the highest possible dividends but to provide members with the means of production at reasonable market prices. To ensure solidarity, each member of the cooperative has only one vote for decision-making. Cooperatives are non-profit voluntary organisations that cannot have a limit on the number of their members.

The goal of a cooperative is to gain market power by reducing costs owing to integration (Čajonovs et al., 2001).

The operation of a cooperative is based on the principles of economic democracy, transparency and solidarity, which strengthen the stability of the cooperative and promote its long-term growth (Development..., 2015).

According to Kučinskis (2004), cooperatives exist in almost every area of life in Europe. The main types of cooperatives are credit, consumer, agricultural, fishermen, dairy, apartment, production cooperatives etc.

The cooperation movement and cooperatives also undergo continuous restructuring in the context of market globalisation. Many countries question the traditional pattern of operation of cooperatives, and the restructuring efforts are linked to the aim to strengthen the competitiveness of agricultural cooperatives in the international market (Nilsson, 1998, pp. 39-48).

Nilsson (2001) compiled a meta-research on the opportunities and risks of cooperation. Contrary to the opinion about the limited influence of cooperative members on the decision-making and the low efficiency of cooperatives, researchers emphasised

the positive benefits related to the sale of cooperative products and the reduced impact of purchase prices set by large retail companies (Nilsson, 2001, pp. 329-356).

Researching the role of cooperatives in agriculture, Valentinov (2007) noted that one of the advantages of participation in agricultural cooperatives is the capability to supply large enough quantities of agricultural products, which could not be done by an individual farm. The efficiency of an agricultural organisation is determined by two orthogonal criteria: the efficiency of labour division in agricultural production and the efficiency of monitoring activities. The importance of the second criterion is determined by the organisational characteristics of agricultural production specific to the industry. Farms considered small in terms of area, to which the author refers as family farms, are more effective in controlling the use of resources. However, such farms have a limited output, which is directly affected by the available resources, which are mainly agricultural land. In Western agriculture, family farming is the dominant form of an agricultural business organisation. Due to the specifics of the agricultural industry, farmers are almost always at a disadvantage compared to their trading partners, so they can use cooperatives for counterbalance (Valentinov, 2007, pp. 55-69).

A survey of cooperative members within the thematic assessment into the Development of Cooperation in Agriculture and the Development Strategy for 2013–2020 (2012) revealed that the key benefit of participating in a cooperative was the opportunity to sell agricultural products at equal prices and receive regular payments.

Arnis Vējš, the owner of Uzvara lauks Ltd and a member of the ASCS Latraps, was cautious about cooperation and believed that access to cooperative services was essential. He emphasised the importance of the distance for grain delivery. Grain collection points should be geographically distributed so as not to increase the total length of the route for grain delivery (Large Framer..., 2019).

Summarising the research studies and findings mentioned above, the authors concluded that many problems faced by farmers could be resolved by joining efforts by way of cooperatives. The problems often affect several farmers, which can be close to impossible to overcome for individuals, depending on personal traits. A cooperative usually has a person who stands out from among the members, has leadership skills and is able to take the lead. It is desirable that this person is well known and trusted by all other members. After overcoming the first obstacles and achieving success, all members gain confidence and trust in the movement. However, for a cooperative to continue to be successful in the long term, it has to be able to bring tangible benefits to its members. Besides, cooperatives need professional management, which should be properly motivated. Although a cooperative is not intended to make a profit, it is not different in nature and business philosophy from other forms of business organisations, as it has to bring economic benefits to its members. Besides, the benefits have to outweigh the personal contribution of each member. Each member has to understand that everyone is the owner of the cooperative, and each member has to promote the development of the cooperative through a personal attitude.

Cooperatives could be categorised and systematised according to various distinctive features: legal status, the type of economic activity, territorial distribution, the position in the production process chain and the economic status of the members (Lismanis et al., 1999).

Associations of people united by one common interest could be distinguished according to legal status. This is the simplest legal form of an organisation built upon an agreement among the participants. According to its legal status, a cooperative society is a mutual company for achieving common goals. Cooperative unions are established by several cooperative societies operating in the same field of economic activity and representing associations of various industries, which could cover a certain region, country or continent (Čajonovs et al., 2001).

According to the national legislation, agricultural cooperatives could be subdivided by industry, for example, grain production, dairy farming, vegetable production etc. (Cooperative…, 2019).

Cooperatives operating in the field of forest management, which unite a large number of forest owners, are widespread in the Scandinavian countries. Successful cooperation examples can also be found in other fields, such as electrification, slaughterhouses, sewing, construction etc.

Cooperatives could also be divided according to the territory, in which they undertake economic activities. Some cooperatives may operate within a city only, and others — a county or a country.

Cooperatives could be divided into vertical and horizontal by the position in the production process chain. Horizontal cooperatives unite enterprises or farmers engaged in the same field of economic activity. For example, grain farms join a cooperative to work

together on production and marketing issues. Vertical cooperation is a form of cooperation, which is widespread in the world but not popular in Latvia. Vertical cooperatives include enterprises that fully or partially complete all the stages of the product production process (Buģina & Pabērza, 2007, pp. 115-123). Such cooperatives are most often formed by enterprises with a fully closed production cycle. The chain includes farmers as the producers of agricultural commodities and owners of the cooperative and enterprises engaged in the processing of agricultural commodities, logistics and the production of final products.

By the economic status of cooperative members, cooperatives are divided into employee, producer or consumer cooperatives. Such cooperatives are established to implement the interests of each social group. Employee cooperatives are established to implement interests that are specific to individuals engaged in one industry (Lismanis et al., 1999).

Vedļa (2000) grouped cooperatives according to their common features:

- by the function to be performed (procurement, production, sales, finances etc.);
- by the degree of economic development of the participants (horizontal and vertical cooperation cooperatives); and
- by the intended duration of the cooperative's tasks to be performed (one-off or fixed-term).

The scientific literature also offers other types of cooperatives, such as equity cooperatives, new generation cooperatives, and cooperatives with limited liability.

Equity cooperatives are those that issue bonds. This type of cooperatives developed at the end of the last century to issue bonds in a closed or open offer (Bekkum & Bijman, 2006, pp. 1-15). In such cooperatives, investors often become members who gain more voting rights in decision-making, and the cooperatives are often privatised (Spear, 2010).

New generation cooperatives have high member trust and can supply specific niche products of high value (Fulton, 1999). They still retain several similarities with traditional cooperatives, e.g. only farmers may be the members, a limited amount of dividends can be paid out, one member has one vote in decision-making, and dividends are paid according to the number of shares purchased. Several differences distinguish the new generation cooperatives from traditional ones:

- new generation cooperatives seek to produce products that could be processed and sold at a maximum profit;
- the number of members is limited;
- each member is obligated to supply a certain quantity of products. The member is responsible for the quantity unsupplied;
- each member invests in the cooperative based on the volume of products planned to be processed by means of the cooperative; and
- the capital invested in the cooperative may be sold to another cooperative member at a price agreed by both members and approved by the management of the cooperative.

The new generation cooperatives have several advantages related to member loyalty. Their members are considered very loyal due to significant investments in the cooperative (Dunn et al., 2002).

2. Research methods

The research used monographic and descriptive methods that allowed determining the problem in detail, which was investigated from a theoretical perspective based on an extensive review of relevant scientific literature. The research also used several other approaches, including induction and deduction, comparison, the graphical method, statistical analysis, cause and consequence analysis and a sociological research method in the form of structured expert survey and interviews. A structured expert survey was conducted to identify the most significant problems for grain cooperatives and their causes. The survey involved seven experts who were competent in the grain production industry and were engaged in operating cooperatives. The experts represented the Latvian Agricultural Cooperatives Association, the Agricultural Services Cooperative Society (ASCS) Latraps and the ASCS VAKS. For confidentiality and at the request of experts, their identities were concealed.

3. Research results

3.1. Development of the grain production industry and its cooperative societies in Latvia

According to the Central Statistical Bureau of the Republic of Latvia (CSB), a breakdown of the cropping pattern by main types of cereal crops in Latvia shows that the dominant crop was wheat, followed by barley, oats and other crops. Rye made up a relatively

small percentage in the cereal cropping pattern in 2019, with only 5.9% (Table 1).

In the cropping pattern, the decrease can be observed in the percentages of areas planted with all crops, except for wheat and oats. In 2018 and 2019, compared with 2009, the percentage of the area planted with oats increased by 1.9 and 0.2 percentage points, respectively.

According to the research project Forecasting of Agricultural Development and the Designing of Scenarios for Policies until 2050, the area used for wheat is projected to increase to 733.2 thou. ha until 2050, compared with 448.2 thou. ha in 2015 (+ 64%).

A significant increase in wheat area by 39%, reaching 623.4 thou. ha, is also expected until 2030. According to the research project, the total area cropped with cereals is also projected to increase from 672.3 thou. ha in 2015 to 918.4 thou. ha in 2050 (+ 37%). In 2030, compared with 2015, the total area is projected to increase by 23%, reaching 829.1 thou. ha (Forecasting…, 2018).

In Latvia, the total cereal output and the average yield varied in 2009–2019 (Table 2).

The most significant annual increase in cereal output of 53.8% was reported in 2019. The result was affected by an increase of 51.4 thou. ha in the area used for cereals, which reached 742.3 thou. ha, and an increase of 42.6 quintals/ha or 43% compared with 2018 in the average yield. It should be emphasised that 2019 saw the highest total cereal output, while the average yield of 42.6 quintals/ha was the second-highest in the history of Latvia.

A decrease of 23.6% in the total cereal output in 2018 and a decline of 22.2% in the average yield resulted from unfavourable winter conditions. Some cereals were destroyed by frost, and because of long autumn rains in August and September of 2017, the area cropped with winter cereals was smaller than expected. In the spring of 2018, the availability of good quality seed on the market was problematic, and prices were high. As a result, many farmers did not reseed the frost-damaged cereals (Agriculture…, 2019). In 2017, the output of grain in Latvia accounted for 0.87% of the total EU output of grain. In the EU, the total output of grain decreased by 4.8% in 2018, compared with 2017 (Agriculture, forestry…, 2018). The analysed information on the total output and average yields, as well as the findings of research studies, allow concluding that agro-climatic conditions affect the total output and average yields the most (Sown area..., 2019; Lowest Average..., 2019, Agriculture…, 2019). The total output of cereals was also affected by the total area cropped with cereals, which was proved by the correlation coefficient r = 0.90. An increase in the area used for cereals leads to an increase in the total cereal output. The correlation coefficient showed a strong relationship between independent and dependent variables.

The coefficient of determination R^2 = 0.8184 shows that an increase of 1% in the area cropped with cereals results in an increase of 0.82% in the total output (Fig. 1).

In 2018, 20 316 farms were engaged in cereal production in Latvia. In 2009–2018, the total number of farms was volatile and decreased by 9.48 thou. or 31.8%.

The largest decrease was reported in the category of farms having a cereal area of up to 10 ha. In the opinion of the authors, this trend could be considered positive, as the number of farms increased in other categories of cereal farms. This finding could be explained by the liquidation of small farms, which allows other farms to increase the area used for cereals. In the analysed period, the largest increase was reported in the category of farms with a cereal area of over 300 ha. In this category, the number of farms increased by 139, indicating that large farms expanded faster.

The expansion of large farms could be viewed positively from the perspective of agricultural intensification. The use of land resources in Latvia is inefficient (Lēnerts, 2018). The management of large

Tab. 1. Percentage breakdown of the cropping pattern by the main type of cereals in Latvia in 2009–2019

Crop	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Wheat	52.8	56.8	59.1	61.7	63.7	61.4	66.7	67.4	67.0	60.8	66.8
Barley	19.3	19.7	18.7	15.3	14.6	18.3	14.8	13.4	11.6	17.4	11.8
Rey	10.9	6.4	5.4	6.4	5.0	4.9	5.6	5.1	4.8	3.2	5.9
Oats	11.2	11.7	11.3	10.8	10.7	10.2	9.0	9.0	10.1	13.1	11.4
Other	5.7	5.4	5.5	5.7	6.0	5.1	4.0	5.0	6.5	5.5	4.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: elaborated by the authors based on CSB data, 2020.

areas increases efficiency, thereby enhancing the performance of the farms.

The CSB data allow concluding that cereal yields are higher on farms with larger areas cropped with cereals. In 2009, the category of farms having the cereal area of up to 10 ha had the average yield of 18 quintals/ha, while farms with 300 ha of the serial area had 36.2 quintals/ha or twice as much. In 2019, the figures for respective categories were 27.5 quintals/ha and 49.8 quintals/ha or 1.8 times more. The average yield trend in 2015–2018 clearly showed that technological support was an important prerequisite for cereal production and differed for small and large farms (Forecasting…, 2018). The summarised data showed that in the analysis period, the average cereal yield tended to increase in all categories of farms, which could be viewed positively.

Tab. 2. Changes in the total cereal output and the average yield in Latvia in 2009–2019

Year	Total output, thou.t	Annual change (%)	Average yield, quintals/ha	Annual change (%)
2009	1663.1	-	30.8	-
2010	1435.5	-13.7	26.5	-14.0
2011	1412.0	-1.6	26.8	1.1
2012	2124.5	50.5	37.0	38.1
2013	1948.7	-8.3	33.4	-9.7
2014	2227.2	14.3	34.0	1.8
2015	3021.5	35.7	44.9	32.1
2016	2703.2	-10.5	37.8	-15.8
2017	2692.5	-0.4	38.3	1.3
2018	2057.3	-23.6	29.8	-22.2
2019	3163.2	53.8	42.6	43.0
2009	1663.1	-	30.8	-
2010	1435.5	-13.7	26.5	-14.0
2011	1412.0	-1.6	26.8	1.1
2012	2124.5	50.5	37.0	38.1
2013	1948.7	-8.3	33.4	-9.7
2014	2227.2	14.3	34.0	1.8
2015	3021.5	35.7	44.9	32.1
2016	2703.2	-10.5	37.8	-15.8
2017	2692.5	-0.4	38.3	1.3
2018	2057.3	-23.6	29.8	-22.2

Source: elaborated by the authors based on CSB data, 2020.

In 2014–2018, according to the Latvian Agricultural Cooperatives Association, the number tended to decrease for Latvian grain cooperatives granted the compliance status.

In 2018, compared with 2014, the number of grain cooperatives decreased by four. An annual change rate calculation showed that the number of grain cooperatives mostly decreased in 2016 and 2017, by 10% and 11.1%, respectively. In 2018, compared with the previous year, the number of grain cooperatives decreased by 6.3%; however, this reduction could indicate a positive trend as it contributed to the expansion of cooperatives and an increase in their total membership.

In 2018, the total membership of grain cooperatives was 2 278 or 446 more than in 2014. The largest increase in membership of 12.2% was reported in 2015, and in 2018, it was only 1.2%. The membership increased due to the economic situation in the agricultural industry in 2014 when the development and turnover of the industry were affected by the food embargo imposed by the Russian Federation (Agriculture…, 2016). The increase in the number of grain cooperatives and their membership was facilitated by

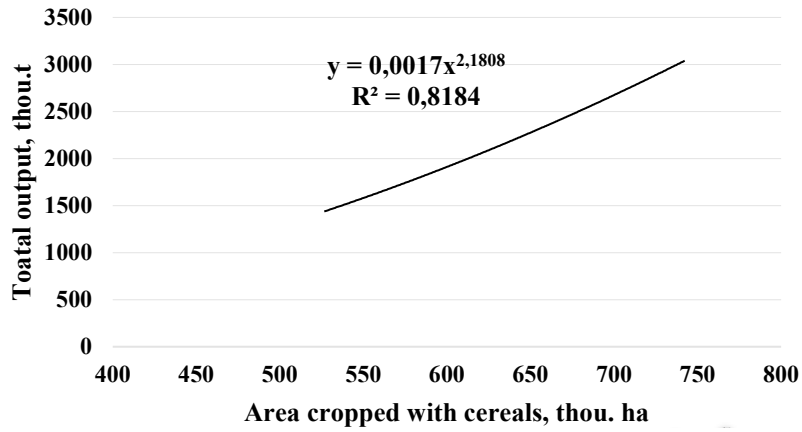

Fig. 1. Correlation between the area cropped with cereals and cereal output in Latvia in 2009–2019
Source: elaborated by the authors based on CSB data, 2020.

opportunities to receive national and EU financial support (Development…, 2012).

The calculated correlation coefficient (r = -1) indicated a strong relationship between the number of cooperatives and their memberships. The coefficient was negative because a decrease in the number of cooperatives resulted in an increase in their memberships.

Based on the analysis of the total number of grain farms in Latvia, 11.2% joined cooperatives in 2018. According to the authors of this article, this rate is considered low; therefore, the Latvian Agricultural Cooperatives Association, in collaboration with cooperatives, should take intensive measures to increase the membership.

In 2015–2019, according to the Latvian Agricultural Cooperatives Association, the proportion of cooperatives engaged in grain production varied. In the same period, most cooperatives that received the compliance status were engaged in milk production. In 2014, their proportion in the total number of agricultural cooperatives was 43.8%, while in 2015, the share decreased by three percentage points. In the following years, the proportion of dairy cooperatives increased and reached 49% in 2019. During the analysed period, the proportion of grain cooperatives in the total number of cooperatives decreased from 39.6% (2015) to 30.6% (2019). Only in 2016, compared with 2014, the proportion increased by 1.2 percentage points and amounted to 40.8%. The total number of cooperatives varied during the analysed period.

Based on analysis into a breakdown of cooperative members by the agricultural industry, in 2014–2018, grain and milk cooperatives had the highest membership proportions.

It should be noted that the membership proportion of cooperatives engaged in grain production has been decreasing since 2017; however, it increased for forest owner cooperatives. The membership proportions of other cooperatives (fruit and vegetable production, technical services, meat production) were small. Consequently, farmers of other agricultural industries should be motivated to join cooperatives.

Based on analysis into a breakdown of memberships of grain cooperatives in 2017 and 2018, the largest number of members was reported by the ASCS Latraps, 915 and 972 members, respectively (Table 3).

ASCS VAKS was the second-largest cooperative in terms of membership with 531 members in 2017 and 538 members in 2018. Based on analysis into a breakdown of memberships of cooperatives, ASCS Latraps and ASCS VAKS comprised more than 64% of the total membership in 2017 and 66% in 2018. In 2018, compared with 2017, the most significant increase in the number of cooperative members was reported by the ASCS Latraps (6.2%). It should be noted that the proportion of membership in small cooperatives tended to decrease. In 2018, compared with 2017, the number of members in small cooperatives decreased by 7.9%, which could indicate a positive outcome as it promoted the development of large cooperatives.

Tab. 3. Changes in memberships of grain cooperatives in Latvia in 2017 and 2018

Cooperative name	2017		2018		Change (%)
	number	(%)	number	(%)	
ASCS Latraps	915	40.6	972	42.7	6.2
ASCS VAKS	531	23.6	538	23.6	1.3
ASCS Durbes grauds	177	7.9	179	7.9	1.1
ASCS Barkavas arodi	113	5.0	114	5.0	0.9
Other	516	22.9	475	20.9	-7.9
Total	2252	100.0	2278	100.0	1.2

Source: elaborated by the authors based on (Kiryluk, 2005, p. 60).

Aiming to identify the activity of members of grain cooperatives and trends in contributing to the performance of cooperatives, it is necessary to analyse the net turnover. In 2014–2018, the net turnover was volatile (Table 4).

In 2014, the total net turnover of grain cooperatives was EUR 246.2 million. The highest annual growth in net turnover (42.9%) was observed in 2015.

Tab. 4. Changes in the net turnover of grain cooperatives in Latvia in 2014–2018

Year	Net turnover, million EUR	Change rate (%)	
		Annual	From base year
2014	246.2	-	-
2015	351.8	42.9	42.9
2016	304.3	-13.5	23.6
2017	341.8	12.3	38.8
2018	310.9	-9.0	26.3

Source: elaborated by the authors based on data of the Latvian Agricultural Cooperatives Association, 2020.

This could be explained by the fact that the year 2015 was the most successful for grain producers, as the total grain output exceeded 3 million tonnes for the first time in the history of Latvia (Agriculture…, 2016).

However, according to analysis into the change rate compared to the base year 2014, the net turnover was higher in all the following years, which indicates the development of cooperatives. Based on a comparison of the total turnover of all types of cooperatives, the turnover of grain cooperatives in the analysed period comprised the largest part of the total turnover (Agriculture…, 2019).

Based on data of the Latvian Agricultural Cooperatives Association, a breakdown of the net turnover of cooperatives that had the compliance status revealed that the industry leaders represented grain production.

In 2014–2018, the turnover of grain cooperatives varied, and the largest turnover of EUR 351.8 million was reported in 2015. In 2015, compared with the previous year, there was also the largest increase in turnover, which amounted to EUR 105.6 million. The turnover of dairy cooperatives was the second largest and varied during the analysed period. The largest turnover was reported in 2018, reaching EUR 87 million. In the analysed period, the net turnover of forest owner cooperatives increased from EUR 0.6 million in 2014 to EUR 8.6 million in 2018. The net turnover of other cooperatives (fruit and vegetable production, technical services, meat production) increased from EUR 1.4 million to EUR 5.8 million in the analysed period.

An analysis of products purchased for sale from cooperative members revealed that in 2014–2018, the number was volatile, which could have been affected by the total output of cereals. The correlation coefficient indicated a moderately strong relationship between the total output of grain and the sales of products purchased from cooperative members ($r = 0.73$). Products purchased from cooperative members indicate their value rather than the quantity. The largest value of products purchased from cooperative members for sale was reported in 2017, amounting to EUR 176.4 million.

The number that represents products sold to cooperative members has been increasing since 2016, which could be viewed as a positive indicator demonstrating the increasing loyalty of the members. In contrast, fewer services were sold to cooperative members in 2018 compared with 2017, i.e. by EUR 6.1 million or 52.1%. Probably, this outcome was the result of hot and dry summer, due to which the average yield and output of cereals decreased as well as the moisture content of the grain; therefore, cooperative members purchased less drying services.

Overall, the activity of grain cooperatives in Latvia slowly expanded, which is suggested by the increased number of cooperative members in 2014–2018. Also, a faster increase was observed in the membership of the largest cooperatives, which also indicated an increase in the importance of cooperation in agriculture.

The Latvian Agricultural Cooperatives Association designed a development strategy for agricultural and forestry service cooperative societies for 2021–2027 and identified the consolidation of cooperatives or the development of second-level cooperation in the agricultural industry as one of the priority areas (LLKA has..., 2019).

3.2. Barriers to the operation of grain cooperative societies in Latvia

Structured interviews with experts allowed the authors to identify factors that hinder the development of grain cooperatives in Latvia. The experts were asked open-ended questions; thus, everyone could express their opinions.

The causes of the most significant problem identified by the experts — poorly developed agricultural processing by cooperatives due to a lack of processing enterprises — were determined with the help of a tree diagram. Based on the tree diagram, the experts provided answers to the question "why?", thereby identifying the possible causes of the problem (Fig. 2):

- lack of financial resources. The experts believed that this economic factor was affected by the reluctance of cooperative members to invest, the inaccessibility of funds from credit institutions, as well as insufficient government support;
- the unclear market situation. According to the experts, there were inadequate resources for market research, insufficient sales guarantees and fluctuating market demand, as well as strong market competitors. One expert emphasised the behaviour of competitors in the event of a new entrant. There were frequent cases of price dumping, as competition intensified in an attempt to drive new entrants out of the market;
- workforce problems. The workforce was affected by demographic processes and emigration, as well as the shortage of skilled and low-skilled workers. The Minister of Agriculture, Gerhards,

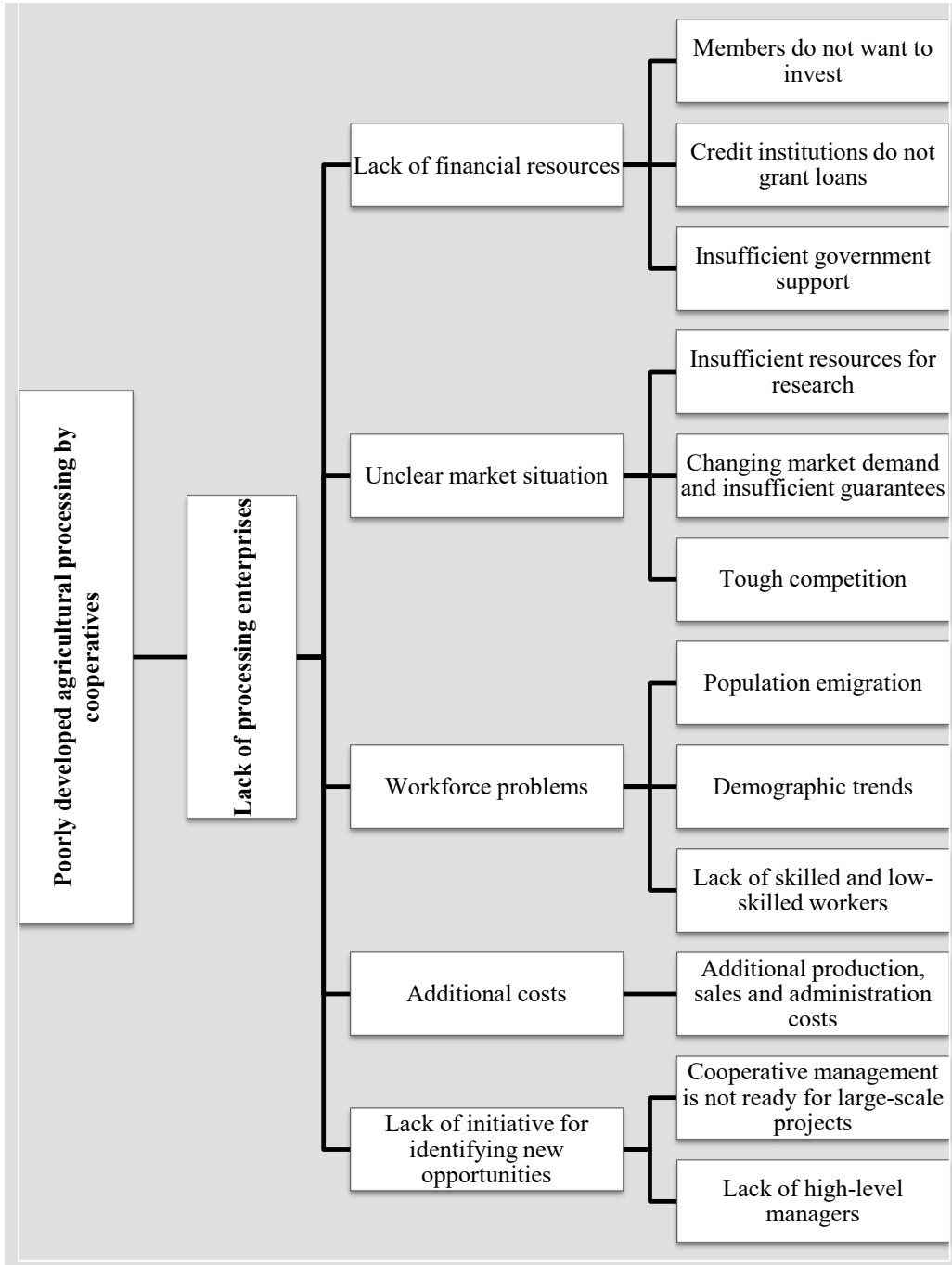

Fig. 2. Tree diagram of the causes for the problem faced by grain cooperatives, i.e. the poorly developed agricultural processing

also noted that one of the most important aspects in the development of the agricultural industry was the quality of the workforce as well as its availability, particularly in the regions. The results of the research showed that approx. 76% of the workforce in the agricultural industry were unpaid employees, including family members, i.e. parents and children. Besides, unemployment in the regions continued to increase despite the rising productivity level (Farmers..., 2019);

- additional costs. The experts pointed out that production, (LLKA has..., 2019) sales and administration costs would increase, which could reduce the income of cooperative members. Labour costs could rise due to the hire of high-level managers;
- lack of initiative for identifying new opportunities. The development of agricultural processing is affected by the readiness of the cooperative management for the implementation of large-

scale projects as well as a lack of high-level managers.

The potential consequences of poorly developed agricultural processing by grain cooperatives include less revenue, a smaller number of customers, decrease in exports, a smaller number of potential cooperative members, an unused opportunity to expand operations and lower profits for cooperative members.

Conclusions

The nature and types of cooperation have been extensively researched in the scientific literature; however, there are relatively few research studies on grain processing by cooperatives.

Multidisciplinary agricultural cooperatives are widespread in the EU, yet in Latvia, they have not been operating for a long time.

During the analysed period, the area cropped with cereals increased by 90%, the amount of exported cereal increased by 126.6%, the number of small farms (up to 20 ha in size) decreased, and the proportion of large farms grew, resulting in an increase in average cereal yields, which is indicative of the development in the Latvian grain production industry.

In 2018, compared with 2015, the membership of grain cooperatives increased by 446 or 24.3%. Large cooperatives had the fastest growth in the membership of grain cooperatives. During the analysed period, the number of grain cooperatives decreased, and the calculated correlation coefficient showed a strong relationship between the number of cooperatives and their memberships, indicating that the cooperatives expanded and developed, gaining more importance in the grain production industry.

The research examined the theory on the development of cooperatives in Latvia and the world as well as the Latvian grain production industry and performed a statistical analysis into the performance of grain cooperatives. The total output of cereals was also affected by the total area cropped with cereals, which was proved by the correlation coefficient r = 0.90. An increase in the area used for cereals leads to an increase in the total cereal output. The correlation coefficient showed a strong relationship between independent and dependent variables.

Structured interviews with experts allowed the authors to identify factors that hinder the development of grain cooperatives in Latvia. The industry experts identified the technological factor of poorly developed agricultural processing. The experts identified the possible causes of the problem, i.e. lack of financial resources, the unclear market situation, workforce problems, additional costs, a lack of initiative for identifying new opportunities.

Using the internal and attracting external financing, the managements of grain cooperatives should establish processing enterprises to increase the revenue of the cooperatives and expand the sales market.

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Moderating role of corporate reputation in the influence of external support on organisational resilience and performance

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ABSTRACT

The article analyses the influence made by corporate reputation on the mediation model for the impact of external support on organisational performance through resilience. The article aims to clarify the mechanism behind the moderating role of corporate reputation played in the influence of external support on organisational performance and considering the mediating role of organisational resilience. The empirical research was made to verify the existence of the relationship and to reach the aim of the paper. The set of hypotheses was built based on the theoretical research and then verified on the sample of 268 organisations operating in Poland. Dependences among the data selected from the theoretical research were analysed using statistical methods, including the correlation with the moderator and the mediated regression analysis. The obtained results clearly showed that corporate reputation was a moderator of the discussed mediation model for the influence of the external support on organisational performance through resilience. The paper contributes to further development of knowledge in organisational resilience management. It clarifies and stresses the role of two external factors: corporate reputation and external support in shaping the resilience of an organisation and its performance. The obtained results imply specific practical recommendations. Since corporate reputation can be the key to achieving greater organisational resilience and performance, special attention should be given to managing this category in an organisation.

KEY WORDS

management, corporate reputation, organisational resilience, external support, organisational performance

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Introduction

Undesirable, potentially disruptive and crises-causing factors are constantly present in the surroundings of contemporary organisations. All organisations encounter such factors; however, some are able to prosper even despite the catastrophic events that occur, while others go bankrupt. The attribute that distinguishes the first group of organisations is perhaps the most desirable nowadays, i.e., organisational resilience, usually under-

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stood as the ability to withstand shocks ("to adapt to, resist and recover from external shocks" (Pirotti & Venzin, 2017, p. 1)). There is still a long way to build a complete, fully accepted concept of organisational resilience. The literature derives and discusses different drivers of organisational resilience, which vary widely across studies. However, most researchers agree that the most important drivers include situation awareness, preparedness, responsiveness, resourcefulness, redundancy, robustness, rapidity, adaptability, agility, integrity, learning processes or organisational culture (Norris et al., 2008; Scholl & Patin, 2012; Bruneau et al., 2003; Wicker et al., 2013; Kantur & Iseri-Say, 2015; Koronis & Ponis, 2018). The observation by Seville that an "organisation can become more resilient if it wants to" (Seville, 2017, p. 2), draws the attention to the meaning of internal factors and the causative role of management and managers in the process of shaping the organisational resilience. The literature mainly focuses on the discussion of these issues. However, external factors — such as external support — also have the potential to shape organisational resilience. This factor is rather rarely discussed and definitely does not belong to the mainstream of research concerning organisational resilience. However, it can be a source of interesting findings for organisational resilience management.

Organisations can seek external support in various situations: for the development of new products or innovation potential, for creating alliances necessary to achieve mutual benefits or under the pressure of circumstances, e.g., during a crisis, when the existence of the organisation is at stake. It is always a possibility and not an obligation; nevertheless, it involves the fulfilment of certain obligations, formal or moral. External support may be institutional (usually, governmental or, e.g., provided by the EU) or come from non-governmental and non-institutional stakeholder groups (suppliers, stockholders, customers, etc.). In the first case, organisations have to meet certain conditions (imposed by the supporting institution). In the second case, however, an organisation deals with stakeholder perceptions of its reputation, which is a kind of patchwork of previous stakeholder experiences gained dealing with the organisation, as well as of possible future benefits gained due to the ability of the organisation "to satisfy their interests" (Pérez-Cornejo et al., 2019). These perceptions become an important factor that determines the scope of external support. This reality has been clearly confirmed during the COVID-19 pandemic in many countries of the world and especially for SMEs. In an attempt to avoid losing thousands of well-functioning businesses permanently, governments of many countries proposed institutional support instruments (i.e., deferring or extending payment deadlines, looking for alternative ways of distributing goods, providing non-returnable subsidies, taking over debts and liabilities of companies, or proposing credit programmes to ensure the liquidity of companies). Different measures were more or less accessible to entrepreneurs depending on the country. However, the second important source of support was offered by non-governmental and non-institutional stakeholder groups. Based on the perceived reputation of organisations, stakeholders took a risk and agreed to pay in advance for the products and services to be received in an unknown future or to change contractual and service delivery terms. However, this support is far from selfless help as stakeholders always weigh the costs of lost benefits, i.e., broken supply chains, the lack of available services, the lack of favourite products or outlets. The support arose from links between organisations and imposed a moral obligation to fulfil promises in the future.

Hence, we have at least two important variables (external support and corporate reputation, both resulting from relationships with stakeholders) that can influence organisational resilience. Their interaction is not entirely clear. On the one hand, superior corporate reputation can attract some groups of stakeholders, e.g., customers and some form of support. On the other hand, perceptions of some stakeholder (i.e., the government) regarding good corporate reputation can lead to the conclusion that no such support is needed.

Hence, it seems to be a valid research gap. In this context, the article aims to clarify the mechanism behind the moderating role of corporate reputation in the influence made by external support on organisational performance, considering the mediating role of organisational resilience. To achieve this goal, first, a set of hypotheses were established; then, the needed variables (organisational resilience, external support, organisational performance and corporate reputation) were built. As a next step, relationships between all variables were examined, and then, a mediation model was built. Lastly, moderation analysis was performed in the context of the constructed mediation model.

1. Literature overview and the development of hypotheses

1.1. Organisational resilience and its influence on organisational performance

In the organisational context, resilience is a multidimensional and sociotechnical phenomenon that addresses how organisations manage uncertainty (Lee et al., 2013). A widely accepted definition of organisational resilience has not yet emerged. It can be understood as a capacity, property, or an outcome, process or a state of an organisation (Hamel & Välikangas, 2002; Kantur & Iseri-Say, 2015; Vogus & Sutcliffe, 2007), referring to the ability to survive and function successfully despite unfavourable conditions. It can also be understood as "maintenance of positive adjustment under challenging circumstances such that the organisation emerges from those conditions strengthened and more resourceful" (Vogus & Sutcliffe, 2007, p. 3418), able to recognise and adapt to unexpected changes (Sutcliffe & Vogus, 2003; Manyena, 2006; Lengnick-Hall et al., 2011; Lee et al., 2013; Linnenluecke, 2017; Koronis & Ponis, 2018). According to McCann et al. (2009, p. 47), "an organisation also demonstrates resiliency be experiencing a severe, life-threatening setback, but then reinventing itself around its core values". Thus, not only the ability to adapt but also to reinvent is sometimes understood as organisational resilience. Various definitions give rise to various resilience drivers, which mainly refer to social and cultural factors, such as sensitivity to changes and situation awareness, preparedness and the keystone vulnerability management or adaptive capacity (Norris et al., 2008; Scholl & Patin, 2012; Bruneau et al., 2003; Wicker et al., 2013; Kantur & Iseri-Say, 2015; Koronis & Ponis, 2018; Szydło & Grześ-Bukłaho, 2020). They often serve as a basis for building tools for the assessment of organisational resilience. However, no single consistent scale has been created for measuring organisational resilience.

According to Lee et al. (2013), organisational resilience is a target, which is desirable although continuously moving. This is important not only in a crisis but also in the daily life of an organisation, as it contributes to performance during business as usual. Being resilient can provide organisations with competitive advantages, as there are similarities and links between organisational resilience and competitive excellence (Vargo & Seville, 2010). Besides, the drivers of organisational resilience are, in many cases, the same as those that are needed to gain a competitive advantage (Mitroff et al., 1989; Mitroff, 2005). Some authors suggest possible links between organisational resilience and profitability (Sundström & Hollnagel, 2006). According to them, "to be resilient, an organisation must be able to deal with unexpected and disruptive events as well as to understand the longer-term impact of such events. (…) this translates into the ability to identify and successfully manage risk at all levels in the organisation while sustaining a profitable business" (Sundström & Hollnagel, 2006; p. 1). It is often underlined that resilience is the capacity to rebound from adversity strengthened and more resourceful (Sutcliffe & Vogus, 2003). Therefore, to be resilient means to emerge stronger and to achieve positive potential outcomes (such as increased competitiveness or innovativeness, more adjusted internal processes or higher profitability). Carden et al. (2018) proved the existence of the relationship between organisational resilience and organisational performance from the financial aspect. The observation also seems to be valid in relation to other categories considered when measuring organisational performance. Concerning the above, the following hypothesis was formulated:

H1a. A relationship exists between organisational resilience and organisational performance.

1.2. Influence of external support on organisational resilience and performance

Undoubtedly, modern organisations are unable to operate effectively without interacting with other market players. Bird (1988) emphasised that social, political, and economic variables, beside individual features of an organisation, created the context for conducting business activities. Hence, the ability to build a lasting relationship with the environment seems to be important, as it allows for "the acquisition of desired behaviour from the environment" (Sznajder, 2003, pp. 194-195), which may be crucial not only to survive but also to win a competitive fight. According to Gnyawali and Fogel (1994), the presence of local, financial and social encouragements significantly changed the entrepreneurial process. This means that external support influences the activities of an organisation as a whole.

External support should be generally understood as tangible and intangible resources provided by external bodies (various groups of stakeholders) to

assist an organisation. According to Cheah et al. (2019), external support may be differentiated by the type of support (direct and indirect) and the type of a stakeholders (e.g., government, private or non-profit). Direct support is typically financial (i.e., in the form of donations, grants, subsidies or earnings from any fundraising activities (Cheah et al., 2019)). Indirect support can be provided in all non-financial forms, e.g., various external sources of knowledge, information and expertise (Bala Subrahmanya, 2013). Organisations seek external support once they perceive a gap between the existing internal resources and the resources required to achieve business objectives (Carey, 2015). Thus, the use of external resources focuses on increasing competitiveness and development and, thus, on striving to achieve better results. However, Mambula (2004) emphasised that although the impact of external support on organisational performance has been studied many times (Cook, 2001; Warren & Hutchinson, 2000), the reports are not explicit in this regard.

On the one hand, research results by Cook (2001) on small and medium-sized enterprises indicate a different level of organisational performance despite the same financial form. On the other hand, Carey (2015) proved that in the case of small and medium enterprises with indirect external support in the form of buying business advice, they achieved superior performance. This finding is consistent with research results by Mambula (2004), who believed that even in the case of exceptional internal resources, the lack of external support would result in insufficient performance. In addition, in studies on social organisations, Cheah et al. (2019) proved that both direct (financial) and indirect (training) support had a positive impact on organisational performance (both financial and social) through business planning. And finally, MacMahon (2001) showed that external funding dependence and financial advice were associated with better performance. Thus, considering the above, the following hypothesis can be assumed:

H1b. A relationship exists between external support and organisational performance.

By definition, each enterprise is a self-governing, independent and self-financing organisation, operating at its own risk and will. However, this independence of action means decision-making independence rather than a lack of business connections, as nowadays, it would be difficult to find an organisation that does not exert influence on other organisations or is not influenced by them. Organisations, as open systems constantly exchange resources with the environment. It is often stressed that ensuring survival and providing the organisation with development opportunities under contemporary, increasingly turbulent environmental conditions, requires mastery in management. Furthermore, it is not just about the mastery in managing internal resources, but also, and perhaps above all, about the mastery in creating and managing relationships with the stakeholders and acquiring external resources.

Externally obtained resources can be crucial for the organisation's survival. According to McCann et al. (2009), having well-established external networks of relationships for accessing financial, human or other resources become essential in a crisis. Also, Tengblad and Oudhuis (2018) stated that to be resilient, organisations had to develop mutually trusting relationships with various groups of stakeholders (committed co-workers, loyal customers, reliable suppliers/partners, supportive owners, media, government, etc.). Such relationships can be treated as a kind of investment or insurance policy for poor times. They can also stimulate the customer citizenship behaviour perceived as non-obligatory consumer actions that create value for the company (Dewalska-Opitek & Mitręga, 2019), which can be especially important in a crisis. And "although establishing strong stakeholder relationships will not likely help an organisation avert every crisis, it can play an important role in how the organisation resolves a crisis it cannot avoid" (Ulmer, 2001, p. 593). First, it can decide whether the organisation receives any external help.

According to Ulmer (2001, p. 594), "if stakeholder relations are not strong, these groups may withdraw their support during a crisis, prolong the effects of a crisis, or intensify the threat associated with the event" and, thus, negatively affect the organisation's resilience. Second, it can determine the scope of external support that can be given to the organisation (from political support, purchase discounts and reasonable credit terms to sharing the crisis-mitigating resources). Being a part of business interaction networks allows an organisation to gather knowledge and use expertise more quickly and effectively. In turn, such external support allows an organisation to manage unexpected challenges, respond more appropriately to adverse conditions and recover from misfortune, damage or destabilising perturbation in the environment. External support, thus, can have a positive influence on organisational resilience. Therefore, considering the above, the following hypothesis can be assumed:

H1c. A relationship exists between external support and organisational resilience.

Appropriate management of stakeholder relationships can bring measurable benefits to an organisation from minimising the risks associated with, e.g. employee strikes, to ideas for great innovation or higher innovativeness obtained despite the lack of sufficient internal resources. To understand relationships and resources, the organisation might need to access other organisations and institutions during potentially disruptive events, which provide a better chance of gaining access to these resources. It must be underlined that external support is only one possible choice among different resources essential for creating organisational resilience. Besides, received support does not guarantee maintained organisational resilience, although the possibility exists. Moreover, it may not only bring results in the form of strengthened organisational resilience and the short-term growth of organisational performance but also can ensure the sustainability and stability of organisational functioning in the long-term perspective by developing solutions that strengthen the organisation's ability to manage the unexpected. In the context of the relationships described above, a need arises to analyse the impact of external support on organisational performance while analysing the mediating role of organisational resilience. It will allow verifying and more comprehensively explaining the mechanism behind the influence of external support on organisational performance. Therefore, a hypothetical model for the impact of external support on organisational performance was assumed, considering the mediating role of organisational resilience, which is clearly connected to both. Therefore, in light of the above, the main hypothesis maintains that:
H2. External support influences the organisational performance (an indirect effect) through organisational resilience (an intermediary variable).

The diagram presented in Fig. 1 illustrates the adopted research hypotheses.

1.3. Corporate reputation and its influence on the scope of external support, organisational resilience and performance

The growing body of research demonstrates that corporate reputation is indicated as a very important intangible resource of a company (Ali et al., 2019; Bergh et al., 2010; Djordjević & Djukić, 2008; Roberts, 2002), and even considered to be the most important (Pérez-Cornejo et al., 2020; Almeida & Coelho, 2019; Hall, 1992). The literature provides many definitions of the term, but they are not consistent. The first approach treats corporate reputation as awareness, i.e. the perception of the company's stakeholders, without its simultaneous judgement (Fombrun & van Riel, 1997). Another is an assessment, where the focus is on the opinion of the company's status (Pharoah, 2003) or assets (Weigelt & Camerer, 1988) but this approach is criticised for the excessive concentration on the consequences of the phenomenon (Barnett et al., 2006). Considering all the approaches above, the definition by Barnett et al. (2006) seems very apt as it covers all aspects and describes corporate reputation as "observers' collective judgments of a corporation based on assessments of the financial, social, and environmental impacts attributed to the corporation over time" (Barnett et al., 2006, p. 34). Noteworthy is also the definition of a higher degree of generality provided by Pérez-Cornejo et al. (2019), where "corporate reputation is defined as the expectations of various stakeholders regarding the company's ability to satisfy their interests" (Pérez-Cornejo et al., 2019, p. 1252).

Although the literature offers different concept definitions (Šontaitė-Petkevičienė, 2019; Barnett, 2006), researchers seem to agree that corporate reputation is a collective phenomenon as the topic always revolves around a group of people (i.e., stakeholders) (Rindova & Martins, 2012; Walsh et al., 2009; Cretu & Brodie, 2007). Thus, there is no doubt that corporate reputation has an immense impact on building

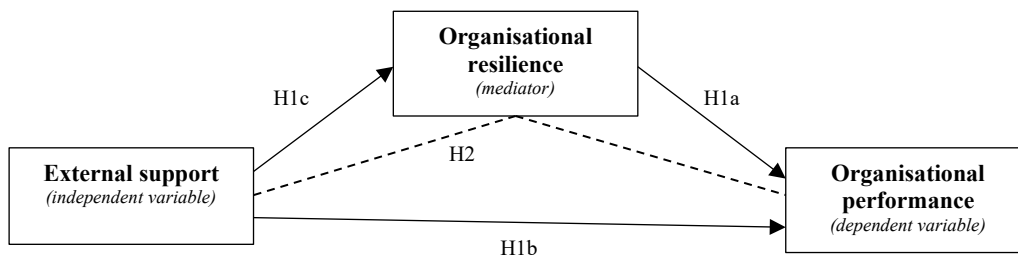

Fig. 1. Influence of external support on the organisational performance through organisational resilience

the relationship of the company with its stakeholders (Pérez-Cornejo et al., 2020; Bergh et al., 2010), and also allows shaping their desired behaviours (Ali et al., 2019). However, it should be remembered that individual groups of stakeholders have different characteristics and also differ in the nature of their participation in the organisation (Ali et al., 2015; Gabionetta et al., 2007). Therefore, the drivers and benefits of positive corporate reputation are different.

First, good corporate reputation results in a higher level of consumer satisfaction, trust, loyalty, and word-of-mouth (Roberts, 2002; Walsh et al., 2009; Chun, 2005; Fedorko et al., 2017; Szwajca, 2017), and, very importantly, customer value (Cretu & Brodie, 2007). Therefore, it affects consumer purchasing decisions. Consumers are willing to pay premium prices and are less sensitive to price changes (Burke et al., 2018), which seems crucial because buyers are main creators of the revenue streams (Pérez-Cornejo et al., 2020; Ali, 2011; Walsh et al., 2009). Second, corporate reputation is a factor in achieving sustainable competitive advantage that is difficult to imitate, and, as a consequence, it can become a source of superior profits (Almeida & Coelho, 2019; Rindova & Martins, 2012; Bergh et al., 2010; Deephouse, 2000; Hall, 1992; Walsh et al., 2009; Roberts, 2002; Djordjević & Djukić, 2008). Third, it affects the trust and loyalty of investors (Helm, 2011), suppliers and other contractors (Potgieter, 2018). Fourth, it helps to attract adequate human resources from the labour market, has an impact on positive feelings of employees (Ali et al., 2019; Potgieter, 2018; Bieńkowska et al., 2020), and also reduces the voluntary turnover (Makarius et al., 2017). As a consequence, corporate reputation affects organisational performance (Bergh et al., 2010; Pradhan, 2016) and company value (Almeida & Coelho, 2019; Roberts, 2002).

Corporate reputation is based on communication processes and personal stakeholder experiences, i.e., as a result of satisfying experiences with a corporate product or service, but also as a result of a broader assessment of employment conditions, investment opportunities and engagement in socially responsible behaviour or financial and competitive performance (Gabionetta et al., 2003). Stakeholders tend to pay special attention to the quality, timeliness, openness and honesty of communication, which seems to contribute substantially to the fair valuation of an organisation's reputation. It is not surprising that behaviours, reactions and decisions of stakeholders are influenced by those factors and, as a consequence, by the subjectively perceived organisation's reputation. They are more willing to support organisations that receive a better evaluation. It is noteworthy that the level of performance is also an important factor to consider during the evaluation of an organisation's reputation. Gabionetta et al. (2003) stated that well-performing companies are generally regarded as more credible — i.e., healthier and better managed, thus, able to deliver positive results now and in the future — than poorly-performing companies. Reputation increases the organisation's attractiveness for partners, joint ventures and prospective funding sources, leads to lower costs and higher prices, and, as a consequence, the organisation can achieve higher profits (Rhee & Valdez, 2009).

We can also observe a kind of feedback between external support and organisational performance in the context of corporate reputation. Corporate reputation changes over time. When seeking further external support, organisations must try not to fail the trust of stakeholders. Therefore, they must demonstrate the ability to "use" the offered external support in the best possible way (that can be judged, i.e., by organisational performance), which allows stakeholders to think that they (organisations) thoughtfully "consume" the offered resources. In that context, it seems that the effectiveness of external support and its impact on the overall effectiveness of the organisation could be higher, and reputation (good reputation and the willingness to maintain it as a policy for the future) can be a catalyst for this relationship. Therefore, considering the above, the following hypothesis can be assumed:

H3a. The higher is the corporate reputation, the greater is the influence of external support on organisational performance.

The relationship between corporate reputation and the scope of external support is undisputable. Good reputation conveys the company's overall attractiveness, increases investor confidence and customer trust (Fombrun, 2005). Thus, it induces repeat purchases or encourages potential investors to make additional financial resources available. And vice versa, poor reputation is not conducive to obtaining additional loans or capital contributions. It can, therefore, be concluded that corporate reputation is important for coping, is often emphasised once acquired, and can protect the organisation in the event of a crisis. In situations of an instability or crisis, it can buy some time as it is highly probable that stakeholders, aiming to reduce uncertainty in decision-making processes, would be more likely to base

their decisions on the perceived reputation of the organisation. Therefore, by developing an appropriate reputation background, an organisation may even escape crises or their harmful consequences (Koronis & Ponis, 2012) or have more time and space to remedy the problem if crises are unavoidable. As a consequence, it can function successfully despite unfavourable conditions, i.e., survive, ensure business continuity and recovery. Hence, by making external support more accessible, corporate reputation also has the potential to strengthen an organisation's capability to modify negative and inflexible propensities to face unpredicted events better (which is organisational resilience).

This relationship seems to work especially well if crises are not the fault of the organisation. According to Ali et al. (2019), if, e.g., a political action leads to economic instability, reputation can protect against negative effects. The same was observed during the crisis caused by COVID-19 pandemic. In fact, both of these situations did not fully test the reputation of organisations. The origin of crises can be different, and corporate reputation is especially important in the case where the organisation may become the target for blame. Faced with incomplete information about company's actions, stakeholders not only interpret the first-order signals sent by companies but also rely on their previous experience and the evaluative signals refracted by other key stakeholders (Fombrun, 2005). However, Koronis and Ponis (2012, p. 283) stated that "the problem with corporate reputation is that it is solely based on the perceptions and evaluations of the stakeholders that are flux, situational and easy to be changed within a relatively short amount of time". Each crisis should be treated as a potentially reputation-damaging event that can be followed by the rapid erosion of reputation. In such a case, key stakeholders of the organisation may react negatively by lowering their quality of involvement, acting confrontationally towards the management, demanding better contractual terms, and/or detaching from the firm. This translates into difficulties in obtaining new clients and maintaining current ones (Rhee & Valdez, 2009), which together significantly reduces the ability to handle difficult situations (organisational resilience).

In summary, by strengthening the network connections with other stakeholders, corporate reputation has an impact on "valorising businesses" in a competitive environment, especially in the context of, e.g., economic downturns, because stakeholders share the view that it contributes to a healthier (more resilient) business (Andres & Rounds, 2015). It is for sure not the main, direct and certainly not the only factor influencing organisational resilience. However, attracting stakeholder interest helps to keep market opportunities and make available new resources to manage uncertainty and develop, which certainly can lead to the strengthening of organisational resilience. Nevertheless, it should be treated as a catalyst rather than a direct factor shaping organisational resilience. Therefore, the following hypothesis is offered:
H3b. The higher is the corporate reputation, the greater is the influence of external support on organisational resilience.

As mentioned above, corporate reputation is linked with organisational performance (Rindova & Martins, 2012; Bergh et al., 2010). According to Tracey and French (2017, p. 57), "firms with superior reputations have a greater capacity to increase prices, retain customers, attract higher quality managers and employees, as well as more committed investors and capable strategic partners". Most research on the topic points to the direct effect between these constructs (Roberts & Dowling, 2002). However, there is some doubt regarding indirect influence (Tracey & French, 2017).

The relationship between corporate reputation and organisational resilience is also indisputable. Favourable reputation is treated as an excellent resource in the times of crisis (Coombs & Holladay, 2006). In addition, research showed that companies with a good reputation could maintain it even in the event of difficulties during a crisis (Fombrun & van Riel, 2003) as reputation protects company assets against damage caused by the crisis (Coombs & Holladay, 2006). According to Jones et al. (2000), corporate reputation protects against adverse events in a competitive environment, which can affect organisational performance. Roberts and Dowling (2002) believed that appropriate management of corporate reputation allows repairing or avoiding damage resulting from disruptive events. This means that a superior level of reputation not only helps to mitigate negative consequences but also avoid crises (Tracey & French, 2017), which in turn leads to secured results of the organisation. Therefore, the following hypothesis appears to be valid:
H3c. The higher is the corporate reputation, the greater is the influence of organisational resilience on organisational performance.

In the context of the proposed mediation model, hypotheses H3b and H3c could be summarised as one statement, namely: the better is the corporate

reputation, the stronger is the influence of external support on organisational performance through organisational resilience. Fig. 2 presents the diagram illustrating the adopted research hypotheses.

2. Research Methodology

Aiming to verify the proposed mediation model and its moderator, quantitative research was conducted. The choice of the survey method was influenced by the possibility to cover a larger number of research respondents. The anonymity ensured by the questionnaire surveys to the respondents had an effect on the number of answers obtained. This approach allowed for a quantitative description of the state of the studied phenomena and for determining the nature and intensity of connections between them. A questionnaire designed by the authors was used as the basic research tool. The main survey was conducted in December 2019, among employees of organisations located in Poland (one employee per organisation was always tested; respondents belonged to senior management). The country of origin was the only condition limiting the sample obtained from the panel of respondents from SurveyMonkey. The sampling was purposive.

In summary, the research sample contained employees of organisations operating in Poland. In total, 268 responses were collected. The sample was sufficiently diversified (considering the diversity of organisational characteristics) to serve as a basis for general conclusions concerning the given topic. Table 1 presents the characteristics of the sample, which indicate that the sample covered a diverse group of organisations. Due to the lack of data, the number in distinct cross-sections of the research sample is different.

2.1. Overview of variables

The hypotheses verification was based on four key variables: corporate reputation, external support, organisational resilience, and organisational performance.

Corporate reputation was measured based on the concept by Ali et al. (2019). The scale contained eight items, which were assessed based on a 5-point Likert scale (from "I strongly disagree" to "I strongly agree" with the middle point "I have no opinion").

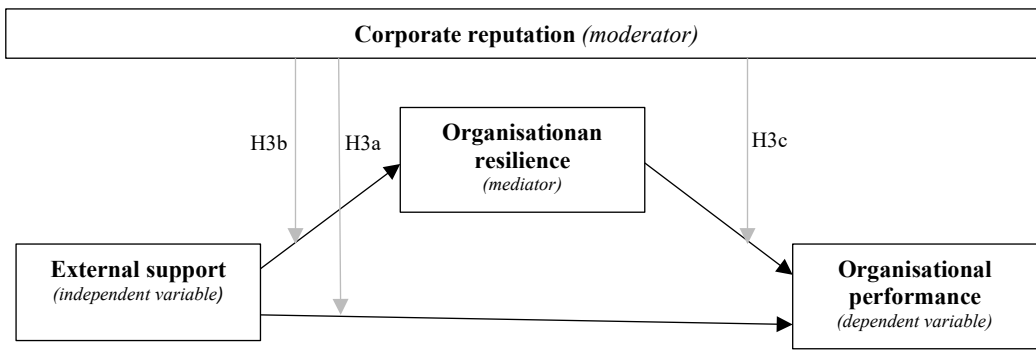

Fig. 2. Model for the influence made by external support on the organisational performance through the organisational resilience and the moderating role of corporate reputation

Tab. 1. Research sample characteristic

Age of the organisation	Manufacturing organisations	Trade organisations	Service organisations	Total
less than a year in the market	16	7	2	25
1–5 years in the market	43	20	14	77
5–20 years in the market	47	25	33	105
more than 20 years in the market	22	10	23	55
Total	128	62	72	262
serving local markets	67	39	45	151
serving global markets	55	20	27	102
Total	122	59	72	253

External support in an organisation was measured based on a 5-point Likert scale (from "I strongly disagree" to "I strongly agree" with the middle point "I have no opinion"). There were six items in this scale, referring to the range of the organisation's collaboration with and outside the industry, the intensity of networking and accessibility to external resources. The questions were phrased based on the available literature (Lee et al., 2013; Seville, 2017; McCann et al., 2009; Tengblad & Oudhuis, 2018).

The variable organisational resilience was built based on four properties assigned to system resilience: robustness, redundancy, resourcefulness and rapidity (Bruneau et al., 2003; Wicker et al., 2013). Within the four properties, four measures (one for each property) were indicated for organisational resilience. They were rated on a 5-point Likert scale (from "I strongly disagree" to "I strongly agree" with the middle point "I have no opinion").

The Balanced Scorecard concept by Kaplan and Norton (1996) was used to build the variable organisational performance. Within four perspectives (financial performance, internal business processes, customer perspectives, and innovation and learning), ten measures were indicated for organisational performance. They were rated on a 5-point Likert scale (from well below expectations to well above expectations with the middle point being equal to what expected).

2.2. Descriptive statistics and the reliability analysis of scales

Cronbach's alpha was used to estimate the internal consistency of responses. Table 2 presents the results. The Cronbach's α was high for corporate reputation, external support, organisational resilience and organisational performance, indicating high internal reliability of the scales and measurements.

3. Research results

The analysis of research results was carried out in two steps, which was the pattern of moderation of the mediation model developed by Bieńkowska et al. (2019). As a first step, the mediation model was built and verified. Then, the moderator in the previously built mediation model was introduced, and the built model was verified.

3.1. Mediation model

As mentioned before, the first step of the research was to build the mediation model. Three conditions must be met to establish such a model:

- the independent variables must be related to the mediator,
- the dependent variables must be related to the mediator, and
- a significant relationship between the independent variables and dependent variables should be reduced (partial mediation) or no longer be significant (full mediation) when controlling for the mediator (Baron & Kenny, 1986).

Aiming to verify the first two conditions and hypotheses H1a, H1b, H1c, the r-Pearson's correlation analysis was performed. The results are presented in Table 3.

The obtained results showed a statistically significant, positive and high or moderate correlation between all analysed variables. It must be pointed out that this correlation is definitely the lowest (but still moderate) in the case of the relationship between external support and organisational performance. It allows for the acceptance of H1a, H1b and H1c hypotheses.

Therefore, such a conclusion enabled to verify the mediating model of organisational performance. To do that, the mediation model was built for external support as an independent variable, and organisational performance as a dependent variable. Organisational resilience was tested as the mediator in the model. The calculations were made using the Process macro for SPSS Version 3.4 by Andrew F. Hayes. To confirm the assumed relationship, it was supposed that the obtained regression model was statistically significant and the total effect was higher than the direct effect calculated for the given variables. Table 4 presents the results of the analysis.

Tab. 2. Defined variables and the results ofthe reliability analysis of scales

No.	Variable	No. Of scales	Cronbach's a	Factor analysis (%)	M	SD
1	Corporate reputation	8	0.871	52.625	3.51	0.76
2	External support	6	0.824	53.313	3.42	0.95
3	Organisational resilience	4	0.809	63.659	3.29	0.87
4	Organisational performance	10	0.873	46.817	3.41	0.69

Tab. 3. Correlation analysis of analysed variables

		Organisational resilience	External Support	Corporate reputation
External support	r	0.549**	1	
	Sig.	0.000	-	
	N	256	262	
Corporate reputation	r	0.606**	0.570**	1
	Sig.	0.000	0.000	-
	N	249	253	255
Organisational performance	r	0.541**	0.484**	0.590**
	Sig.	0.000	0.000	0.000
	N	247	251	246
**. Correlation is significant at the level of 0.01 (two-sided)				

Tab. 4. Organisational resilience as the mediator of the relationship between external support and organisational performance

Mediator	Direct effect value	Indirect effect value	Boot LLCI	Boot ULCI	R2
Organisational resilience	0.2012	0.1568	0.0994	0.2217	0.3467

*accepted level of significance 0.05

The obtained research results showed that the built regression model with the mediator was valid and statistically significant ($F(2, 245)=64.224$, $R2=0.347$). Furthermore, organisational resilience was a statistically significant mediator of the model ($p<0.001$, coeff. = 0.3238, se = 0.0506). According to Table 4, the mediating effect (the indirect effect of the independent variable on the dependent variable through the mediator variable) is also statistically significant (BootLLCI = 0.099 and BootULCI = 0.222 and they are both above 0), although this is a partial mediation. To confirm it, the Sobel test was calculated ($Z=5.43$, $p<0.001$), which confirmed that organisational resilience significantly carries the influence of an independent variable to a dependent variable. The obtained model showed that organisational resilience was a partial but significant mediator of the relationship between external support and organisational performance. Therefore, hypothesis H2 can be accepted.

3.2. Moderator analysis for the corporate reputation

As a next step of the analysis, the obtained mediation model was studied in the context of corporate reputation to verify the statistical significance of it as moderator of the relationships given in the model. As the first step, to check if corporate reputation has a potential to be a moderator of the discussed relationships, the hypotheses were tested using the regression analysis with the moderator for three separate sets of independent relationships:

- corporate reputation as the moderator of the relationship between external support and organisational performance,
- corporate reputation as the moderator of the relationship between external support and organisational resilience,
- corporate reputation as the moderator of the relationship between organisational resilience and organisational performance.

In the next step, this variable was tested as the moderator in the previously build mediation model (as a moderator of the relationship between external support and organisational performance trough organisational resilience) to test hypotheses H3a, H3b and H3c. In both cases, the moderated regression analysis procedure was performed using the Process macro for IBM SPSS Statistics. The results of the analysis are presented in Table 5.

Based on research results, when the discussed relationships are treated separately, corporate reputation is the moderator for all of them (all obtained results were statistically significant, Table 5). However, the obtained results showed that in the proposed mediation model, corporate reputation moderated the path from external support to organisational resilience (the moderator coeff.=0.108, $p=0.0222$) and the path from organisational resilience to organi-

Tab. 5. Regression model statistics

Model description	R^2	Delta R^2	Moderator coeff.	Standard error	t Stat	P Value
Separate relationship						
External support Moderator dependent v.: org. performance	0.422	0.030	0.135	0.038	3.547	0.0005*
External support Moderator dependent v.: org. resilience	0.451	0.012	0.106	0.046	2.281	0.0234*
Organisational resilience Moderator dependent v.: org. performance	0.456	0.049	0.179	0.039	4.609	0.0000*
Mediation model						
External support Corporate reputation Moderator dependent v.: organisational resilience	0.441	0.013	0.108	0.047	2.302	0.0222*
External support Organisational resilience Corporate reputation Moderator 1 (Ext.Supp x Corp.Rep) Moderator 2 (Org.Res x Corp.Rep) dependent v.: Org. performance	0.472	 0.001 0.023	 -0.031 0.196	 0.059 0.062	 -0.515 3.180	 0.6068 0.0017*

sational performance (the moderator coeff.=0.196, p=0.0017), but not the path from external support to organisational performance (the moderator coeff.= –0.031, p =0.6068). Hence, corporate reputation is a statistically significant moderator in the case of both relationships, i.e., between external support and organisational resilience ($F(3, 235)=61.897$, $p<0.001$) and the relationship between organisational resilience and organisational performance ($F(4, 234)=52.106$, $p<0.001$). Therefore, as shown in Table 5, the obtained results are the basis for the acceptance of hypotheses H3b and H3c and the rejection of the hypothesis H3a.

4. Discussion

The role of organisational resilience in shaping organisational performance seems to be a significant issue in the management of modern organisations. In this context, the main focus of the study was to explain how external support and corporate reputation affected the results of organisation's functioning and, in particular, the aim of the paper was to clarify the mechanism behind the moderating role of corporate reputation in the influence of external support on organisational performance, considering the mediating role of organisational resilience. The obtained results are given in Fig. 3.

To achieve the research goal, it was first necessary to demonstrate the influence of external support on organisational performance, which was suggested by Mambula (2004), Cheah et al. (2019) and others. The results confirmed the anticipated relationship. In addition, it was noted that the relationship between these constructs was indirect. Organisational resilience proved to be a mediator for shaping the relationship between external support and organisational performance. According to Tengblad and Oudhuis (2018) or McCann et al. (2009), external support plays a fundamental and direct role in shaping organisational resilience. In addition, organisational resilience directly influences organisational performance, which is consistent with the statements by Carden et al. (2018) or Sundström and Hollnagel (2006). In the above context, the model of external support and organisational performance through the organisation's resilience can be considered validated.

Then, an issue of corporate reputation was introduced to the above considerations. Corporate reputation is the moderator in the mediation model and affects both paths that constitute the indirect effect of external support on organisational performance

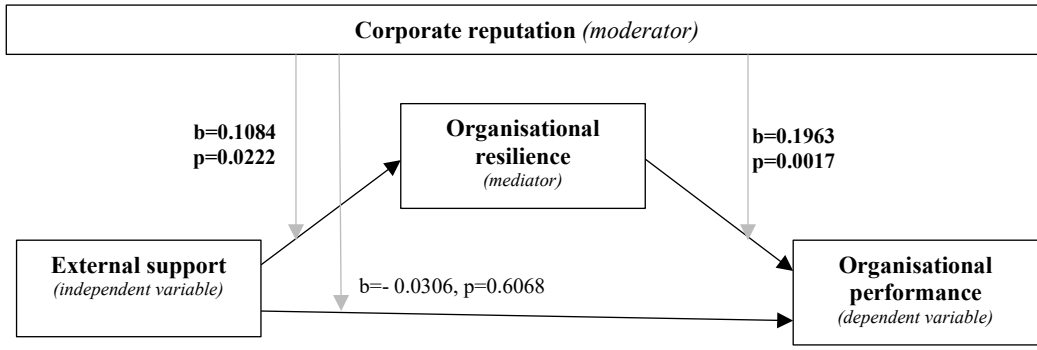

Fig. 3. Results of moderating effects in the mediation model

through organisational resilience. The obtained results did not confirm all of the adopted assumptions.

According to the model, corporate reputation moderates the relationship between corporate reputation and organisational performance most strongly. This means that for organisations with a superior reputation, even a slight improvement in organisational resilience would result in improved organisational performance. These findings appear to be consistent with conclusions by Jones et al. (2000), Roberts and Dowling (2002), Tracey and French (2017). The moderating role of corporate reputation was also confirmed in the relationship between external support and organisational resilience. This means that for organisations with a superior reputation, even a small increase in external support would positively impact organisational resilience. This finding coincides with the settlement by Andres and Rounds (2015).

However, it is worth noting the interesting relationship that appeared in the presented mediation model. The research did not confirm the assumption about corporate reputation being the moderator in the relationship between external support and organisational performance. The relationship between constructs was negative, although statistically insignificant). This phenomenon can be explained by the fact that enterprises with a superior reputation might be ignored in the case of support that is not uniform for all entities. This finding seems to be confirmed by Fombrun (2012), who believed that reputation could be transformed into stakeholder support or the lack of support, resulting in different levels of resource acquisition and, consequently, different levels of organisational performance. In addition, it seems that enterprises that cannot be supported by external resources focus more on their own resources, which leads to improving organisational performance. Therefore, they try to improve profitability in other ways, for example, by launching innovative processes. However, the above statements require confirmation in empirical research. When making the analysis, it would be worth considering types of support suggested by Cheah et al. (2019), i.e. the type of support provided (direct and indirect) and types of stakeholder (e.g., government, private or non-profit) as, for example, institutional support depends on meeting formal conditions rather than corporate reputation.

Conclusion

Corporate reputation is nowadays treated as an intangible asset of an organisation, which is rather measurable. It helps to distinguish an organisation in the market and build a dialogue and exchange resources with stakeholders. According to Sirgy (2002, p. 145), effective exchange with external stakeholders is the condition of survival and growth of organisations. It benefits both the organisation and its stakeholders, can be considered at many levels (institutional and non-institutional, contractual or with no intentions to contract, etc.) and concern the flow of a wide variety of resources, either tangible (i.e., money, services, employees or specific skills) or intangible, although no less important (i.e., information, influences, social support or prestige). It should also be noted that relationships with internal stakeholders matter at least as much; however, this paper focused on relationships with external stakeholders and, more precisely, on the support they can give organisations, especially in the face of hardship. The performed literature analysis resulted in a conclusion that corporate reputation could be a moderator of a relationship between external support and organisational resilience and organisational performance. The obtained results clearly showed a positive and statistically significant correlation between all discussed

variables. Moreover, on the basis of the conducted empirical research, the moderating effect of corporate reputation was found in the mediation model for the influence made by external support on organisational performance through organisational resilience.

The obtained results imply specific practical recommendations. Since corporate reputation can be the key to achieving greater organisational resilience and performance, organisations should especially focus on the management of this category. According to stakeholder theory, the moral obligation to maintain mutually appropriate and beneficial relationships with stakeholders usually belongs to managers, who should consider relationships with stakeholders in the context of strategic management processes to maximise the organisational benefits. It is not an easy task as different stakeholders influence organisations in different ways, some more than others. Thus, the task requires many different approaches and actions. According to Friedman & Miles (2002), relationships between organisations and stakeholders change over time. However, the efforts pay off in the event of a crisis.

The presented empirical study has some limitations. The obtained sample size (268 organisations) is not representative by far. Besides, it was verified in one business context only, so in future, it is worthwhile to consider verifying the formulated hypotheses in organisations operating in other countries. However, the shown diversity of the sample appeared sufficient to form some general conclusions based on the obtained results. The obtained results constitute a solid first step in the analysis of the role played by the influence of corporate reputation on the scope of external support and its impact on organisational performance through organisational resilience. However, further research is required as well as in-depth analysis to provide further recommendations for the management of organisational resilience. Moreover, the obtained conclusions allowed formulating directions for future research. There is a need for further analysis concerning the type of support (institutional, non-institutional) and types of stakeholders with a special focus on the internal ones. The support given by employees in shaping organisational resilience and organisational performance can have immense importance. Therefore, employees as internal stakeholders seem to be an important group (that was intentionally omitted in the present research), which influences corporate reputation and is influenced by it.

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Management of technological process optimisation

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ABSTRACT
The research aims to characterise the optimisation of a technological process depending on the main time parameters for production. The optimisation does not require to correct technical parameters of a system, but rather the organisational and managerial factors of the technological process. The workload is taken as an evaluation criterion, which factors in the probability distribution of time characteristics of computer process operations. Time characteristics that represent the performance of an operation influence the workloads of an operator and equipment, determining the productivity of the technological process. Analytical models were developed for the operational control of a production line efficiency considering the probability–statistical parameters pertaining to the performance of operations and technological equipment peculiarities. The article presents research results, which characterise the dependence of a production line efficiency on the type of equipment, and the duration of preparatory and final operations considering their probability. Under an optimal workload of the operator, the duration of the complete program changes linearly, regardless of the time required for the performance of operations by a computer without the involvement of the operator, and depending on the type of equipment. A managerial decision can be optimal under the condition that the factor of technological process efficiency (K_TP) tends to max. The developed method of analytical determination can be used to calculate the workload of both an operator and technological equipment. The calculations of the duration of a production line operation resulted in the methodology for the consideration of probability characteristics pertaining to the time distribution of the period required to perform operations, which influences the unequal efficiency of the production line. The probabilistic character of time distribution related to intervals of performed operations serves as a parameter in the management of technological process optimisation, which can be achieved using simulators of technological processes optimised in terms of their efficiency.

KEY WORDS
workload factor, process productivity, analytical model, duration of operations, amount of equipment

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Introduction

The efficiency of modern automation of machine building is characterised by its flexibility, reduced production costs and the volume of manufactured products (Gálová et al., 2018). A technological process should result in a product of appropriate quality and low production cost within a short period (Sobolewski et al., 2012). This goal helps to increase competitiveness in the unstable economic market.

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Many approaches can be used to improve competitiveness. One of the concepts is flexible production. Flexibility depends on the probabilistic character of the performance of operations undertaken by an operator of technological equipment.

Thus, the duration of performing an operation will be different, as well as the workload of the equipment operator. The number of operations performed by one operator or certain equipment serviced by one operator depends on the duration of time required to perform the operations. It is important to exclude idle times of the operator and equipment.

The duration of time required for the performance of similar operations by various operators is different and accidental. The productivity of the technological process changes depending on the duration of performing an operation.

One possible way of optimisation is through the distribution of workstations (Kikolski et al., 2018). However, it is necessary to consider the duration of time required to perform the operation. Time is the main criterion, which influences productivity. The analysis of the duration of performing an operation characterises the functioning of a technological process (equipment). It optimises the amount of equipment serviced by one operator.

Thus, the actual problem is to develop a mathematic model to control the technological process optimisation, which does not require the correction of the system's technical parameters but rather of the organisational and managerial factors related to the technological process.

The duration of time required to perform operations is the main parameter, whereas the time of performance is accidental and probabilistic. The article presents the methodology of the research into an optimal amount of equipment serviced by one operator. The methodology considers the workload factor and the distribution of the duration of performing an operation, which corresponds to the law of normal distribution. The productivity of a technological line is the criterion of optimality.

The article presents research results regarding the duration of performing an operation using an example of a technological line in a machine-building company (Ukraine). The research was conducted using different combinations of workstations. Technological equipment was placed in a line, angle-wise to the direction of the operator's movement, i.e. the "herringbone" arrangement, or on both sides of the workstation of the operator, i.e. the "tandem" arrangement, or ordinarily, in the direction of the operator's movement, i.e. the "parallel" arrangement.

1. Literature Review

Optimisation is an instrument that can be used to solve engineering problems; however, it is not simple. No unified, universal method exists for an effective solution of engineering problems (Wędrychowicz & Bydałek, 2017). Recently, imitative modelling has become widely used. Application of an imitative model to a technological process of production based on standard stochastic distributions ensures the balancing between flows of production inputs and outputs considering the operator's workload (Rahman & Ullah, 2015; Zwierzyński et al., 2018). An imitative model is used to determine bottlenecks and evaluate some possible alternatives. For instance, the rearrangement of workstations or equipment, the adjustment of the level of resources, and the employment of additional workers. The research proposes alternative methods to increase the efficiency of the system under unset parameters and their limits, which optimise the technological process and, particularly, the productivity of the system.

Some researchers (Mourtzis et al., 2015; Al-Ahmari et al., 2016) consider that digital technologies of production can also be used to experiment with production systems and processes and production resources. However, such efforts are advisable at the level of abstracting and in the case of the lack of definite digital parameters for a technological process.

Technological process planning has changed together with the dynamic social demand, according to the Industry 4.0 concept (Briesemeister & Novaes, 2017). In particular, certain shifts occurred in logistic models of inputs and outputs of the production process. Traditionally, production is optimised based on a search with the help of a simulator to evaluate the importance of decisions (Ivanov, 2017; Ran, 2018).

The article offers a methodology for decision-making based on SPAF — the sustainable process analytics formalism (Shao et al., 2014). It provides step-by-step instructions including required data, sensitivity analysis and the optimisation of decisions in relation to sustainability indices on the basis of modelling and analysis. However, a mathematical

model, either empirical or analytical, is the final element in decision-making.

The best possible decision suggests a dynamic optimisation of the technological process with the use of automatic systems of control in the case of a worker absence (Åkesson, 2008). Such a case requires a mathematical model and the specification of parameters.

Otherwise, it is required to use standard software programs, which ensure the assessment of decision-making risks on the basis of statistical data processing, while taking managerial actions to express the accepted optimisation parameter in qualitative terms (García & García, 2018; Sujová et al., 2019; Mourtzis, 2019; Kibira & Shao, 2016).

In contrast, mathematical and, particularly, analytical methods are universal and more available; besides, they secure effective decision-making. Explicit mathematical formulas and numerous methods of calculation are used. In such a case, modelling simulators are adjusted to specific conditions, performing faster and with high accuracy of optimisation and forecasting. Thus, analytical methods are still widely used for assessing the efficiency and production optimisation (Sujová et al., 2019; Mourtzis, 2019).

An analytical method has been developed to additionally consider the distribution of time intervals of an operation performed by an equipment operator. It determines the coefficient of the operator's workload, which indicates the amount of equipment that can be serviced by one operator effectively and immediately. The research considers different arrangements of equipment placed in a technological line and the movement of an operator from one piece of equipment to another while performing the same operations.

2. Research methods

2.1. Development of the method for the management of technological process optimisation

The control of efficiency of completed technological processes secures the continuous improvement of their operation in all fields, particularly, organisational, technological, economic and others (Tkaczyk & Roszak, 2002).

For a technological process, the efficiency of optimal functioning is assessed by the factor of efficiency K_{TP}:

$$K_{TP} = \frac{1}{C_{TP}} \sum_{n=1}^{i} (Q_P - \Delta Q_P), \quad (1)$$

where CTP stands for the consumption of energy required to perform the technological process;
Q_P — the productivity of a production process under ideal conditions;
ΔQ_P — the efficiency of a technological process under an inconsistency of the system's parameters, which are subordinate to the probability characteristic of the distribution of indices in time, revealed in their quantity equivalent, $\Delta Q_P = Q_P - W_{PTL}$;
W_{PTL} — productivity of the technological process considering the probability distribution of the duration of performing the operation.

The presented dependence (1) demonstrates that efficiency is contingent on parameters of a technical system, which should provide conditions for the performance of a technological process according to the technological requirements on the reduction of production costs.

The choice of a rational direction for the improvement of computer technology considering production peculiarities depends on requirements for technological operations of the production process. The efficiency can be increased by reducing the period of performance of some technological operations, which do not influence the quality of the final product.

A typical process of computer technology was taken as an example, the regulated workstations were subjected to a set of operations, performed by an operator according to the following technology:

- prepare to perform operations for a set of items:
  - the operator or an item approaches the device used to perform the operation;
  - preparatory operations (expected by regulations for the operation (route) map);
- performance of main operations:
  - switch on technological equipment operations and preliminary consistency control (position, supply, regimes, etc.);
  - perform main operations (under partial visual control by the operator);
- performance of final operations:
  - technical control of item parameters or other operations according to the operation (route) map;

– switch off the operation process and remove the item off of the equipment;
– control the conditions, move to the next operation or item.

To make a theoretical analysis into the regularities of technological indices of the process, depending on the type of technological equipment (manual, automatic, robotised), standard consumption of time can be used for the performance of an operation or the consumption of time by the stopwatch study.

The duration of time required to perform main operations is regulated by the operation modes of technological equipment and by the item, which is processed by the equipment.

The productivity and efficiency of work of an operator manning the technological equipment (tools) and the quality of performed operations (according to standard requirements) depend on the amount of servicing equipment, simultaneously controlled by one operator. The amount of servicing equipment, simultaneously maintained by one operator, depends on the time of performance of the main operation (without the operator's participation, but performed by equipment, programmed by the operator, to complete one operation) and the duration of preparatory and final operations, and the time required for passing from one equipment to another (or a workstation).

The visualise how a technological process is organised using the technological equipment as well as understand the sequence of operations performed by the operator, Fig. 1 presents a cycle scheme of the stream process used by computer technology of a random performed operation.

For instance, if one operator services four workstations, where each of the stations has two operations equal in time, the operator performs the first operation and then passes to the second. Thus, having four workstations, the operator controls four technological machines or one operation in each, i.e. the number of simultaneously processed items (details, etc.).

Fig. 1 demonstrates that having an optimal number of workstations or an amount of serviced equipment per one operator, the factor of the operator workload should be equal to one or approaching one.

The duration of preparatory and final operations depends on the conformity with standard requirements and technological skills (qualification) of the operator. Considering the sequence of preparatory and final operations of computer technology (Fig. 1), the factor of the operator workload K_{op} is calculated by the formula (Dmytriv et al., 2018):

$$K_{op} = \frac{t_{sdo} + (n_{am.ed} - 1) \cdot t_f}{n_{am.ed} \cdot t_{p-f}}, \qquad (2)$$

where t_{sdo} stands for the duration of operations on one equipment or one workstation, $t_{sdo} = t_m + t_{p\text{-}f}$, s;
t_m — the duration of operation performed immediately on the equipment, without the operator's participation, s;
t_f — the duration of final operations, s;
$t_{p\text{-}f}$ — the duration of preparatory and final operations, s;
$n_{am.ed}$ — the amount of equipment, controlled by one operator, or the number of workstations serviced by one operator, units.

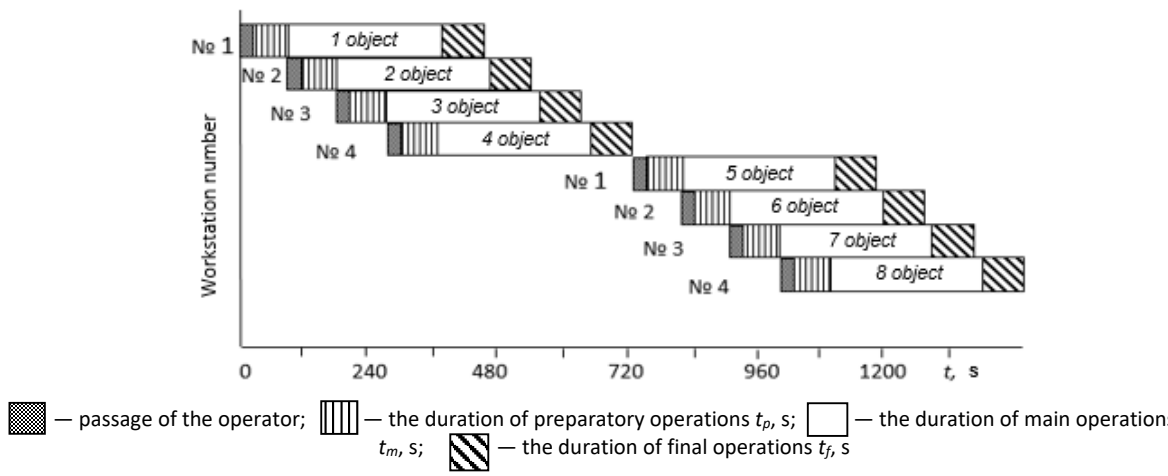


Fig. 1. Cycle scheme of computer technology

If $K_{op}>1$, the operator is underloaded and has free time, whereas if $K_{op}<1$, the operator is overloaded and does not keep to performance regulations regarding preparatory and final operations due to the lack of time.

Considering that $t_{p\text{-}f}= t_p + t_f$, $t_{sdo} = t_p + t_m + t_f$ and using the dependence (2) for the calculation of the optimal amount of technological equipment per one operator, the following result is obtained:

$$n_{am.ed} = \frac{t_m}{t_p}\cdot\left[K_{op}+\frac{t_f}{t_p}(K_{op}-1)\right]^{-1}+\left[K_{op}+\frac{t_f}{t_p}(K_{op}-1)\right]^{-1} \quad (3)$$

$$\text{or} \quad n_{am.ed} = \left[K_{op}+\frac{t_f}{t_p}(K_{op}-1)\right]^{-1}\cdot\left[\frac{t_f}{t_p}+1\right] \quad (4)$$

where t_p stands for the performance of preparatory operations by the operator, s.

Considering the mathematical model for the probability of performance of operations by computer technologies, the impact of the process design for different types of technological equipment (manual, automatic, robotised) on the distribution of time intervals representing the duration of performed preparatory and finishing operations is analysed in the research. The indices used to organise the technological process of the equipment operator include productive efficiency of the operator and equipment; and the probable and mathematical expectation for the duration of preparatory and finishing operations.

The law of normal distribution applies to the duration of time required to perform preparatory and finishing operations by computer technologies, their limits of the scope, the mean square deviation, and dispersion of the results for a sampling distribution of 100 observations of the performance of operations using different types of technological equipment (Kodra et al., 2008).

The distribution of the duration of time required to perform preparatory and finishing operations is subordinate to the normal law, which is characterised by the probability density function (Bronstein et al., 1986):

$$f(t)=\frac{1}{\sigma\cdot\sqrt{2\cdot\pi}}\cdot \mathrm{e}^{-\frac{(t-m(\bar{t}))^2}{2\cdot\sigma^2}}, \quad (5)$$

where σ stands for a confidence interval; $m(\bar{t})$ mathematical expectation.

A mathematical expectation of the variable t for the Gaussian distribution is determined by the formula (Bronstein et al., 1986):

$$M|t| = \int_{-\infty}^{\infty} t\cdot f(t)\cdot dt = \frac{1}{\sigma\cdot\sqrt{2\cdot\pi}}\cdot\int_{-\infty}^{\infty} t\cdot \mathrm{e}^{-\frac{(t-m(\bar{t}))^2}{2\cdot\sigma^2}}\cdot dt \quad (6)$$

The $\frac{t-m(\bar{t})}{\sigma\cdot\sqrt{2}} = x$ is substituted for the integration of equation (6). Consequently, equation (6) undertakes the following form:

$$M[t]=\frac{1}{\sqrt{\pi}}\cdot\int_{-\infty}^{\infty}\left(\sigma\cdot x\cdot\sqrt{2}+m(\bar{t})\right)\cdot \mathrm{e}^{-x^2}\cdot dx = \\ =\frac{\sigma\cdot\sqrt{2}}{\sqrt{\pi}}\cdot\int_{-\infty}^{\infty} x\cdot \mathrm{e}^{-x^2}\cdot dx+\frac{m(\bar{t})}{\sqrt{\pi}}\cdot\int_{-\infty}^{\infty}\mathrm{e}^{-x^2}\cdot dx. \quad (7)$$

In equation (7), the first integral is equal to zero, and the second is the Euler–Poisson integral, respectively:

$$\int_{-\infty}^{\infty}\mathrm{e}^{-x^2}\cdot dx = 2\int_{0}^{\infty}\mathrm{e}^{-x^2}\cdot dx = \sqrt{\pi}. \quad (8)$$

Thus $M|t| = m(\bar{t})$ which characterises the mathematical expectation of the variable t, is the average value for the integral of distribution of the random variable t.

The dispersion of the variable t is calculated by the formula (Bronstein et al., 1986):

$$D|t| = \frac{1}{\sigma\cdot\sqrt{2\cdot\pi}}\cdot\int_{-\infty}^{\infty}\left(t-m(\bar{t})\right)^2\cdot \mathrm{e}^{-\frac{(t-m(\bar{t}))^2}{2\cdot\sigma^2}}\cdot dt \quad (9)$$

The $\frac{t-m(\bar{t})}{\sigma\cdot\sqrt{2}} = x$ is substituted, and, consequently, equation (9) undertakes the following form:

$$D|x| = \frac{2\cdot\sigma^2}{\sqrt{\pi}}\cdot\int_{-\infty}^{\infty} x^2\cdot \mathrm{e}^{-x^2}\cdot dx \quad (10)$$

The integration of parts of equation (10) resulted in the following equation:

$$D|x| = \frac{2\cdot\sigma^2}{\sqrt{\pi}}\cdot\int_{-\infty}^{\infty} x^2\cdot \mathrm{e}^{-x^2}\cdot dx = \frac{\sigma^2}{\sqrt{\pi}}\cdot\int_{-\infty}^{\infty} 2\cdot x\cdot x\cdot \mathrm{e}^{-x^2}\cdot dx = \\ := \frac{\sigma^2}{\sqrt{\pi}}\cdot\left\{-x\cdot \mathrm{e}^{-x^2}\Big|_{-\infty}^{\infty}+\int_{-\infty}^{\infty}\mathrm{e}^{-x^2}\cdot dx\right\}. \quad (11)$$

The first addition of integral (11) under $x\to\infty$ is reduced faster than the exponentiation growth. Thus, it is equal to zero. The second addition of integral (11) is equal to $\sqrt{\pi}$, according to the dependence (8).

Thus, the dispersion of the variable t will be $D|t| = \sigma^2$, and σ in equation (5) is a mean square deviation S of the variable t.

Table 1 presents the distribution of performance duration of preparatory and final operations for the set types of technological equipment, as well as their mathematical expectation and dispersion.

Using the distribution model for the duration of preparatory and final operations and having a mathematical expectation regarding the duration of the performance of those operations (Table 1), the model is created for the duration of the performance

Tab. 1. Characteristics pertaining to the distribution of the duration of preparatory and final operations performed by computer technology

TYPE OF TECHNOLOGICAL EQUIPMENT	OPERATIONS	DISTRIBUTION LAW	MATHEMATICAL EXPECTATION $M(T_P)$, $M(T_f)$, s	MEAN SQUARE DEVIATION S, DISPERSION Σ^2
Manual, linear arrangement	t_p	$f(t_p)=\frac{1}{8{,}225\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_p-67{,}79)^2}{2\cdot 67{,}65}}$	$M(t_p)$=67.79±8.225	$S(t_p)$ = 8.225 σ^2 = 67.65
	t_f	$f(t_f)=\frac{1}{14{,}12\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_f-82{,}02)^2}{2\cdot 199{,}38}}$	$M(t_f)$=82.02±14.12	$S(t_f)$ = 14.12 σ^2 = 199.379
Partially automated, linear arrangement	t_p	$f(t_p)=\frac{1}{8{,}233\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_p-68{,}65)^2}{2\cdot 67{,}78}}$	$M(t_p)$=68.65±8.233	$S(t_p)$ = 8.233 σ^2 = 67.78
	t_f	$f(t_f)=\frac{1}{10{,}22\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_f-53{,}11)^2}{2\cdot 104{,}44}}$	$M(t_f)$=53.11±10.22	$S(t_f)$= 10.219 σ^2 = 104.438
Partially automated, "tandem" arrangement	t_p	$f(t_p)=\frac{1}{4{,}431\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_p-36{,}84)^2}{2\cdot 19{,}634}}$	$M(t_p)$=36.84±4.431	$S(t_p)$ = 4.431 σ^2 = 19.634
	t_f	$f(t_f)=\frac{1}{4{,}432\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_f-45{,}34)^2}{2\cdot 19{,}64}}$	$M(t_f)$=45.34±4.432	$S(t_f)$ = 4.432 σ^2 = 19.644
Automatic, "tandem" arrangement	t_p	$f(t_p)=\frac{1}{4{,}627\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_p-37{,}85)^2}{2\cdot 21{,}41}}$	$M(t_p)$=37.85±4.627	$S(t_p)$ = 4.627 σ^2 = 21.41
	t_f	$f(t_f)=\frac{1}{2{,}43\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_f-17{,}61)^2}{2\cdot 5{,}898}}$	$M(t_f)$=17.61±2.429	$S(t_f)$ = 2.429 σ^2 = 5.898
Automatic, "herringbone" arrangement	t_p	$f(t_p)=\frac{1}{2{,}99\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_f-38{,}29)^2}{2\cdot 8{,}926}}$	$M(t_p)$=38.29±8.926	$S(t_p)$ = 2.987 σ^2 = 8.926
	t_f	$f(t_f)=\frac{1}{0{,}48\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_f-10{,}1)^2}{2\cdot 0{,}23}}$	$M(t_f)$=10.1±0.48	$S(t_f)$ = 0.48 σ^2 = 0.23
Automatic, "parallel" arrangement	t_p	$f(t_p)=\frac{1}{3{,}94\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_p-31{,}09)^2}{2\cdot 15{,}522}}$	$M(t_p)$=31.09±3.94	$S(t_p)$ = 3.94 σ^2 = 15.522
	t_f	$f(t_f)=\frac{1}{0{,}904\cdot\sqrt{2\cdot\pi}}\cdot e^{-\frac{(t_f-10{,}94)^2}{2\cdot 0{,}816}}$	$M(t_f)$=10.94±0.904	$S(t_f)$= 0,904 σ^2 = 0.816

of one-type operation using different types of technological equipment. From equation (2), it is possible to derive a dependence for the calculation of the duration of an operator workload by the calculated amount of technological equipment. The duration of the operator workload depending on the amount of manned equipment can be calculated by the formula:

$$t_w = K_{op} \cdot n_{am.ed} \cdot (t_p + t_f) \qquad (12)$$

Due to the probabilistic character of the distribution representing the duration of the performance of preparatory and final operations, dependence (12) undertakes the following form considering the mathematical expectation for the performance of operations:

$$t_w = K_{op} \cdot n_{am.ed} \cdot \left[\bar{t}_p \pm S(t_p) + \bar{t}_f \pm S(t_f)\right], \qquad (13)$$

where $\bar{t}_p, \bar{t}_f$ stands for the average value of the duration of preparatory and final operations, respectively, s;

$S(t_p), S(t_f)$ — the mean square deviation of the duration of preparatory and final operations performed by computer technology, respectively, s.

The duration of the performance of a production program considering the number of operators per computer technology (workstations or technological equipment) is calculated by the formula:

$$T_w = K_{op} \cdot n_{am.ed} \cdot \left[\bar{t}_p \pm S(\bar{t}_p) + \bar{t}_f \pm S(t_f)\right] \cdot M_{prog}/N_{n.op}, \qquad (14)$$

where M_{npoz} stands for the production program, units; N_{on} — the number of operators, servicing a technological line, number of people.

Dependence (14) enables calculating the duration of the performance of a program with different duration of the performance of an operation immediately on the equipment and without the operator's participation, and the optimal workload for different types of technological equipment.

2.2. Model of a technological process efficiency under the rational workload of a computer technology operator

The productivity of different types of technological equipment used for operations of different duration to procedure one item ensures the optimised management of the technological process.

Considering the duration of the operations t_{sdo} for one production item (considering the performance of preparatory and final operations $t_{sdo} = t_m + t_{p\text{-}f}$), the dependence for the determination of labour efficiency will have the following form:

$$W_{op} = \frac{3600 \cdot n_{am.ed}}{t_{sdo}}. \quad (15)$$

From dependence (2), the dependence can be derived for the operator efficiency or the efficiency of a production line with a set amount $n_{am.ed}$ of technological equipment, having determined the duration of the operations t_{sdo} for each production item and having introduced it in dependence (15):

$$W_{PTL} = \frac{3600 \cdot n_{am.ed}}{K_{op} \cdot n_{am.ed} \cdot (t_p + t_f) + t_f (1 - n_{am.ed})}. \quad (16)$$

Considering the mathematical expectation for the duration of time required to perform preparatory and final operations, dependence (16) undertakes the following form:

$$W_{PTL} = \frac{3600 \cdot n_{am.ed}}{K_{op} \cdot n_{am.ed} \cdot \left[\bar{t}_p \pm S(t_p) + \bar{t}_f \pm S(t_f)\right] + \overline{+\left(\bar{t}_f \pm S(t_f)\right) \cdot (1 - n_{am.ed})}}. \quad (17)$$

With the help of the developed analytical method, the research was conducted, which confirmed the reasonability to use the statistical distribution of probability for the duration of operations performed by an operator for the management of the technological process optimisation.

3. Research results

3.1. Results of the analytical research of an operator's workload

The amount of equipment serviced by one operator characterises the workload. Results of the modelling of the operator workload and dependence (2) are demonstrated in Figs. 2–4.

The increase in the amount of equipment, which is serviced by one operator (Figs. 2 and 3), causes an increase in the operator's workload. Thus, the operator cannot keep to the set time limits required to perform the operation adequately. Therefore, the coefficient of the operator's workload depends on the correlation between the duration of the performance of the operation immediately by the operator and the duration of the performance of operations without the operator's participation.

Results of the modelling for the optimal amount of technological equipment per one operator are demonstrated in Fig. 5.

Under the condition that final operations are performed without the participation of an operator (i.e. automated or serviced by a robot), the change of t_f/t_p correlations from 1 to 7 contributes to a significant increase in the amount of equipment serviced by one operator. For the analysis of dependence (4), the article supplies a diagram of the response projections (Fig. 6).

The duration tm of an operation performed immediately on the equipment without the operator's participation is an important parameter influencing the amount of equipment, which is simultaneously serviced by the operator. The analysis of the graphical dependences (Figs. 5 and 6) resulted in a sampling of the most common types of equipment used in Ukraine (Fig. 7).

The analysis of the research results (Figs. 5 and 6) demonstrated that an increase in the duration of computer operations (t_m) without the operator's participation led to an increase in the amount of equipment serviced by one operator. Similarly, an increase in the correlation between the finishing and preparatory operations caused an increase in the amount of equipment serviced by one operator.

The condition for the conformity of the operator's work with requirements of computer technology is expressed as $Kop \geq 1$.

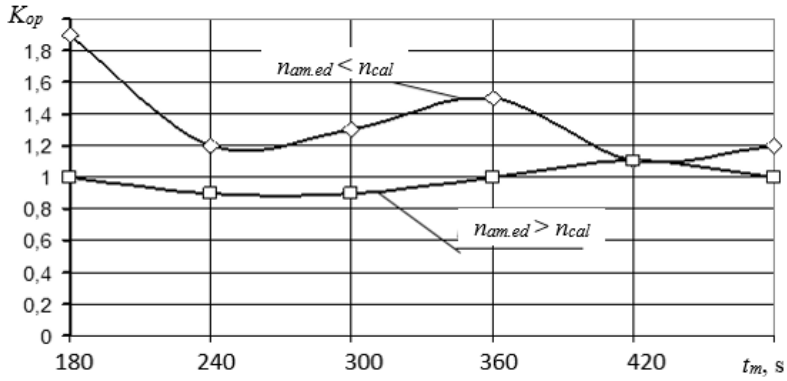


Fig. 2. Workload of the operator of manual technological equipment

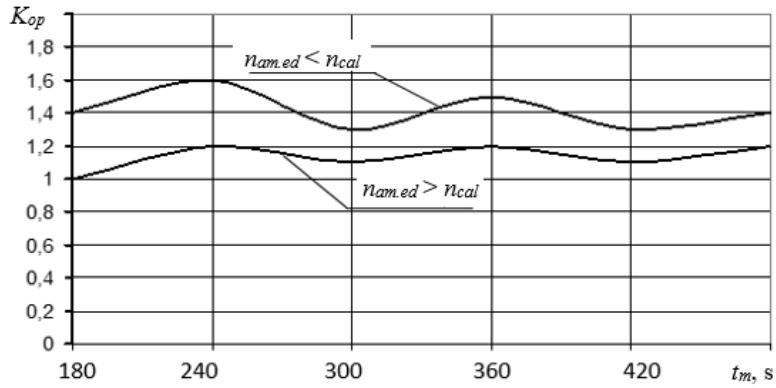
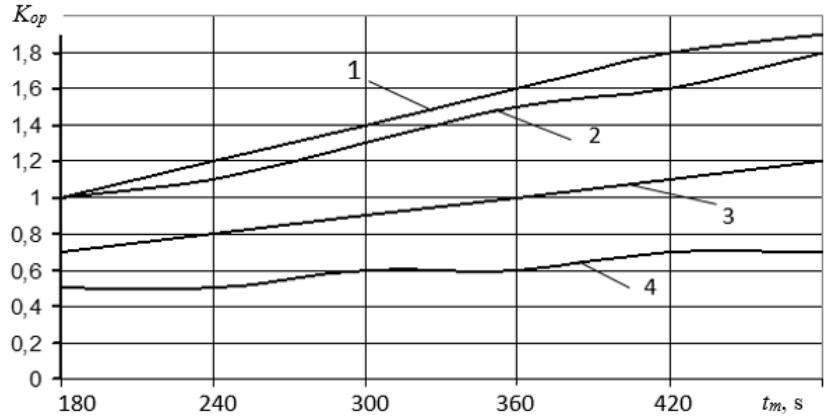


Fig. 3. Workload of the operator of partially automated technological equipment



1 — partially automated, “herringbone” arrangement, 4 units of equipment; 2 — partially automated, “tandem arrangement, 3 units of equipment; 3 — automatic, “herringbone” arrangement, 8 units of equipment; 4 — automatic, “herringbone” arrangement, 16 units of equipment

Fig. 4. Workload of the operator of automated technological equipment

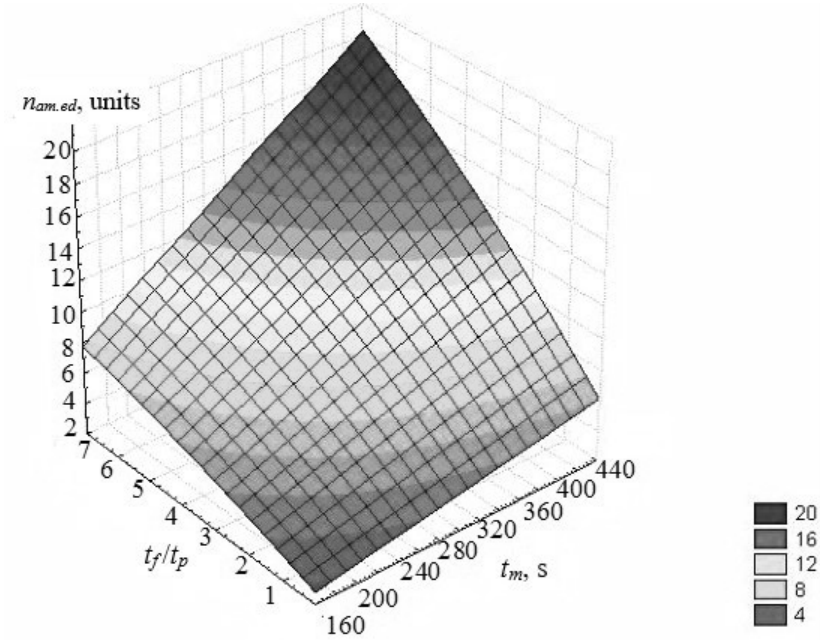


Fig. 5. Dependence of the amount of technological equipment $n_{am.ed}$ serviced by one operator on the duration t_m of the operation performed immediately on the equipment and without the operator's participation and the correlation of final and preparatory operations t_f/t_p

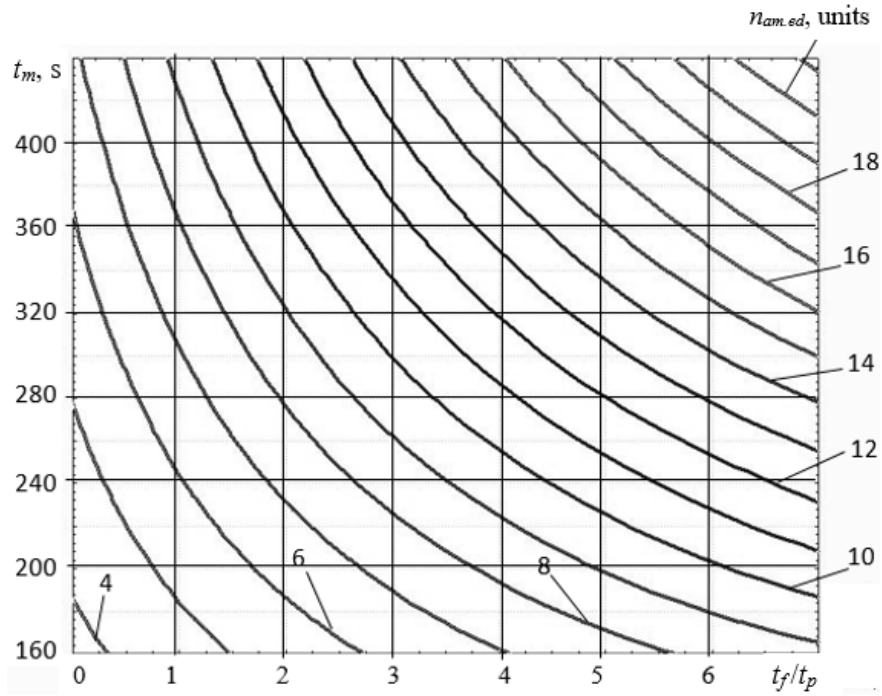
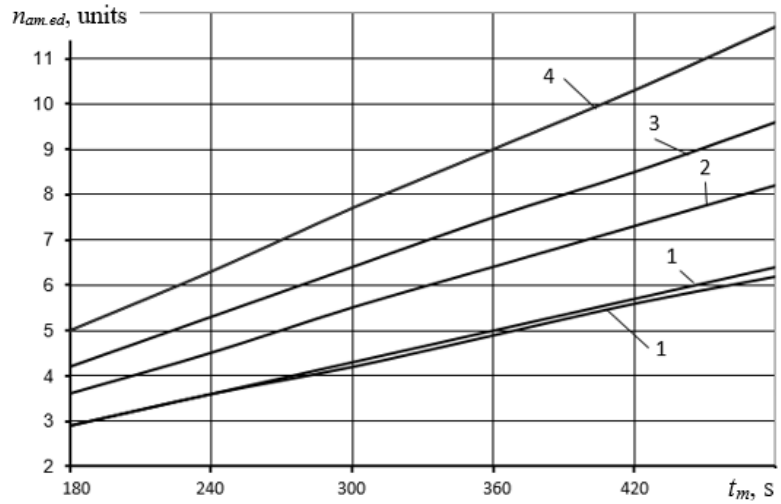


Fig. 6. Diagram of projections for the response surface of a dependence of the amount of equipment $n_{am.ed}$ serviced by one operator on the performance duration t_m of the operation immediately on the equipment and without the operator's participation and the correlation of final and preparatory operations t_f/t_p



1 — manual, linear arrangement; 2 — partially automated, linear arrangement; 3 — automatic, t_f/t_p :m" arrangement; 4 — automatic, "herringbone" arrangement

Fig. 7. Dependence of the amount of technological equipment $n_{am.ed}$ serviced by one operator on the duration t_m on of the operation performed immediately on the equipment and without the operator's participation, and on the type of equipment

Thus, an increase in the level of automation of technological operations ensures an increase in the amount of equipment serviced by one operator (Fig. 7). The duration of computer operations, regardless of the level of automation, leads to an increase in the amount of equipment serviced by one operator.

3.2. Results of the analytical research on the duration of work and efficiency of a production line

Figs. 8–11 present the calculations for the duration required to perform a program using dependence (13) and different duration of the operation performed immediately on the equipment without the operator's participation and the optimal workload of the operator for different types of technological equipment.

The reduction in the duration of a production line operation within the range of the correlation $t_f/t_p = 0.5\text{-}0.8$ results from the optimal amount of technological equipment serviced by one operator, and under $K_{op} \approx 1$. The reduction in $K_{op} < 1$ is intolerable because the operator will not manage to perform all operations according to requirements because of the unargued amount of serviced technological equipment.

The productivity of a production line (equation 21) depends on the duration of time required to perform preparatory tp and final tf operations, which have the number series subordinate to the normal distribution and the duration tm of performance of the computer operations without operator's participation. It also characterises the number of equipment units serviced by an operator and regulates the factor of the operator workload Kop. The modelling results are demonstrated in Fig. 12.

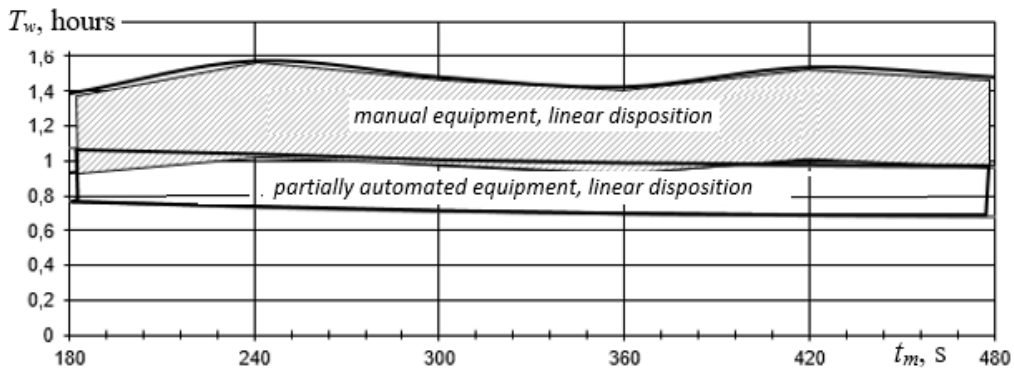


Fig. 8. Interval in the duration of a production line operation to perform the program for 100 products during the time t_m of the operation performed immediately on the equipment and without the participation of the operator

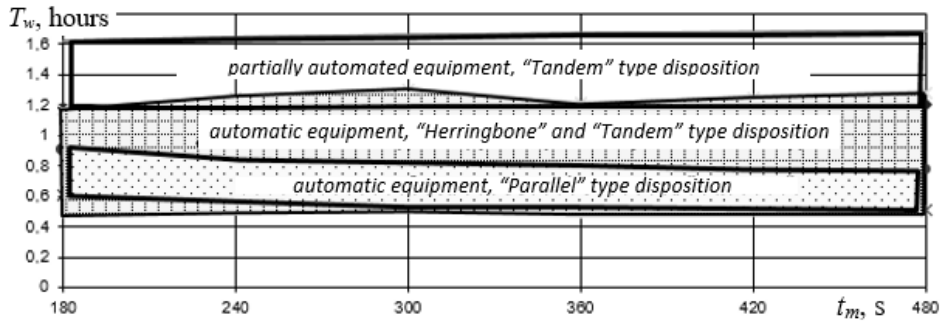


Fig. 9. Interval in the duration of a production line operation to perform the program for 100 products during the time t_m of the operation performed immediately on the equipment and without the participation of the operator

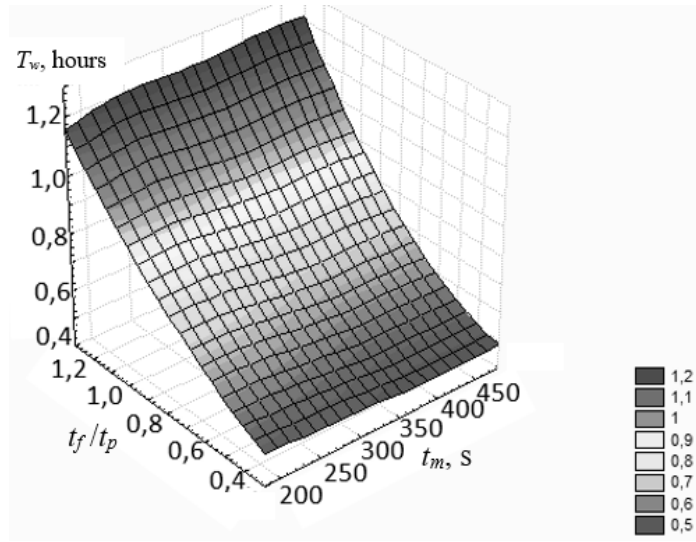


Fig. 10. Dependence of the duration of a production line operation to perform the program for 100 products during the time t_m of the operation performed immediately on the equipment and without the participation of the operator, and the correlation t_f/t_p, under: $t_f \rightarrow min$, $t_p \rightarrow min$

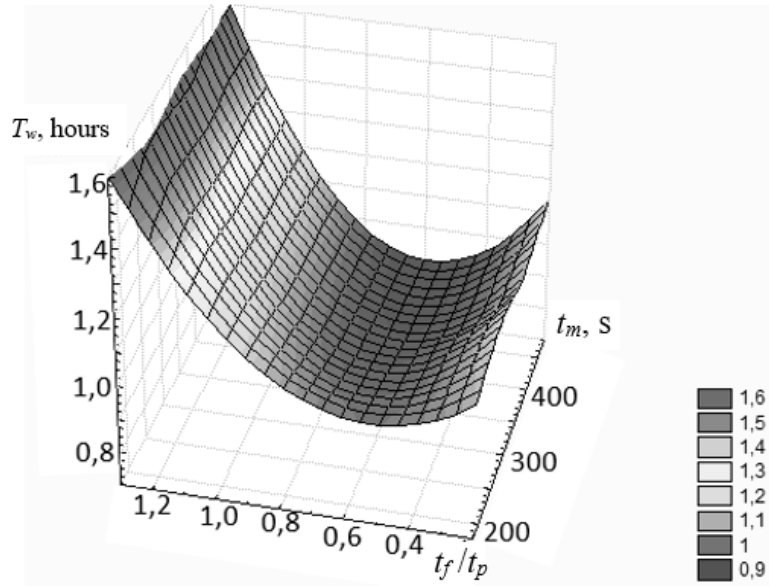


Fig. 11. Dependence of the duration of a production line operation to perform the program for 100 products during the time t_m of the operation performed immediately on the equipment and without the participation of the operator, and the correlation t_f/t_p, under: $t_f \rightarrow max$, $t_p \rightarrow max$

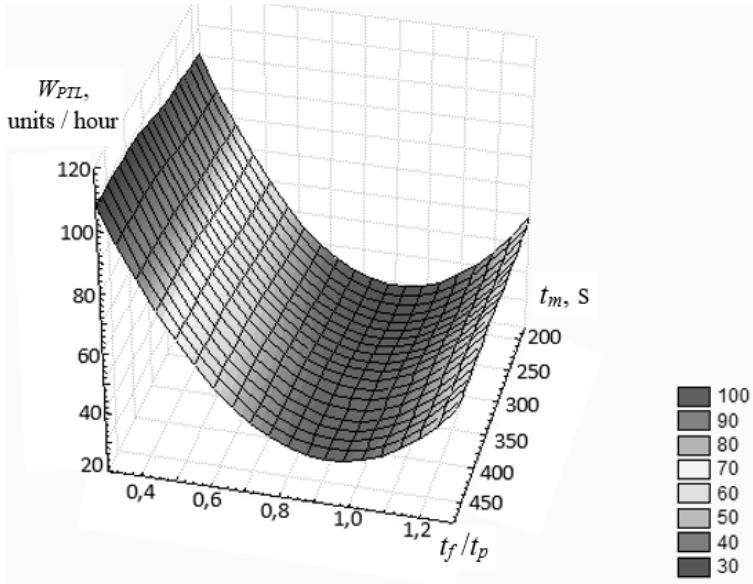


Fig. 12. Dependence of the efficiency of technological equipment on the duration t_m of the operation performed immediately on the equipment and without the participation of the operator, and on the correlation t_f/t_p, under: $t_f \rightarrow min$, $t_p \rightarrow min$

4. Discussion of the results

The analysis of modelling results demonstrated that under the optimal workload of an operator ($1.0 \leq K_{op} < 1.15$), the duration of time required to perform the program changes linearly, regardless of the time tm of the operation performed immediately and without the participation of the operator, and depends on the type of equipment (Figs. 10 and 11).

The analysis into the dependence of the efficiency of technological equipment on the duration tm of operations performed by computer without the participation of an operator, and the correlation t_f/t_p under $t_f \rightarrow min$, $t_p \rightarrow min$ (Fig. 12) confirmed that the productive efficiency of equipment is subordinate to the second-order equation. In the 3D diagram (Fig. 12), the domain of the efficiency of a technological process at the level of 29–36 unit/hour corresponds to the manual equipment with a linear arrangement, and 51 unit/hour or more — the automatic equipment with the arrangement, which is required for the work of manipulation robots.

Therefore, the results of the research on the dependence of the efficiency of a production line on time characteristics of the technological process can be used to optimise the process control by determining the efficiency of the optimal operation by expression (1).

The reduction in losses of a technological process efficiency causes an increase in system efficiency.

Conclusions

The analysis into a technological process of computer technologies demonstrated that the duration of preparatory and final operations depended on the type of equipment, level of automation of operations and instruments, and partially depended on an operator's qualification and sense of responsibility.

The amount of technological equipment serviced by one operator characterises the workload under the condition of the conformity with standard requirements for computer technology.

The time interval of the technological equipment operation depends on intervals of preparatory and final operations and the time tм of the operation performed immediately on the equipment and without the operator's participation. Thus, when the factor Kop of the operator's workload approaches one, the duration of the equipment operation reduces. However, in the case of increasing $K_{op} > 1$, the operator will be underloaded, and thus, the duration of the technological equipment operation will increase.

The optimality of the approved managerial decision is reached under the condition when $K_{TP} \rightarrow max$.

The developed method for the analytical determination of the workload helps to calculate the workloads of an operator and technological equipment. The calculations of the duration of a production line operation resulted in the methodology for the consideration of probability characteristics pertaining to the time distribution of the period required

to perform operations, expressed a the irregularity of the production line efficiency.

The consideration of the probabilistic character of distribution of time intervals required to perform an operation is taken as a parameter for the management of a technological process optimisation, which can be achieved using simulators of technological processes with optimised efficiency.

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Servitization of public service processes with a simulation modelling approach

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A B S T R A C T

This article aims to examine how the theory of co-production can be connected with servitization and digitalisation and used together for the public service development with the help of discrete-event simulation modelling to highlight time-related deficiencies of a complex public service process, which is most commonly used by patchwork families. Data was taken from the Guardianship Office in Győr (Hungary), based on which in-depth interviews were conducted. Based on the legal background and the interviews, the authors of the article created the process model of the contacting procedure. Based on the model, discrete-event simulation was used to identify the process elements for potential improvement through servitization. Discrete-event simulation showed the insufficiency of national regulation regarding the whole process and weaknesses of the contacting procedures in terms of quality and success. Basic reasons were found for the dissatisfaction expressed by participants of the procedures (administrators and customers). The increasing customer demand for high quality and efficient public services and failures in the New Public Management (NPM) in Eastern European countries require other approaches to advance. The paper connects the theory of co-production and servitization in a public service context and demonstrates how a complex public service can be examined with this approach to find possible improvements. The government must change the process regulation considering the number of the cases, the workload of administrators and family types (divorced or patchwork). The emphasis should be placed on the training and experience of administrators.

K E Y W O R D S

co-production, digitalisation, discrete-event simulation, public service processes, servitization

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Introduction

In the age of ever-increasing stakeholder expectations, developing new and improving on existing public services is a challenge for every government (Lathrop et al., 2010; Ringold et al., 2013; O'Toole, 2015). These expectations in the globalised and rapidly digitalising world are pushing governments to find new ways to meet the needs of their citizens at the same or higher levels of efficiency than before (Casalino et al., 2013). Because of this, public

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administration as a profession is facing increasing stakeholder expectations (Lathrop et al., 2010; Ringold et al., 2013; O'Toole Jr. & Kenneth, 2015). Solving complex problems of knowledge economy requires the collaboration of different actors for regions to mobilise and utilise sources, accelerate growth and improve competitiveness (Tamándl et al., 2014). The satisfaction with actors of the public sector can improve the competitiveness of cities (Filep et al., 2010). Citizens of a state can be considered as customers, but customer satisfaction is a complex concept, which is difficult to define properly (Stoker, 2006; Meynhardt, 2009). Moreover, the most attractive opportunities for IT companies are the solutions required by governments, manufacturing companies, and banks, so the IT companies are also interested in entering a new market (Reicher, 2014). In Eastern European countries, the dominant approach in the public service sector is the Weberian model (Jenei, 2009; Drechsler, 2009; Hajnal et al., 2018). After the change of the regime in the Eastern European countries, governments started to improve their public sectors. First, they used the New Public Management model to change the public services using available positive examples (Barberis, 1988; Kettl, 1995; O'Toole, 1997; Kaboolian, 1998; Terry, 1999; Lindquist & Paquet, 2000; Stark, 2002; Hood & Peters, 2004). The expectation for NPM was to improve the methods used and to make them more flexible to achieve higher consumer satisfaction in the public sector. Of course, there were also examples for making things worse than before (Osbore & Gaebler, 1992; Mintzberg, 1996; Drechsler, 2005) as NPM proved to be ineffective in terms of several aspects at a later stage, especially in Eastern European countries (Pollitt-Bouckaert, 2000; Hajnal, 2004; Drechsler, 2005; 2008; Nemec, 2010; Bouckaert, 2011; Drechsler et al., 2015).

The purpose of this paper is to examine possible ways to apply the long-existing phenomenon of servitization (Vandermerwe & Rada, 1988) in the field of public administration and use it for the development of a complex public service. While the concept of servitization is well-known in the manufacturing contexts, it has not or rarely has been used for public services.

Servitization generally means developing innovative capabilities that could complement and enhance product offerings. However, in this case, the authors of the article did not apply servitization to products but examined ways to improve the organisational capacity of a government agency to enhance the offered service. The paper connects the theory of co-production and servitization in a public service context and demonstrates how a complex public service can be examined using this approach to find possible improvements. The paper gives an overview of current research trends while examining how governments can use digital solutions for the servitization of public services.

The article uses the contacting procedure of Hungarian guardianship offices as an example. It discusses the steps of this complex service, demonstrates the specifics of the guardianship procedure and uses a simulation modelling approach to visualise and analyse the service process. Because this service is mostly used by patchwork families to settle issues, the nature of patchwork families — as the main customers of the service process and who would benefit the most from the servitization improvements — is discussed to help understand the nature and complexity of the service.

The main research question focuses on the possibility to improve elements of a complex service. This paper is the first phase of a lengthier research effort, trying to identify the possibilities and restrictions of the application of servitization-based solutions in the public field.

As a result of the research, the simulation highlights the time-related deficiencies of the service process as it shows how much longer it takes to finish the process in reality compared to how regulations define it, and how this situation affects the administrators who have to pay the penalty if the service delivery takes too long. Timely delivery is also essential for the head of the guardianship office, as it is the basis for effectiveness and judgement.

Time is a relevant factor in public service. Consumers find it important to receive the results of the public service as quickly as possible and of the highest quality possible. Services can be divided into different categories based on their complexity (Benedettini & Neely, 2015). Some services are less time consuming and can be easily standardised and digitalised, e.g., applying for a passport or renewing an ID card. In many countries, these public services are available from home, so for customers who do not want to go to the office personally, everything can be arranged online. But there are also more complex public services which are much more time consuming and their digitalisation and optimisation could be exceedingly difficult.

Administrators of these public services play a crucial role in service provision. Customer satis-

faction is greatly based on their skills as well as personality and attitude. The measure for the success of a service is customer satisfaction or dissatisfaction. The success of good governance of the respective offices is measured by the satisfaction of clients at the end of the administered case. Satisfaction is a complex issue. Nobody enjoys such administrative procedures; therefore, the services must be fast, sensitive and definitely successful. Clients prefer cases to be administered in one place or at least with little legwork. Different types of business conduct can be encountered in district offices. Some cases are referred to as typical and affect the majority of clients, while others affect only a small target group. One such small target group is patchwork families, which are a specific group affected in many cases. Patchwork families are complex, and the literature considers them to be inhomogeneous, providing several different types.

Patchwork families encounter several challenges in different areas of life. The arrangement and operation of reorganised families and the preservation of the mental health of their members are interesting areas for family psychologists. Sociologists, however, focus on the emergence of new family types and the resulting social changes and challenges. Marketing professionals perceive patchwork families as a potential target market, which also buys products and product portfolios that are different from those selected by traditional families, basing purchase decisions on different mechanisms. Due to a complex family model, workers living in patchwork families require more empathy, attention and more flexible working hours from corporate HR departments.

It is incredibly difficult to optimise these service processes and analyse their elements. As NPM cannot provide practical solutions for this problem, other methods and approaches must be found. An examination of the education system by Rámháp et al. (2017) led to a conclusion that public institutions should apply marketing and management techniques originating from the business to respond to challenges arising in the environment and adapt their competitive ability (Filep & Kovács, 2005). The theory of Co-Production and Co-Creation (Boyle & Harris, 2009; Durose et al., 2013; Nambisan, 2013; Osborne et al., 2013, 2016) provides a practical way to plan and deliver public services. Servitization offers a unique approach to the use of new methods for the analysis and development of public services.

The paper first presents the theoretical background of co-production and servitization. Next, it offers the background of the examined contacting procedure and the nature of patchwork families who are the most common customers of this service. Then, the background of discrete-event simulation is given and the details of the collected data, which were used to create the simulation of the service process. The remaining part of the article discusses the results of the simulation and benefits for customers and facilitators from the improvement of the service.

1. Literature review

1.1. Co-Production and servitization in public administration

In the last decades, as technology and society developed, governments realised the necessity to find new ways and methods to improve public services and maintain their efficiency as well as to answer to the changing needs of citizens to secure the satisfaction of the public. With growing expectations, old-school bureaucratic processes and the lack of fast and efficient solutions often turn people against the government, leaving a poor permanent impression (Richwine, 2012).

According to Nemec et al. (2019), while many research papers focus on co-production and co-creation in the international body of literature, only a few originate from Central and Eastern Europe. This paper aims to help fill this gap by focusing on intricate public services, such as the contacting procedure used at the Hungarian guardianship office. This research aims to emphasise the importance of the role played by public service employees in such processes as they are an essential part of the service just as customers.

According to Osborne et al. (2013, 2016), co-production is one of the public policy reforms, which can be considered an effective way to plan and deliver public services (Boyle & Harris, 2009; Durose et al., 2013; Nambisan & Nambisan, 2013). Osborne et al. presented the conceptualisation of co-production and highlighted how it was theoretically rooted in both public management and service management theory (Osborne & Strokosch, 2013).

In public administration and management literature, co-production originated from efforts by

Ostrom (1972) and also by Alford (2014), who re-evaluated Ostrom's work. The literature on the New Public Management presents co-production as "consumerism", and also, it can be found in the literature of the New Public Governance as well as a systems-level approach to public service delivery methods.

According to Osborne et al. (2016), the theory focuses on the way of adding service user participation to the whole service process aiming to increase quality. However, from the service management perspective, the literature says that co-production is already an essential and core component of service delivery and delivery is inseparable from co-production (Osborne et al., 2016). Users have no choice, which means that co-production happens whether they know it or not; thus, co-production is an intrinsic process of interaction between service providers and users when the service delivery happens (Osborne et al., 2016).

Osborne et al. (2016) focused on the relationship between co-production and the co-creation of value through public service delivery and explored this relationship further in a detailed literature review. It resulted in the definition of "co-production as the voluntary or involuntary involvement of public service users in any of the design, management, delivery and/or evaluation of public services" (Osborne et al., 2016, p. 2).

Nabatchi et al. (2016) also defined co-production as "the involvement of both users and public sector professionals in the delivery of public services"; however, they also highlighted that "this definition is neither used consistently nor applied in ways that make clear what does (and does not) constitute co-production" (Nabatchi et al., 2016).

Because of various other definitions and interpretations, Nabatchi et al. (2017) summarised the need to clarify whether services of a guardianship office in general and the contacting procedure in particular could be examined from the co-production point of view, especially because of the nature of this complex service. According to Alford (2014), in the case of co-production, public service providers can be considered regular producers and customers (citizens) — the co-producers of the service process. However, while some authors (Brudney & England, 1983; Parks et al., 1981; Pestoff, 2006) stated that involuntary participation with one party feeling obligated to participate in the service process could not be considered as co-production, other authors (Alford, 2002, 2006, 2009; Osborne et al., 2016) disagreed. In terms of this contradiction, the authors of this article agree with the latter and, thus, examined the contacting procedure from the point of view of co-production.

Servitization can be defined as the innovation of an organisation's capabilities and processes to better create mutual value through a shift from simple selling to an integrated product and service offering that delivers value in use (Vandermerwe & Rada, 1988; Neely, 2008; Neely et al., 2011). There are similarities between private organisations and public service providers as they both aim to improve customer satisfaction, efficiency and effectiveness, but they also differ from each other in many ways.

Servitization now refers to the process of creating value by providing additional services to products (Vandermerwe & Rada, 1988). Since its first appearance, the term was studied from several angles by scholars to uncover a different kind of methods and implications of service-led competitive strategies for manufacturers (Wise & Baumgartner, 1999; Oliva & Kallenberg, 2003; Slack, 2005; Shikata, 2019).

In the last three decades, servitization has been a popular strategy in the manufacturing sector, and according to the relevant literature regarding the manufacturing industry, an increasing number of companies are complementing their products with value-added services (Vandermerwe & Rada, 1988; Wise & Baumgartner, 1999; Fang et al., 2008; Baines & Lightfoot, 2009; Kozłowska, 2020). Also, scholars have shown a steady interest in the understanding of how firms create value by adding services to products (Cusumano et al., 2015; Németh & Dőry, 2019).

Numerous examples of servitization include areas of finance, transportation, manufacturing (Dachs et al., 2012) and education (Arantes, 2020). According to the literature, servitization is usually a subscription model and can be applied to most industries in one way or another. It developed out of the necessity for businesses to remain profitable and competitive in an age where the financial aspects of design and manufacturing are becoming increasingly more challenged by emerging markets and, apparently, the concept of servitization is in strong connection with value delivery.

The servitization of public services seems to be a noble but also a tricky challenge. Several significant differences exist between private and public service providers, including, e.g., the lack of competitors. However, in essence, the ultimate goal of governments and private companies are basically

the same. Although the approach may be different (top-down, bottom-up), they both aim to satisfy customers and save money while increasing efficiency and effectiveness and (Kurucz, 2016). Despite other reasons, public satisfaction is important for the government as much as for companies. However, to satisfy customers by adapting and creating new and even better products and services, it is important to know what they think about the existing situation.

According to Hockerts and Waver (2002), three main forms of Product–Service Systems exist. The first is product-oriented, and in this case, the customer gets the ownership of the product while the manufacturer provides additional services, which are related to the product directly. The second is use-oriented, where the service provider retains the ownership of the product and uses a modified distribution and payment system, such as sharing or pooling to sell the functions of the product. The third is result-oriented, in which case the provider replaces services for products (Hockerts & Weaver, 2002).

Neely (2009, 2012) extended this list with two additional categories to be able to include the full scale of servitization applications and results (Neely, 2009, 2012).

The two new categories are integration-oriented Product–Service Systems and service-oriented Product–Service Systems. In the first case, companies conduct a vertical integration adding services at the downstream of their value chain. In the second case, companies provide new services for their products in a way that they integrate those services into products (Neely, 2009, 2012).

According to Neely (2012, 2013), there are four main categories of reasons behind the application of this phenomenon: economic, strategic, environmental and technological (Neely, 2012, 2013). The first three main categories are usually considered more or less responsible for applying the concept of servitization by companies, but there is one more category, which increasingly accelerates the shift and can be considered as a major driver of servitization. This category is technological reasons (Neely, 2012, 2013).

At one point, technology was only considered as an enabler of servitization approaches. However, with the tremendous amount of new innovations introduced in the last three decades, the world is now one big pool of infinite data which can be collected and analysed in many ways to gain valuable information about customer demands and trends. Thus, the potential for new and innovative services grows with every year. According to Lightfoot and other researchers, technology will enable a higher level of service delivery, and future products and services can be tailored to individual product needs of customers. This is possible thanks to the upcoming age of The Internet of Things (IoT), which will greatly accelerate the servitization in the future as it will turn the physical world into a digital information centre (Baines & Lightfoot, 2013).

"The technology — and particularly the ability to capture and analyse "big data" — open up some new opportunities for service innovation" (Neely, 2013, p. 3).

While governments are trying to meet the growing expectations of citizens, the relationships between a citizen and a public institution become more and more complex as they mutually influence each other. Numerous IT tools are available to be transferred to the public sector to increase customer satisfaction, efficiency and effectiveness (Süle, 2018).

Manufacturing companies choose servitization due to economic, strategic, environmental and technological reasons. The same reasons apply to the public sector as well. Digitalisation and new technological solutions are already present in most public administration systems on different levels as the world approaches the age of e-government and e-governance (Jeong, 2007). While private companies and public organisations are different in many terms, fundamentally they both aim to create more effective and efficient solutions, which are not just economically acceptable but also satisfy customer needs. In other words, governments started attempting the servitization of public services. The literature clearly shows that servitization is much more than simply the creation of additional services. It also changes the way how products and services are perceived.

1.2. Theoretical background of patchwork families

Professionals representing different disciplines have been dealing with the sociological and psychological analysis of the lifestyle of stepfamilies (Cheal, 2002). The actuality of the topic is proved by the rise in the number of stepfamilies, which has become a worldwide phenomenon. While 83 per cent of children in stepparent families live with their natural mother, there appears to be little recognition of the

difference between "intact" and "blended" families (Beck & Gernsheim, 2002). In the Christchurch Health and Development Study, nearly one in five children had experienced three or more family situations by the age of nine (Fergusson et al., 1984). In the United States, 12-year olds who had experienced more than two family changes were more likely to show disruptive behaviour in school than those who had experienced none (Kurdek et al., 1995).

The United States Census Bureau (2003) reported that 16 per cent of all families with children living at home were classified as stepfamilies. In Hungary, every sixth child lives in a stepfamily (Spéder, 2005). Besides the rising international publicity (Ahuja et al., 1998; Felker et al., 2002; Beck & Gernsheim, 2002; Fisher et al., 2003) several research programmes were started in this topic (Corfman & Ehmann, 1987; Foxman et al., 1989; Schumaker Dyke, 2005).

Before introducing the literature background, it is inevitable to define what stepfamily means. (1) A stepfamily, also known as a blended family or reconstituted family, is a family, in which one or both members of the couple have children from a previous relationship. The member of the couple to whom the child is not biologically related is the stepparent, specifically the stepmother or stepfather (Mintel, 2005). (2) A blended family is a family that is formed when separate families are united by marriage or other circumstance (Barker, 2003, p. 46). (3) A reconstituted family (also known as a blended family) is the sociological term for the joining of two adults via marriage, cohabitation or civil partnership, who have children from previous relationships. (4) A new family made from the remnants of divorced families (Biblarz & Gottainer, 2000).

In Germany, stepfamilies were first mentioned in 1984 (Sager et al., 1983). Earlier, such families were founded by the remarriage of widows with children. However, a large-scale rise in the number of divorces became the reason for the frequent creation of stepfamilies (Clarke & Joshi, 2005). According to Sager (1983), a stepfamily is formed by marriage (or cohabitation) of two partners, of whom at least one had already been married. Visher and Visher (1995) defined a stepfamily as a symbiosis where at least one adult had the role of a stepparent. From the point of view of the systems approach, a nuclear family contains a couple or a parent subsystem and a child–sibling subsystem. Parents who do not live together with the family after the divorce play an important role in the life of the new family as well (Allan & Crow, 2001). The importance of the role and values of the family was also emphasised by Huszka and Platz (2017).

McGoldrick and Gerson (1987) completed a family map with a genogram. From the outside, a stepfamily might not differ from a nuclear family; however, there is a significant difference between the two (Hetherington, 1999).

The analysis of stepfamilies reveals special importance of borders, positions, hierarchy and the connecting subsystems. The most important comprehensive typology was made by Sager (1983), who made a distinction between 24 types of stepfamilies. Papernow (1980) denoted two types, namely, (a) a simple stepfamily-system (one parent–child system and a stepparent) and (b) a complex family (the subsystem of two parents and a child). According to the opinion of Burgoyne and Clark (1981), more differentiated categories are necessary, and stepfamilies with one or more common child require a diverse definition.

Verena Krähenbühl (2011) et al. elaborated on a typology which distinguishes whether a stepfather or a stepmother joined the system: (1) a family with a stepmother, (2) a family with a stepfather, (3) a complex stepfamily, (4) a stepfamily with a common child or children, and (5) a part-time stepfamily. Stepfamilies are less solidary than other families, and they encounter conflicts due to differences of family members (Bien et al., 2002; Clingempeel et al., 2004; Tinson & Nancarraow, 2007). Children have less voice in each decision since the family members do not want the situation to be more complex (Tinson et al., 2008). Their common thinking is family-centred, which is why it is often observed that they try to frame their lifestyle into that of normal families, denying the differences (Bray & Berger, 1993). For the members of stepfamilies, one source of difficulties is that it is not clear what role is required from them (Fischer, 2005). These families have no common history; therefore, conflicts can occur regarding child-upbringing and decision-making in connection with everyday tasks (Lawton & Sanders, 1994). Research indicates that problems, such as poverty, mental health and behavioural issues, difficulties at school, and general health problems occur more often among the children (Cockett & Tripp, 1994). The hardest problem to solve is the material clash. Money is extremely important in our lives. Although it is common for a household to manage finances together, some decision can be made separately

(having separate bank accounts) (Lansford et al., 2001). Stepfamilies have to plan more than nuclear families, which can make household planning and marriage greatly important (Clark, 2008). However, the family type affects their purchase decisions-making and the characteristics of the process itself as well (Rogers-Rose, 2002; Brown, 2004). Eisingerné et al. examined the purchase decision process in patchwork families, stating a difference in the processes applied by patchwork families compared to nuclear families (Eisingerné et al., 2012; Eisingerné, 2014).

1.3. Unwrapping the contacting procedure

The question may arise whether public services, district offices or their sub-departments have anything to do with patchwork families and their members. The answer is yes, and primarily at guardianship offices. The workers of guardianship offices deal with such cases daily, providing services to members of patchwork families. Typical cases for patchwork families are:

- cases related to alimony,
- contacting,
- open adoption matters.

Based on the literature review, it seems important to highlight the legal regulation applicable to contacting. According to the governmental decree 331/2006 (XII.23) on the roles and responsibilities in child protection and guardianship affairs and on the authority and jurisdiction of guardianship offices, par. 9, the district office for child protection and guardianship affairs (guardianship office):

- decides about the communications between the child and the parent, or another person in charge of contacting, orders monitored contacting in justified cases, and also orders the mandatory child protection mediation procedure or the use of the mandatory supported procedure,
- disposes of the enforcement of the court's or the guardianship office's regulation on communications.

The following laws apply to the activities of the guardianship office in general and contacting procedure in particular:

- Pars. 4:178–185 of Chapter 18 on exercising parental supervision of the Fourth Book (Family Law) of Act V of 2013 on the Civil Code deal with communications.
- Article 4 (pars. 27–33/B) of 149/1997 (IX. 10.) Government Decree on the guardianship offices and the proceedings of child protection and guardianship cases deals with contacting.
- Act CL of 2016 on general administrative order, which entered into force on 1 January 2018, disposes of the rights and obligations of the clients, of the general administrative deadline and of the rules of conducting the administrative procedure. Act XXXI of 1997 on child protection and guardianship administration, disposes of the rights and obligations of the child and the parent, and on the main rules of child protection and guardianship administration.
- The above acts were considered as "literature" as well as Chapter XVI of the 2nd volume of Polgári jog kommentár (commentary on civil law commentary) edited by Dr Ferenc Petrik.
- The national government office judges the requests for legal remedy handed in against the decisions of the official procedure of the first instance; the office also states its own professional case regarding unique decisions, and according to a determined plan, executes the control of the authority of the first instance and the target examination of each field, and in doing so, it has supervision over the authorities of the first instance.

The basics of the research are provided in the model below, which is the basic model of the contacting procedure applied by guardianship offices (Fig. 1). This model illustrates the above-mentioned procedure, for the administration of which the law ensures 60 days. The procedure is considered a "production process". The pending question for the continuation of the research is whether this model is applicable in the case of patchwork families in its current form and whether 60 days were enough for the procedure involving patchwork families as participants.

1.4. Discrete-event simulation

A simulation is an imitated operation of a real process or system over time. This includes the creation of an artificial history of the system and the observation of this artificial history in order for the creator to draw conclusions about the operational characteristics of the real depicted system (Bernard et al., 2000; Bohács, 2012).

A discrete-event simulation model is defined as one, in which the state variables change only at those discrete points in time, at which events occur. Discrete-event system simulation is the modelling of

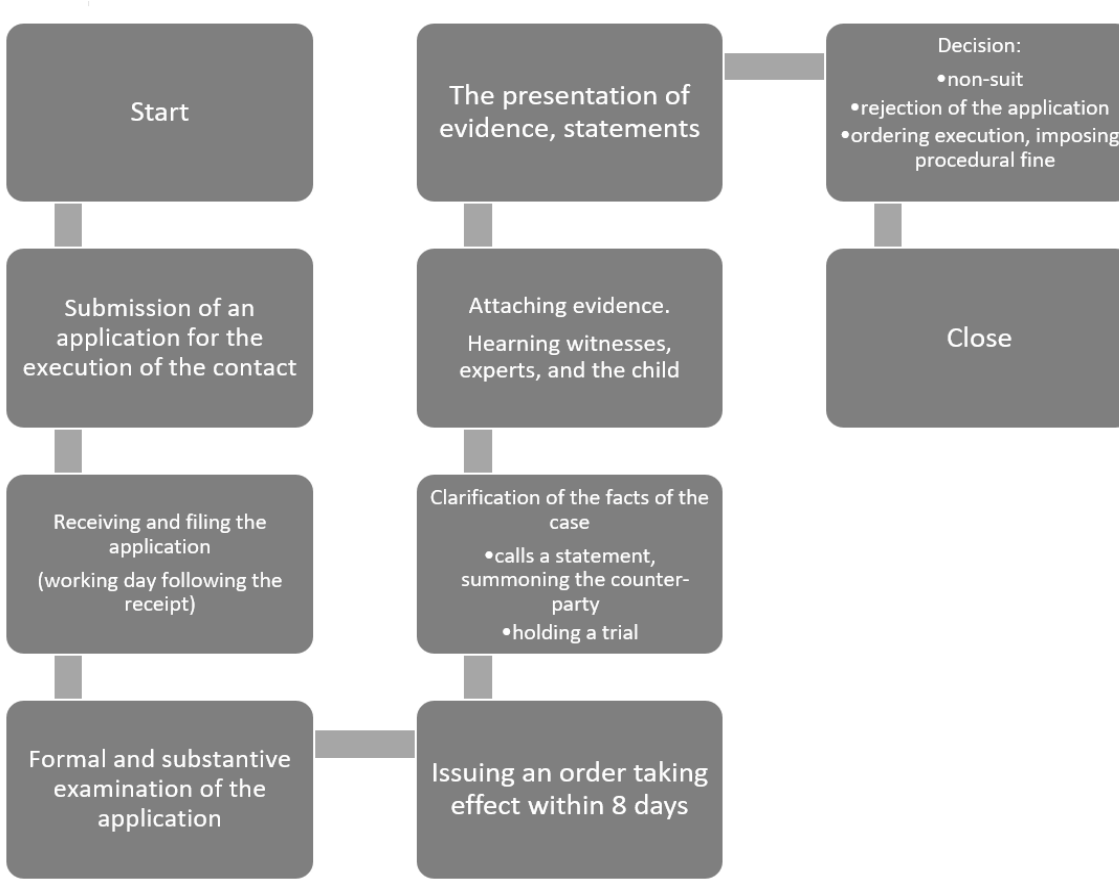

Fig. 1. Process steps of the contacting procedure

systems, in which the state variable changes only at a discrete set of points in time.

The discrete-event simulation tracks the state changes in the model components at the time the changes occur. Unlike continuous simulation, where the clock runs in a continuous manner, the clock in discrete-event simulation jumps from one scheduled event to the next. Events can schedule other events, such as an object entering a machine, which schedules an event for the same object to leave the machine. Discrete-event simulation only shows the state changes of the model components at certain points in time, not continually over time. When certain events take place, certain model components change their state and, thus, control the simulation (Bernard et al., 2000; Bohács, 2012).

A simulation is a test, in which a system or the expected or actual behaviour of the system is studied in a physical or computer model of the process. Accordingly, simulations are simplifications of reality that focus more on the system as a whole and less on its details. The simulation imitates a real phenomenon with the help of the available alternative technological solutions, which most often means a simulation software developed for this purpose. The purpose of the simulation is to create the same or very similar conditions for users in the virtual environment at the model level as the simulated phenomenon. This allows using a virtual environment that mimics the operation of the original system to accomplish a specific task, which greatly facilitates, e.g., various efficiency and optimisation efforts (Bernard et al., 2000; Garrido, 2009).

The purpose of the simulation is to understand the features and essence of processes. It allows answering the question "What would happen if…?" without any financial or safety risks. Changes can be made to parameters, and different setups can be tried to find the optimal solution during the design or review phase. The simulation requires a model that properly describes the steps, relationships and features of the process. The level of detail and what "properly" means is always a valid question. These models are simplified descriptions of reality and, as a rule of thumb, the model should be simple but also detailed enough to grasp the general and studied behaviours of the real process (Bohács, 2012; Banks et al., 2013; Prateek, 2015; Martijn, 2017).

The model not only describes the relationships and the steps of the processes but features of the steps. These features involve parameters such as processing times, input rate, etc. In the case of modelling an existing real-world process, such parameters must be measured or estimated as distributions to simulate significantly more cases than measured. The way the model is described is based on the framework that is used. Usually, simulation frameworks provide ways and tools to describe the models, while also allowing to "operate" or "run" these models. This framework, the set of rules that describe how to operate the model, can be executed manually or, more optimally, by software (Prateek, 2015; Martijn, 2017).

2. Research methods

This paper aims to examine how the phenomenon of servitization could be applied in the field of public administration and how it could be used for complex public service development. Servitization generally means developing innovative capabilities that could complement and enhance product offerings. In this research, the approach of servitization is applied in a public service context, and a complex contacting process is used as an example.

Data was collected from the Guardianship Office in Győr (Hungary), and in-depth interviews were conducted. Based on the legal background and in-depth interviews, the process model was created for the contacting procedure. Based on the model, discrete-event simulation was applied to identify the process elements where protentional improvements could be made through servitization.

The new model was used to create a simulation about the procedure, to examine the connection and relationship between the Governmental Regulation and the practice. Discrete-event simulation showed the insufficiency of the Governmental Decree regarding the whole process, weaknesses of the contacting procedures in the field of quality and success. The basic reasons for the dissatisfaction of the procedure participants (administrators, customers) were found.

In the discrete-event simulation, a specific case of a patchwork family) was used. Based on the theory of the authors, it was impossible for the administrators to conduct the whole procedure on time and with appropriate quality as, if required, it may involve doctors, policemen, teachers, kindergarten teachers, psychologist etc.

In the current phase of the research, the authors conducted seven in-depth expert interviews with the head and other employees of the Guardianship Office of Győr. The analysis of the model showed that the time factor, which is especially important for the procedure, was not indicated at all. Furthermore, the procedural elements, which may repeat or induce a further delay in the procedure, were not indicated either. For example, there is no indication that different parties have to be summoned during the procedure, which may take a long time due to the complexity of posting and notification. It may increase the duration of the procedure by two weeks.

The hearing of the experts (doctor, psychologist, teacher, and kindergarten-teacher) also takes a long time and slows the entire procedure down, making the close on time impossible. During the procedure, it would often be necessary to use a mediator. Each affected party can ask for a mediator, but the administrator can also offer the service. However, administrators often do not use this option as they are sure that the procedure would not be closed within 60 days in such a case.

Administrators have two choices. First, they can comply with the rules and decide on the time, in which case, the quality would be compromised. Such an option does not seem appropriate when dealing with people. Hence the second choice to exceed the time frame and concentrate on the quality. However, in this case, administrators fail to operate within the time limit (especially in the case of patchwork families), having to pay a fine of HUF 10.000 (EUR 30). None of the choices is good. In this situation, neither the administrator nor the affected parties would be satisfied.

Table 1 illustrates the complexity of the contacting procedure used at the Guardianship Office of Győr-Moson-Sopron County in 2017. Each case is divided into sub-numbers, which means that newer actions were submitted by parties during the procedures. Obviously, the higher are the sub-numbers, the more complex is the case, and the more the case bothers the participants. Furthermore, it increases the duration as well as the complexity of the procedure. It is a vicious circle, which is difficult to break.

Table 2 shows cases with sub-numbers, in which patchwork families are/were the participants. Sorted in the descending order, the data clearly shows that cases of patchwork families were more difficult. They had more files, used the more of the administrator's time and had little chance to be closed on time.

Tab. 1. Contacting procedure of the Guardianship Office of Győr-Moson-Sopron County in 2017

Main number	Sub-number 1-10	Sub-number 11–30	Sub-number 31–50	Sub-number 51–100	Sub-number above 100
153	112	27	8	4	2

Tab. 2. Contacting procedure with patchwork families used at the Guardianship Office of Győr-Moson-Sopron County in 2017

Sub-number	Patchwork families
133	M7
112	M13
109	M1
95	M5
81	M2
58	M6
48	M4
37	M8
28	M3
14	M9
11	M11
10	M12
6	M14
6	M16
5	M15
2	M10

3. Research results

The research used the Tecnomatix Plant Simulation software by Siemens, which offers a wide range of tools to build and operate process simulations and imitate the behaviour of the real process. First, the process was built based on how it should look like according to the laws and regulations detailed before. The collected data was used to define the processing time parameters of each step (Fig. 2).

In the simulation, the objects moving from the source to the sink are individual cases. Each station of the simulation represents a main step of the contacting procedure, such as the examination on an application, attaching evidence, decision-making, etc. Five categories of moving objects were defined according to the data (Fig. 3).

By using methods to create simple programmes, the simulation becomes highly customisable, which is an excellent benefit of this simulation software as many different and complex scenarios can be probable.

After the simulation of multiple cases with the built model, the authors of the article concluded that the average time needed to finish a case was 49 days, which is within the frame of 60 days. According to this simulation, an ordinary case can be closed before the deadline, which is regulated by the law (Fig. 4). However, as previously discussed, some could take significantly longer to finish, and this was suggested by the information collected during the in-depth interviews. For example, according to the experience of the administrators, the complexity of posting and notification could increase the duration of the procedure by several weeks. However, these steps were not detailed in the original service process. Therefore, the posting and notification process was added to the simulation model, and its parameters were defined according to the experience of the administrators.

After rerunning the simulation, it turned out that the average time needed to finish a case was 81 days, which exceeds the current regulation by 21 days. The simulation results correspond to the experience of administrators who stated that sometimes, cases could run for several months and even longer due to their nature and complexity. One solution could be to improve the posting and notification process. It could be digitalised at least partially, as currently, this part of the process is completely manual and uses regular post and delivery methods as discussed before. Administrators dealing with a more complex case, in which multiple external actors should/could be involved, must notify them using regular post. Usually, replies are also received in the same way, whether the actors are sending back requested data, asking for more detailed information or just confirming that they are ready to participate.

While this difference reveals only one aspect of the complexity of a public service process, this research is the first to provide real proof in relation to for the contacting procedure and its failure to meet regulations. Thus, steps should be made to re-evaluate the process regulation in detail and find ways to improve its efficiency and effectiveness.

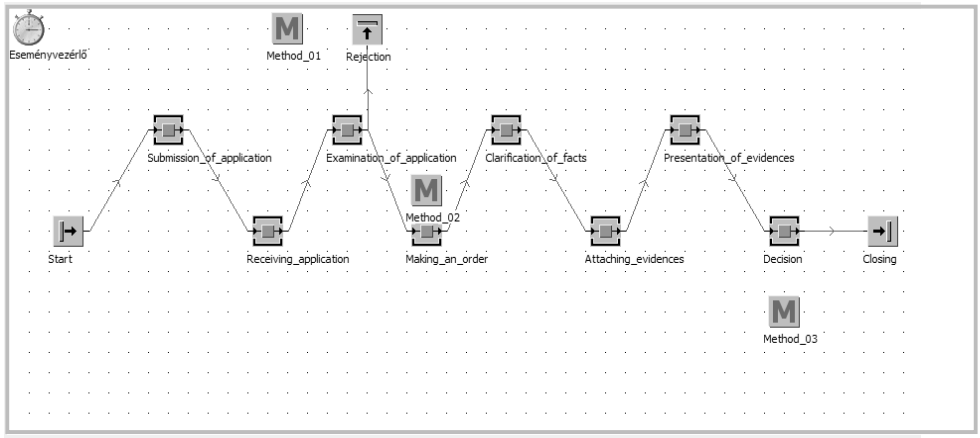

Fig. 2. Simulation model of the contacting procedure according to regulations

	object 1	integer 2
string	MU	Case number
1	.MU.A	112
2	.MU.B	27
3	.MU.c	8
4	.MU.D	4
5	.MU.E	2

Fig. 3. Case categories and numbers defined

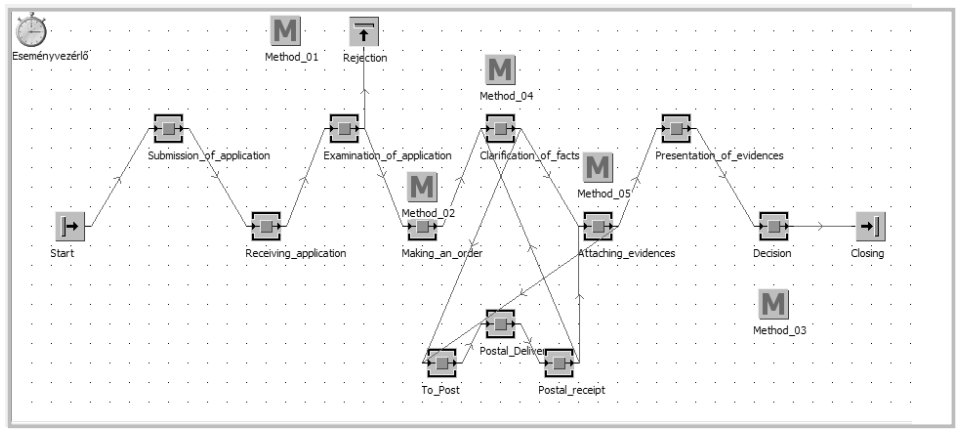

Fig. 4. Simulation model of the contacting procedure with the detailed posting process

4. Discussion of the results

While digitalisation is not the only way towards the servitization of government services, the technological developments can make a significant impact (Sabbagh et al., 2012) on service operations and processes, which makes digitalisation a promising avenue to pursue. Trends in the private sector can provide good examples of innovation in terms of servitization approaches, which use digitalisation methods to increase efficiency and effectiveness (Dinges et al., 2015), and these innovative ideas could be useful in the public sector as well.

Researchers who studied servitization in the private sector or in the field of education generally agree that the technological advancements can lead to new servitization solutions because customers create increasingly more data, which can be analysed and used not just as feedback but also as a resource to predict future needs. In the very same way, governments could use the feedback of the administra-

tors to create better services and to predict future needs, which could lead, e.g., to shorter queues and faster service.

In the last decades, as our technology and society rapidly developed, governments realised the necessity to develop new ways and methods for services to maintain efficiency and answer the changing needs of citizens to secure the satisfaction of the public.

The authors of this article believe that public service digitalisation and emerging e-government solutions can play the role of enablers and accelerators of the servitization of public service systems just as they earlier did in the private sector. However, because of the general differences between private and public service providers, new solutions should be implemented carefully.

We could see that contacting procedures are especially complex and lengthy. The law requires the administrators of the guardian office to strictly remain within the timeframe allotted for case administration; however, it does not consider either the complexity of the cases or different family types.

Conclusions

Based on the simulation model, the service process takes longer to finish than the allowed timeframe, which corresponds with the collected data and experience of the guardianship office administrators. The analysis of the model showed that the time factor of the procedure was not indicated at all. Furthermore, the procedural elements that may have to be repeated or create further delays in the procedure were not indicated either. For example, different parties have to be summoned during the procedure, which may take a long time due to the complexity of posting and notification. It may increase the duration of the procedure by up to two weeks.

This situation can immensely affect the quality, efficiency and effectiveness of these processes as administrators are forced to take shortcuts in some cases to save time, which also affects customer satisfaction. The research is the first effort that provided real proof for the contacting procedure and its failure to comply with regulations. Thus, steps should be made to re-evaluate the process regulation in detail and find ways to improve efficiency and effectiveness.

By using the theory of co-creation to examine a public service process and its steps and participants and combining it with a digital servitization approach, public services can be viewed from a new angle. In the case of complex public services, where administrators are an inseparable part of the process, their feedback and experience can be used to map and analyse the process and find possible improvements with the help of digital solutions.

This study presents the initial steps of the research. The further aim of the research is to describe the contacting procedure with the help of a model that includes all elements of the procedure and considers the time factor as well as the possible risks. After the creation of the model, the authors aim to introduce the actual time needed for the procedure with the help of simulation and to discuss the optimal timeframe of the procedure in the case of patchwork families. The long-term goal is to call the attention of decision-makers to optimise the procedural deadline to ensure the satisfaction of both parties and the administrators.

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