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CONTENTS

DETERMINANTS OF ORGANISATIONAL COMMITMENT IN OUTSOURCING RELATIONSHIP

Katarzyna GRONDYS

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Abstract: Outsourcing relationships are an important element of creating the value chain, determining new conditions and challenges of business cooperation. Despite the widespread use of outsourcing, many agreements end in failure and the search for a new partner. The development of mutual attachment deepens the quality of the relationship not only in terms of financial benefits, but also those of an intangible nature. The aim of the article was to indicate features of affective, duration and moral commitment, depending on the shaping tendencies of outsourcing costs, that have the strongest influence on the stability and long-term nature of relationships. The study was conducted among randomly selected enterprises from the Opole region automotive industry. On the basis of the obtained results, a multivariable regression morel was built. It presents the costs changes of the use of outsourcing due to the organisation's level of commitment to the contractor.

Keywords: outsourcing, organizational commitment, long-lasting business relationships, co-operation.

1. Introduction

Features of modern outsourcing are the long-term and partner nature of cooperation between business entities, which result in the creation of an integrated inter-organisational business formation (Ciesielska and Radło, 2014). Moreover, outsourcing relationships contribute to organisational networks creation, which is an inseparable part of the value chain, creating new determinants for cooperation (Pec, 2017).

A good outsourcing relationship is primarily determined by generating benefits for both parties to the agreement. The source of this type of relationship is mainly of an economic nature and is based on simultaneous maximisation of profit while minimising the costs of hitherto implemented processes (Potkány et al., 2016). Each party of the cooperation seeks to generate benefits as big as possible, mainly for itself.

In the literature, the outsourcing relationship, from the perspective of financial and organizational benefits as well as barriers to effective cooperation, is described very broadly. An important part of it, much less emphasized, are non-economic factors, which also affect the efficiency and timeliness of the relationship. On the other hand, economic reasons determining the outsourcing relationship may also contribute to the partners getting accustomed to each other (DePersis, Lewis, 2015).

In search of the source of an effective and long-term cooperation, the concept of commitment plays an important role. The concept is based primarily on affective factors, which gain importance in the sustainability of the organisation's commitment to its business partners. Both economic and non-economic factors determine the frequency of change of partners, the scope of outsourcing and the length of an agreement. In building of a cohesive structure, it is important to strengthen those situations and elements of cooperation that allow for maintainence of a long-term, dependent relationship with one outsourcing partner.

2. Emotions in the business relationship

In achieving of mutual organisational balance, beyond technical issues, social and environmental issues that take into account the emotional aspects of human behavior are also important (McGrath, 2006). E. Banachowicz points out that interpersonal contacts in outsourcing are one of the key reasons for the problems of effective cooperation, which means that they are at the same time an important aspect of efficient implementation of the planned solutions. In her research, the author pays particular attention to the attitude of the employees of the outsourcing company, exchanging disputes during negotiation and design meetings, and a negative atmosphere as important symptoms of limited communication with the customer.

P. Mosak directs his observations towards the emotions accompanying outsourcing relationships that require understanding by managers. Skilful emotion management allows for influencing the partner and proper interpretation of its behavior (Ciesielska and Radło, 2014). D. Hill emphasizes proper communication in the relationship as "helping in finding mutually beneficial solutions, submitting proposals in search of realistic forms of cooperation and introducing a good atmosphere between the parties based on mutual trust and respect" (Hill, 2010, p. 152).

A necessary condition for the implementation of the assumed effects of cooperation is mutual trust between the parties (Ciesielska and Radło, 2014). B. Seligman treats the factor of mutual trust in the interaction between enterprises as enabling mutual cooperation and implementation of set goals (Seliman, 1997). In turn, M. Mitręga indicates key differences between trust built between enterprises and between an enterprise and a customer. These

relationships differ in complexity, as part of which enterprises create a set of interrelationships in the supply chain, as a result of which trust is conditioned by many entities. Organisational cohesion is, therefore, a basic element of a correct relationship based on trust. The author also emphasises that in the case of B2B relationship, termination of cooperation is much more difficult in case of unfavourable transaction due to the costs of changing the contractor (Mitręga, 2009). Such costs result not only from typical outsourcing estimates, but also have an indirect and social character. The former may include monitoring and supervisory agreement, creation of agreements and purchases, intangible assets and traditional costs. The social outsourcing costs are related to human resources and amount to a significant, but hard to specify level (Kremic et al. 2006). These costs are rationally justified only in the light of long-term cooperation related to the engagement in the success of the relationship of both parties.

Therefore, the transition costs derive not only from the so-called hard activities regarding the development of a proper strategy, financial analysis or physical flows, but are also conditioned by "soft" factors regarding changes in attitudes and behaviors as well as streams of knowledge, competences and emotions (Preus, 2012). On the other hand, it is possible that "the outsourcing costs are slightly higher than the costs of realisation of the process within the company, however, in turn additional benefits are obtained, ie: guaranteed quality, technical security or experience" (ONZ, 20.05.2017). All of those factors should be included in the final assessment of the effectiveness of the outsourcing relationship.

3. Organisation Commitment Types

Assessment of the engagement of business partners in the outsourcing relationship requires the identification of factors affecting the level of engagement. Particular attention was paid to the level of mutual commitment of the cooperators, based on the theory of employees commitment to the organisation (commitment theory), according to which the duration factor determines the level of work performance and profit generation (Lewicka and Pec, 2017).

The organisational commitment theory can be applied to business relationships in an outsourcing agreement, according to which an external company by being associated with the contractor is obliged to perform specific services in order to develop new benefits for its partner with simultaneous care for its own interests.

There are three leading types of commitment for an organisation that can be observed in the outsourcing relationship distinguished in the literature (Lewacka and Pec, 2017):

1. Affective commitment, related to emotional commitment with the business relationship, which can result from the partners being used to each other.
2. Duration of commitment, resulting from the reluctance to change the partner and incur costs due to implementation of a new project.
3. A normative commitment, related to staying in a relationship due to the concluded contract.

In this context, the outsourcing commitment should be considered in the aspect of mutual commitment of partners to each other in the dimension of emotional involvement, reluctance to change and the adopted principles of cooperation. In the case of outsourcing, the generated benefits include, above all, profit, minimisation of performance-limiting behaviours and limitation of the Customer's tendency to change the partner.

4. Aim and scope of the study

The aim of the study was to identify the factors of organisational commitment, which determine the mutual commitment of partners in the outsourcing relationship. The obtained results may be used to create a strategy of effective and long-standing cooperation ob both parties to the agreement. The analysis was based on the data collected on the basis of a research questionnaire addressed to persons holding managerial positions in enterprises of the automotive industry of the Opole region for the N = 51 sample.

The task for the respondents was to assess individual features of cooperation, assigned to three categories of organisational commitment, expressed on a five-point Likert scale (where 1 meant – "definitely agree", whilst 5 meant – "definitely disagree"). Tables 1-3 contain individual elements of engagement along with the average assessment of the relationship with a key outsourcing partner.

The average rating of elements above 3 indicate a high level of an organisation commitment to the partner. Ultimately, as part of duration, affective and moral commitment, a total of 21 out of 33 elements of partnership features have been identified, which are positively perceived. This means that the surveyed entities highly assess their involvement in cooperation with their outsourcing partner, constituting an appropriate research background, which suggests that the condition necessary to identify the key factors of commitment in outsourcing has been met.

Table 1.
Features of affective commitment in outsourcing

Symbol	Features of affective commitment	Average rating
P1_1	Our business partner negotiates terms of our cooperation in an honest manner	**3.81**
P1_2	Our business partner shares his plans with us	2.85
P1_3	The outsourcing applied by us is of great importance for the future success of our company	**4.16**
P1_4	Our strenghts complement one another	**3.92**
P1_5	Together, we have contributed to the development of knowledge concerning our cooperation	**3.50**
P1_6	We hold unique advantages, which are related to our relationship	3.12
P1_7	We are greatly involved in our relationship	**3.88**
P1_8	The use of outsourcing is very significant for us	**3.96**
P1_9	Outsourcing allows for the improvement of cooperation skills	2.19
P1_10	Our relationship is strongly supported by management	**3.77**
P1_11	We share industry information	2.73

Table 2.
Features of duration commitment in outsourcing

Symbol	Features of duration commitment	Average rating
P2_1	The use of outsourcing enables the acqusition of new knowledge	1.96
P2_2	Outsourcing enables the implementation of our strategic goals	3.23
P2_3	Outsourcing allows us to develop competitive advantage	3.27
P2_4	We use the relationship to increase profits	**4.32**
P2_5	Outsourcing relationships enables us to realise benefits at the synergy level	**3.58**
P2_6	Changing of the partner would cause losses for us	2.73
P2_7	We search new possibilities and opportunities for the development of our current relationships	**3.96**
P2_8	The most important thing for us is to obtain low transaction costs	**3.73**
P2_9	We have jointly generated large profits	3.31
P2_10	This cooperation provides both parties with more profits rather than for each of us separately	**3.46**
P2_11	We present a predictable structure of costs	**4.62**

Table 3.
Features of moral commitment in outsourcing

Symbol	Features of moral commitment	Average rating
P3_1	Outsourcing relationships enable us to achieve common goals	**4.12**
P3_2	Each of has made a great number of investments for the success of this cooperation	**4.04**
P3_3	Our partner has been strongly committed to maintain this relationship	**3.77**
P3_4	Our partner has acted in an honest manner and has complied with the principles	**3.96**
P3_5	We exchange information on the new events	**3.92**
P3_6	Our partner has adjusted his activities to our expectations	**4.38**
P3_7	Our partner has modified the offer specifically for us	**3.54**
P3_8	For the needs of the relationship, our partner has made investment in the information technology	2.88
P3_9	For the needs of the relationship, our partner has invested in additional resources and measures to increase the performance of services	3.19
P3_10	For the needs of the relationship, our partner has invested in technical infrastructure.	3.08
P3_11	For the needs of the relationship, our partner has adopted out procedures	3.31

5. Identification of significant relation between cost and the commitment factor

For the aim of distinguishing of significant factors influencing the sustainability of organisations commitment to business partners, a research method of multivariable regression model, preceded by an analysis of statistical relations between individual variables, was used (Bedyńska and Brzezicka, 2007). The costs level related to the use of outsourcing in the surveyed entity was assumed as an independent variable (subjectively assessed by the respondents). The costs of using outsourcing were considered in five percentage rages. The first range meant a maximum of 25% of costs of the use of outsourcing in relation to the activities costs incurred in the given area before separation and the fifth range meant 100% of all these costs.

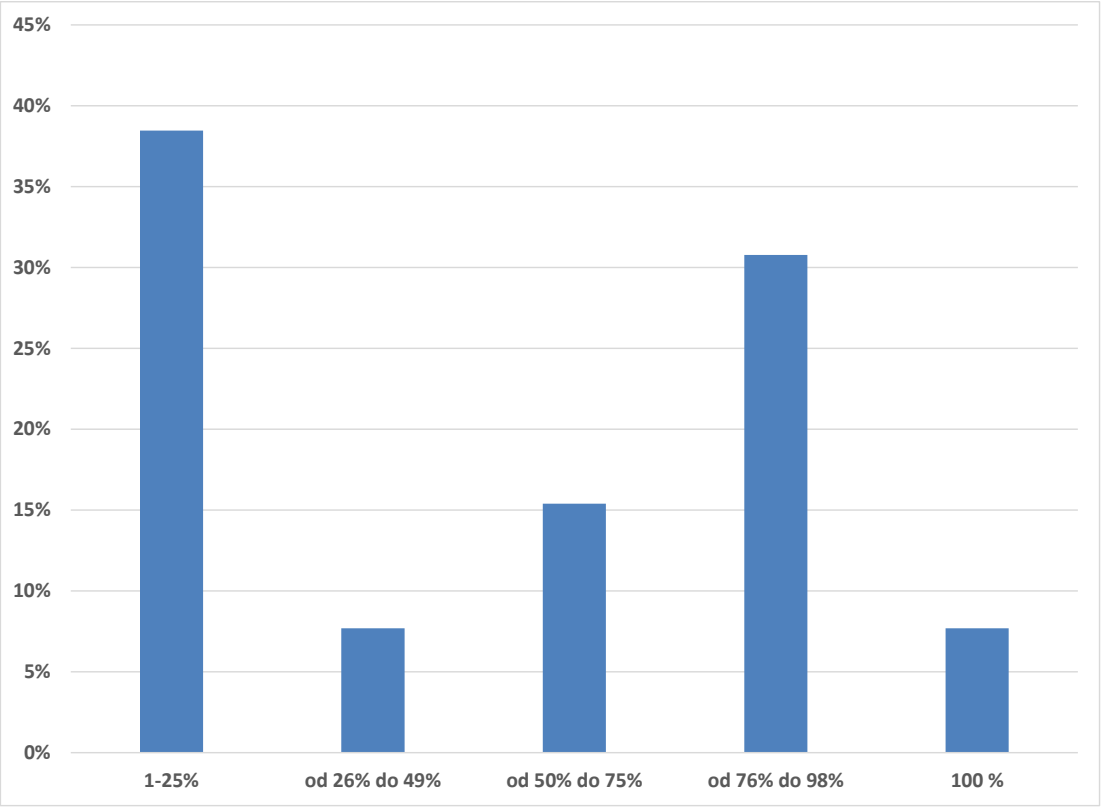

Figure 1. The share of costs of outsourcing in a given area in relation to the general operational costs incurred before the separation.

It was observed (Figure 1) that the surveyed enterprises have highly differentiated costs of outsourcing in relation to their level before separation. Every third entity does not spend more than 25% of the so far generated costs on outsourcing. The costs of outsourcing in the range of 76-98% are obeserved almost as often.

Thereafter, the relations between a dependent variable and the evaluations of the cooperation elements were research. An a result, a lack of correlation between the variables was observed, which enabled including all four variables into the further analysis (Table 4).

Table 4.
Significant relations between costs and individual ratings of commitment of the entity to its ***outsourcing partner***

Type of commitment / Independent variable	Affective commitment		Duration commitment		Moral commitment	
	Symbol	**Independent variables (significance level p)**	**Symbol**	**Independent variables (significance level p)**	**Symbol**	**Independent variables (significance level p)**
COSTS	P1_2	**0.027**	P2_3	**0.008**	P3_1	**0.001**
	P1_3	**0.003**	P2_5	**0.025**	P3_3	**0.018**
	P1_4	**0.006**	P2_7	**0.000**	P3_4	**0.001**
	P1_5	**0.003**	P2_8	**0.011**	P3_5	**0.000**
	P1_6	**0.005**	P2_9	**0.004**	P3_6	**0.018**
	P1_7	**0.000**	P2_10	**0.000**	P3_7	**0.005**
	P1_8	**0.000**			P3_9	**0.000**
					P3_10	**0.001**
					P3_11	**0.001**

Based on pairwise correlation for p values < 0.05, 22 significant relationships between the examined variables were identified, and it can be assumed that each type of attachment is determined by the level of costs related to outsourcing. At the same time, average ratings of all of the significant cooperation elements were above 3, therefore, were characterised by positivity corresponding to a high level of commitment in cooperation.

6. Linear regression model of organizational commitment

The further part of the research was concentrated on prediction model building, in which outsourcing costs determine the type of commitment of the service recipient considered. The significance of regression model was calculated for the aim of fitting it to the data Moreover, the Durbin-Watson test was conducted to assess the variations between residues.

Table 5.
Testing and selection of variables for the model

Dependent variables	Sum of squares	Average of square	F (50)	Significance	Durbin-Watson test
P1_5	9.455	9.455	7.939	.007	2.141
	59.545	1.191			
P1_7	22.799	22.799	33.034	.000	1.966
	34.509	.690			
P1_8	20.596	20.596	40.661	.000	2.164
	25.327	.507			
P2_10	11.460	11.460	12.604	.001	1.935
	45.463	.909			
P3_3	3.469	3.469	4.594	.037	2.149
	37.761	.755			

P3_9	7.159	7.159	14.366	.000	2.044
	24.918	.498			
P3_11	13.441	13.441	10.903	.002	2.164
	61.636	1.233			

The coefficients of the multivariable regression equation were assessed for the model, to enable prediction of the commitment level of an enterprise depending on the outsourcing costs (Table 6).

Table 6.
Coefficients of the regression line equation

The variable number	Dependent variables	Unstandarised coefficients		Standarised coefficients	t	significance
		B	Standard error	Beta		
1	P1_5	2.4	.408		5.957	.000
		.295	.105	.370	2.818	.007
2	P1_7	2.3	.311		7.163	.000
		.459	.080	.631	5.748	.000
3	P1_8	2.4	.266		8.959	.000
		.436	.068	.670	6.377	.000
4	P2_10	2.3	.357		6.408	.000
		.325	.092	.449	3.550	.001
5	P3_3	3.1	.325		9.605	.000
		,179	.084	.290	2.143	.037
6	P3_9	2.3	.264		8.569	.000
		.257	.068	.472	3.790	.000
7	P3_11	2.0	.415		4.898	.000
		.352	.107	.423	3.302	.002

Based on the calculations for $y = b_0 + b_1 * x_i$ equation, the regression model can be recorded as:

$$Y = P_0 + P_1 * k_j \wedge P_2 * k_j \wedge P_3 * k_j \wedge P_4 * k_j \wedge P_5 * k_j \wedge P_6 * k_j \wedge P_7 * k_j$$

where k_j signifies next outsourcing costs values for j ranges, where j = 1,2,3,4,5
therefore:

$$y_j = \sum_{i=1;\, j=1} P_0 + P_i * k_j \tag{1}$$

where i = 1, ..,7 constitutes the consecutive commitment variables, while j = 1, .., 5 constitutes consecutive variables of percentage outsourcing costs.

The created model enabled the separation of material factors of affective, normative and moral commitment, which constitute significant aspect of business relationships maintainance. With the costs per unit level increase, the rating level of outsourcer's commitment to the service provider changes (**assuming that in a given relation the duration factor will be connected to profit** [symbol P2_10]).

At the same time, the model is based on the affective and moral rather than duration commitment. This means that the increase of cooperation costs contributes to the creation of emotional rather than economical bond. Therefore, high cooperation costs affect higher entity

engagement only under the condition of generation of higher profit. In any other case the duration factors will have a decisive influence on the further course of the cooperation.

Ultimately, from more than thirty initially separated cooperation elements assigned in accordance with the type of organisation commitment to the business partner, seven turned out to be particularly important for the considered relationship in the aspect of the costs of outsourcing. These include: working together on relationship developement and knowledge about it, high engagement in the cooperation of both parties, justified use of external company services, the synergy effect visible in profit generation for both parties, efforts to relationship maintainance, additional investments undertaken for the needs of cooperation by the outsourcing partner and his adaptation to the procedures prevailing in the customer's organisation. These elements can serve as basis to rate a potential as well as an existing service provider.

7. Research Results Discussion

The basic reason for outsourcing is the need to decrease the costs of own activity (Doh, 2005; Click and Duening, 2005; Brzozowska, 2006), however, often the decision about outsourcing does not have a solely financial character, and other factors take on importance in cooperation. In the case of outsourcing, the synergy effect is emphasised. It results from establishment of new relations in the structure of enterprise's resources, as a result of which the benefit generation is be delayed in time. The implementation of outsourcing changes the structure of enterprise's resources, at the same time influencing the level of total costs, which growth may be rational from the economic point of view (Williamson, 2000). Simoultaneously, the reduction of basic costs of the service provider contributes to the consolidation of the relationship.

Therefore, costs may concurrently be a reason to start cooperation (Nowodziński, 2004), and to build mutual commitment of partners. This may contribute to the reduction of basic errors made at the beginning of the cooperation, concerning shortening the time of agreement, instead of strengthening the ties and, therefore, generate mutual benefits.

The obtained research results show that each undertaken investment of outsourcing cooperation causes commitment in the aspect of:

- creating new knowledge about relationships,
- engagement in the agreement,
- the necessity of outsourcing,
- the synergy effect in relation to profit,
- appreciation of the partner's efforts.

The identified factors are the key to the success of the relationship both for service users and service providers in such a complex and demanding undertaking as outsourcing. The impact of the undertaken investments and expenditures related to the establishment of a cooperation agreement clearly influences the perception of relationships. The expenses, efforts, joint discussions and time devoted to the mutual adaptation to the expectations and requirements make it more difficult to give up cooperation with a given business partner. The effort put in its success determines the level of partner attachment, thus allowing a greater probability of long-term and effective outsourcing cooperation.

8. Summary

The created model of linear regression examines changes of the business commitment level due to the changes in costs of outsourcing application, presenting the linear dependencies between these variables. The obtained results allowed to identify the set of elements, which determine the construction of corporate commitment to the outsourcer as a result of changes in the level of outsourcing costs. In the decision on the continuation of outsourcing, the costs of outsourcing, which are the economic factor, which mainly contributes to emotional and moral commitment. As for the aspect of duration commitment, the increasing costs of outsourcing are rewarded by profit being generated by both parties.

When assuming costs, the higher level of identifiable costs related to the use of outsourcing may contribute to greater corporate commitment and thus increase the probability of maintaining long-term relationships. The managers of both sides should be aware of the multidimensionality of mutual commitment, which should be considered when striving for effective cooperation.

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THE ESSENCE OF QUALITY IN CORPORATE LOGISTICS MANAGEMENT

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Abstract: The purpose of this article is to present theoretical determinants of quality related problems in the management of modern corporate logistics. The article presents general matters relating to the interface between quality and logistics from the perspective of the determinants, advantages and disadvantages for the operation of modern enterprises.

Keywords: quality, logistics, management, enterprise.

1. Introduction

Presently, we can observe an enormous increase in the interest in quality related matters with respect to various fields of economic activity. Intensification of challenges creating new conditions and dynamics of operation of enterprises has become the reason for which attention has been paid to quality and its importance in such areas such as, for instance, production, customer service, management, or logistics which is a reference point for the deliberations undertaken in the article. Quality is a multidimensional and extremely complex phenomenon, and quality management, in particular in logistics which is one of the main driving forces in economy, becomes a necessity.

In the highly complex and turbulent environment in which modern business entities are supposed to carry out business activity, there are numerous approaches to succeeding in business. Along the development of logistics, there also develop numerous concepts which make up for the related effects, among which one may observe the concept of management through quality. The purpose of this article is to present theoretical determinants of quality related problems in the management of modern corporate logistics. The article postulates that enterprise strive to succeed through developing quality in logistics, while demonstrating opportunities and risks associated with it. It might appear to be an obvious postulate, but in practice it is difficult to achieve, primarily due to the multidimensionality of logistic processes and the complexity of the issue of quality. It is but a challenge to 21st century enterprises.

2. Methods

The purpose of the article was accomplished based on the cited interpretations of the issues in question in the course of a subject matter literature study. In particular, logistics, quality and enterprise management were considered. The research method used in this article is the analysis of the domestic and foreign subject matter literature, mainly non-serial publications and scientific articles. A subjective selection of literature sources was significantly reduced due to the limited space available in this article to present the specifics and the essence of the problems of management science as a vehicle for the author's own considerations.

3. Results

3.1. Quality and logistics

Co-existence of the concepts of quality and logistics is an integral part of the contemporary market. Relativity as well as some kind of multidimensionality of views defining quality result in that there is actually no single definition applicable to each and every case, and the concept of quality itself does change over time. Issues related to the concept of quality are of interdisciplinary nature. The term is interpreted differently in economics, sociology and marketing, it is interpreted differently in philosophical, production related, humanistic and technical terms, and it is perceived differently from the perspective of logistics. Quality is also interpreted differently by customers, consumers, buyers, manufacturers and other links in the distribution chain (Zapłata, 2009). On the other hand, logistics is generally defined as an activity coordinating flows of articles, information and funds within a given supply chain (Bowersox, Closs, and Cooper, 2012). Integration of flows and processes, and focus on thorough coordination and cooperation in resource flow processes are immanent identifiers of logistics. Its purpose is to 'coordinate the flow of raw materials and finished products, minimising the cost of the flow, and subordinating the logistic activity to the customer service requirements' (Christopher, 2011). In logistics, the most efficient and highly effective action to safeguard the functioning of all the primary processes carried out within a given operation system continues to be of primary importance (Langley, 1990). Objectives of logistics centre on three basic issues, namely quality, cost and time, both in operational and strategic terms.

Overall (total) quality of a product or service is made up of: overall quality and logistic quality (Price, and Harrison, 2013). Quality is linked to each and every aspect of the functioning of an enterprise, and it is an ambiguous, difficult-to-define category which refers

to both products and services, knowledge, information, management, and life in general (Cichoń, 2012). Quality means compliance with customer requirements, the level of customer expectation fulfilment, 'the level to which a set of inherent characteristics fulfils the requirements' (Łunarski, 2008).

Combining logistic issues with quality management aspects which, until recently, were considered separately, resulted in the distinguishing of the concept of logistic quality. Logistic quality is defined as the potential to create a new value in enterprise management (Chopra, and Meindl, 2012). This concept is related to the usefulness of logistics in an enterprise, thus its ability to create benefits (Rushton, Croucher, and Baker, 2017). Logistic quality does not only mean the quality effects offered to customers but also the quality of management and the quality manufacturing processes. A higher quality of logistics management enables accomplishment of better economic results. Achieving a higher quality in the sphere of production requires attention paid to the enterprise management quality, including the quality of management in the sphere of logistics. The logistics management quality enables accomplishment of better results with lower inputs, meaning accomplishing something which, until recently, appeared to be unaccomplishable (Bozarth, and Handfield, 2016). 'Quality' is not only the result of the production process, but it is determined by all the processes integrated within and for the creation and delivery of services to the customer' (Blaik, 2016). According to the Total Quality Management (TQM) concept, it is a prerequisite for the fulfilment of multiple and multidimensional needs of customers (Page, and Curry, 2000). The quality of the activities and the services carried out and provided by an enterprise refers to all the processes associated with creating and delivering values and benefits for the customer. One of such processes is the logistic process which, on the one hand, affects quality through an objective determination of quality features and, on the other hand, due to the fact that logistic processes are implemented at the interface with customers, so it has a direct impact on the functional dimension of quality (Blaik, and Matwiejczuk, 2008). In logistic services, quality refers to all the properties affecting a given logistic service's ability to meet both identified and anticipated needs. Customers' typical expectations in terms of logistic activities include, among others, punctuality and short delivery times, reliability, flexibility, unambiguous condition and characteristics of deliveries, and others.

The logistics system and the quality system are characterised by their integrating nature. The interaction between the two systems is based on customers' needs which are the central point of reference both in the field of logistics and in the quality science (Fonseca, Pinto, and Brito, 2010). On the other hand, the aforementioned systems are primarily differentiated by the area of the impact. A logistics system mainly focused on managing the flow of materials and information has a narrower range. In turn, a corporate quality system, as a kind of an organisational structure and procedures, processes and policies relevant to quality management, has a greater coverage (Brewer, Button, and Hensler, 2001). In addition, it should be mentioned that in logistics the quality programme is included in the overall quality

programme of the enterprise. The main factor of both of those programmes is the customer orientation and integration of all the levels of business and all the employees of the enterprise.

In economic practice, mutual relations between quality and logistics are considered in the following sections (Jezierski, 2017):

- internal logistics of enterprises and logistics of cooperation in the supply chain,
- the role of quality on the internal market and in cooperation with foreign entities,
- the function of quality in freely shaped and regulated areas.

A quality assurance motto which may successfully be applied to logistics as it is perfectly aligned with overriding purposes and activities implemented within this scientific discipline is as follows: 'Correctly and on time, for the first time, and every next time' (Rafele, 2004). One of the main principles of logistics states that the task of logistics is to ensure the required conditions (appropriate parameters) of goods at every stage of their presence in the logistics system, which directly translates into the quality of the product at the outlet from the system (Toman, 2011).

In logistics, quality means fulfilment of the customer requirements and expectations previously agreed with the customer with respect to the following customer service characteristics (Kisperska-Moroń, Płaczek, and Liniecki, 2003):

- the ease of obtaining necessary information, submitting and forwarding orders,
- the timeliness and reliability of deliveries and communication,
- the execution of orders in an accurate and complete manner, without unnecessary documentation,
- the timeliness and sensitivity to the after-sales service customer needs,
- the accuracy and timeliness of obtaining and forwarding information between functional departments within the company and between the company and its external partners.

Quality in corporate logistics is determined by the so-called logistic triangle principle. This principle states that the creation of a 'new value' for the customer requires three elements (Ładoński, and Szołtysek, 2007):

- synchronisation of activities within the three critical areas of logistics, namely: supply, production and distribution,
- optimisation of the use of the most important instruments of logistics (employees, fixed assets, equipment),
- assurance of an adequate quality of products.

Viewing the logistic chain from the quality management perspective may regard such issues as, among others, the logistic strategy, decisions pertaining to the adequate selection of raw materials and suppliers, the quality of subcontractors, the product designing process, installation in accordance with the 'just-in-time' concept, and the product storage (Coyle at al., 2016).

Logistics or, to be more precise, logistics management focused on quality first of all requires the integration and rationalisation of all the quality assurance processes as well as designing and developing such logistics systems that will enable the enterprise to accomplish long-term objectives (Rafele, 2004). The essence of quality in logistics generally boils down to providing customers with the highest value by meeting their requirements and needs. Therefore, it may be said that the basis of the concept combining quality and logistics management is to seek and develop high-quality logistics systems giving the possibility of anticipating (i.e. predicting, forecasting), realising and exceeding customer requirements.

The formal quality assurance process is characterised by four main stages: the transition from quality control to quality assurance, followed by comprehensive quality management evolving towards creation of values for the customer. In logistics, the quality assurance process comprises six steps (Coyle et al., 2016):

- commitment of the entire organization,
- understanding of customer needs and requirements,
- measurement of current performance,
- development of a quality strategy,
- implementation of the quality assurance process,
- continuous process improvement.

In conclusion, it needs to be stated that the issue of quality in logistics is quite a complex one. Customer service, to which all the activities of a given enterprise are now subordinated, may be considered the basis for the integration of logistics and quality objectives. Comprehensive quality management is more and more frequently applied in contemporary business practice, also by enterprises in which logistics plays an important role.

3.2. The importance of quality to logistics management in the 21st century

In today's turbulent and highly competitive world, no enterprise may afford to ignore the contemporary methods of managing organisations which include, among others, quality management systems. Unfortunately, conventional strategies often turn out to be insufficient (Romanowska, 2009).

More and more enterprises take serious steps towards the preparation and implementation of processes to improve quality in logistics. Incentives encouraging to ensure corporate logistics quality are numerous. Among the most common causes of corporate interest in the improvement of logistics quality, which may also be classified as both chances of survival and opportunities for development in the current economic reality, we may distinguish (Bozarth, and Handfield, 2016):

- acquiring or increasing competitive advantage over other enterprises,
- following the actions of competitors,
- striving to eliminate the errors made in the past in relation to service,

- striving to meet customer needs and requirements,
- being able to reduce operating expenses,
- participating in initiatives involving the entire enterprise,
- logistics quality management realising the need to improve quality in logistics.

Application of the logistics quality comprehensive management concept, in particular with respect to the supply chain, is associated with the attempt to achieve the so-called 'logistic excellence' which the enterprise achieves upon fulfilment of the eight essential criteria being the elements of the quality assessment concept (Bowersox, Closs, and Cooper, 2012). The elements of the corporate logistic excellence include: partnership with customers, partnership with suppliers, long-term planning, integration of corporate functions, technological advancement, personnel mobilisation, an integrated information system, and quality indicators (Blaik, 2006). An enterprise may achieve logistic excellence in many ways. These include, among others, adequate planning and thorough integration of corporate functions.

Logistics quality management is a complex issue the importance of which to small, medium-sized and large enterprises becomes more and more significant over time. Ensuring adequate levels of quality in the enterprise, especially with regard to logistic processes, is now one of the main challenges for businesses (Blut et al., 2014). Complexity of quality management issues is highlighted by, among others, A. Hamrol Zymonik and Z. (2017), K. Lisiecka (2013), W. Łunarski (2008), E. Fiddler (2000), W. Urban (2018), and S. Wawak (2011), who promote interpretation of the concept as a planned and structured impact of the managing system on the managed system which comprises everything that leads directly to the fulfilment of quality requirements, subject to that the quality of any product/produce or service should be perceived as a relation between the properties of the product and the needs of the consumers (Evans, and Lindsay, 2016; Garvin, 1988; Urbaniak, 2004). This article interprets management of quality in logistics as management covering all the actions undertaken by the management of the enterprise, reflected by the adequate level of customer service logistics quality, enabling to generate lower costs of logistic processes and meeting all the other corporate logistics management objectives.

In the 21st century economy, dependencies between logistics and quality are more and more distinct. Logistics, due to its universal nature manifesting itself in the ability to use it in virtually any management area, has become one of the most important management tools used in the enterprise (Bendkowski, Kramarz, and Kramarz, 2010). On the other hand, quality is of significant importance to the survival, development, and broadly interpreted market success of enterprises. Combination of quality management and logistics management is the key to the success of the twenty-first century companies which, according to W.E. Deming, is the century of quality (Hamrol, 2008). Quality is more and more frequently perceived as one of the most important determinants of competitiveness of enterprises (Ingaldi, 2016).

Quality management in the area of logistics is an extremely important field. Quality in logistics is important both from the perspective of individual actions, processes, or logistic

chains, and entire logistics systems – to each link separately, and to all of them together (Nowakowska-Grunt, and Mazur, 2015) It is crucial to both the efficiency of the enterprise and the development of its corresponding image.

In the era of dynamically developing concepts of management, including quality management and logistics management, particular attention should be paid to the need for a multidimensional analysis aimed at providing quality in logistics with a new dimension and meaning, which will result in an increase in the efficiency of enterprises through the use of opportunities and elimination of threats posed by the efficiency and rationalisation potential of the combination of those two trends in management.

There are more and more postulates supporting application of the quality policy to the logistic processes carried out. Enterprises more and more frequently decide to integrate quality and logistics management systems, primarily due to possible advantages. Numerous companies undertake measures aimed at improving their business logistics in a manner enabling achievement of customer satisfaction by providing them with the best possible quality (Bienstock, Mentzer, and Kahn, 2015). The most important positive effect of the interest in the subject of quality in logistics has been presented in the next section of this article.

3.3. Conditions, benefits and difficulties of modern enterprises related to the implementation of quality management in logistics processes

After a brief introduction to the problem of coexistence of the concept of quality and logistics in enterprises, and explanation of the essence of this type of combination, it is advisable to analyse the advantages and disadvantages of the solution discussed that may determine the success or failure of the implementation of the decisions made in terms of shaping quality in logistics. It should be noted that opportunities may become threats, and vice versa; therefore, it is worth to closely observe the changes arising both inside the enterprise as well as in its close and distant environment (Nogalski, and Śniadecki, 2001).

'Since the dawn of time, quality has been a challenge for mankind and a signpost to development' (Frąś, Gołąbiowski, and Bielawa, 2006). Many years ago, an American statistician, E. Deming, a man known as the 'guru of quality', suggested what follows: 'Focus on quality, and profits will follow' (Hamrol, 2008). According to the Greek philosopher Plato, quality is nothing but 'a certain degree of perfection' (Fiddler, 2000). Following up on this statement, one may indicate that the pursuit of excellence should be the goal of every enterprise, mainly due to the fact that it is perfection that gives you the opportunity to succeed in the competitive struggle that has been accompanying enterprises since the earliest times. From the perspective of the specific nature of market operation of modern enterprises, an observation by M. Żemigała (2009) that 'quality is what distinguishes a company from the competition – a feature which is the most difficult to imitate' is particularly important. Thus, high quality is now a factor having a significant impact on the market success.

Research carried out by the Council of Logistics Management has shown that enterprises succeeding due to undertaking adequate actions in the quality assurance area may be characterised with the application of certain common features, namely (Coyle et al., 2016):

- conviction that all the employees are responsible for the improvement of quality,
- support and commitment of the chief director in activities aimed at improving quality,
- changes in the corporate culture consisting in focusing attention on customers and developing cooperation with suppliers,
- implementation of business processes irrespective of the functional divisions in the enterprise through the resignation from operation based on the so-called traditional 'functional funnel',
- clear tendency to perceive quality in logistics and work performance improvement in the company as an integral factor owing to which it is possible to succeed in the quality assurance process,
- regular measurement and reduction of variation in the implementation of the main logistics processes, for instance order fulfilment.

The new approach to the elements and processes related to the functioning of quality in the enterprise, more precisely – in relation to the logistics area, provides opportunities which, if properly identified, enable enterprises to adapt to the changing economic conditions and the ever increasing customer requirements (Perez et al., 2007).

In the case of quality impact on the operations of enterprises in the field of logistics, we are dealing with a wide spectrum of possibilities. Basic opportunities offered by the implementation of the concept discussed include:

- increasing the regularity and reliability of logistics processes,
- increasing the profitability of the company,
- succeeding in the competitive struggle on the market,
- gradual reduction of differences between the quality delivered to the consumer and the quality they expect,
- improving the customer service process on multiple levels of the enterprise operations,
- improving the coordination of activities between the supplier and the customer, timeliness of deliveries, and better quality of finished products.

Research into the impact of the marketing strategy on profit, carried out by Cambridge Strategic Planning Institute, showed that 'in general, companies providing high quality and having a high market share generate a five times higher margin of profit than companies at the opposite end' (Coyle et al., 2016). The statement, referring to quality in a comprehensive manner, makes it possible to presume that the aforementioned high quality, apart from the quality of the products and services as such, is also made up of, among other things, adequately structured logistic activities and processes (Kardas, 2015). Higher quality implies two types of benefits for companies, namely: reduction of the total cost as compared to

competitive entities through lower costs of quality, and the fact that quality is often the key factor in the purchase decision (Chen Chang, and Lai, 2009). Due to the foregoing, one may say that it becomes reasonable to perceive quality in logistics as a category affecting the company's profits, which in turn means that it is closely linked with the implementation of the basic objectives of the entity.

High level of quality facilitates accomplishment of the primary objectives of logistics, including in particular (Bowersox, Closs, and Cooper, 2012):

- reducing the costs of inventories,
- preventing additional costs due to the handling of returns, and related to storage and transportation,
- developing cooperation in the longer term, which in turn may lead to the integration of partners within logistics systems in the organisational and technical sphere,
- improving customer logistics service due to the increased value of products resulting from the increase in their quality.

Logistics makes it possible to achieve 'productivity through quality'. This is possible due to the fact that the implementation of the formal quality assurance process, also in the sphere of logistics, leads to a real decrease in the overall cost of operations. Coordination of quality improvement programmes and activities aimed at rationalisation of logistics in the enterprise makes it possible to obtain a synergistic effect in meeting the expectations of customers (Bansal, and Taylor, 2015). Awareness of the synergy discussed has a significant impact on the outcome of adaptation projects in logistics and quality within a given business entity to the ever-changing, ever-increasing demands of the modern market. So, the quality of the logistics management may stimulate accomplishment of positive results in all the main areas of business management, which may lead to an increase in the value of logistics services and the quality of the logistic relationships (Calabrese, 2012). One of the most significant prospects within the subject discussed is created by the broadly interpreted efficiency and rationalisation potential resulting from the combination of logistics and quality management.

Being aware of the benefits brought about by quality in logistics, one ought to pay attention an opposite phenomenon, namely certain dangers related to the problem. They are the opposite of the benefits; for instance, too low quality of basic logistic processes may lead to deterioration in the quality of goods and a loss of customers, and thus a reduction of the profits of the enterprise. Moreover, high level of quality of the products or services offered may be a source of challenges to the corporate logistics, associated with the need to handle more and more orders on newer and newer sales markets (Skowron-Grabowska, 2010).

This part of the article on the identification of possible threats to the application, lack of application, improper application, improper or incompetent application of the quality concept assumptions in logistics and logistic activities to improve quality is based on the following statement by K. Ishikaw: 'Quality is not everything, but everything is nothing without quality' (Hamrol, 2008).

According to Lao Tsu, 'quality is a kind of continuum that never ends. What appears excellent today does not need to be the same tomorrow. Perfection achieved is only temporary' (Kumar, 2013). These words seem to perfectly reflect the issues centred on the issues covering adverse aspects of the analysed concept. It is a threat in itself to the functioning of the enterprise, especially nowadays, to perceive quality in static terms, i.e. as a permanent element, because this factor is characterised by the enormous dynamics of the changes arising within it (Cavana, and Corbett, 2007). A failure to align the quality management policy in the sphere of logistics impact within a given business entity with the changing internal and external conditions may result in effects quite different from those assumed when undertaking activities aimed at integrating the quality management system and logistics management system.

Efforts to ensure quality assurance in logistics may be rendered void by a lot of different factors and situations which a given business entity will need to face. Among the most significant obstacles on the way towards improving the quality and performance in logistics, there are the following difficulties (Halvorsrud, Kvale, and Folstad, 2016):

- lack of support or insufficient support from information systems,
- barriers inherent within the company: both those of a functional nature and those of an organisational nature,
- lack of a structured database,
- incorrect identification of customer requirements and expectations, deviating from the actual status,
- disregard for the need to carry out training on the methods of improving quality,
- lack of recognition by the top management of the opportunities provided by the improvement of quality and performance in logistics,
- lack of monitoring of the company's activities which, although carried out outside the company, actually affect its functioning.

Appropriate decisions made in the area of procurement, warehousing, distribution and transportation have a significant impact on the quality of products. Other dangers arise, among others, from the lack of commitment of the top management, corporate myopia manifesting itself in the lack of recognition of contractors (i.e. suppliers and partners within the logistic channel) for the 'clients', or the lack of continuous updating of problems regarding quality assurance in logistics. As the above shows, paying attention to quality in logistics reveals a lot of logistical problems.

According to the views presented by W.E. Deming, in the future there will be two types of enterprises: those that have decided to implement a quality assurance system in their structures, and those that have dropped out of business (Hamrol, 2008). The very fact that an enterprise does not undertake any effort to improve the quality in various areas of its operations (or those activities are not sufficient) is a threat to it.

Due to the ongoing globalisation and deepening division of work, there is a justified fear that companies without logistics and due concern for quality will become companies with no future.

4. Conclusions

On the threshold of the 21st century, enterprises have to operate in a very competitive and dynamically developing environment. Coping with competition requires that enterprises create conditions for the development of modern management concepts, inclusive of paying attention to the opportunities brought about by the development of quality in the area of logistics. The importance and the scope of impact of quality of the operation of enterprises in the 21st century are increasing. The need to undertake appropriate initiatives is also visible in logistics. Changes in corporate attitudes towards simultaneous improvement of quality and logistics are necessary.

Application of the concept of quality management in logistics results from the search for new directions of effective corporate development. One of the most important reasons for the interest in quality in logistics is the effort to fill in the gaps existing between customer needs and requirements on the one hand, and the results actually obtained on the other hand, meaning avoidance of the differences between the expected quality and the quality delivered to customers.

Considering quality in logistics from the perspective of opportunities and threats that exist in relation to the specifics of the functioning of enterprises in today's modern and demanding market makes it possible to look at this issue in a comprehensive manner, and thus to contribute to a better understanding of the problem discussed. However, combining logistics and quality does not guarantee that the enterprise will succeed, but the versatility and flexibility characteristic of the concept, and the strong focus on customer needs, will make it possible to meet the challenges to companies that the modern markets pose.

Summarising the matters regarding the interface between quality and logistics, it may be concluded that because quality issues widely affect logistics, both favourably and unfavourably, quality may be considered as one of the most important determinants of the efficiency of logistics systems, in particular of the development of corporate logistics. Quality is a great challenge, not only to logistics, but also to many other areas of life, both in social and economic terms.

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ANALYSIS OF THE POSSIBILITY OF USING THE KAMISHIBAI AUDIT IN THE AREA OF QUALITY INSPECTION PROCESS IMPLEMENTATION

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Abstract. The article analyses the possibilities of using the kamishibai audit in the area of quality inspection process implementation. The kamishibai audit is a tool of lean and visual management concept used, among others, in the Toyota automotive company in order to verify their compliance with standards. This audit can, in effect, contribute to the improvement of processes. In the article, the kamishibai audit was characterised, the characteristics of the audit that determine its usefulness in the area of quality inspection processes were identified, and an example procedure for the implementation of the kamishibai audit in the examined area was presented. The article also presents the characteristics of the successful implementation of kamishibai audits and ways of enhancing their effectiveness. It has been proven that kamishibai audits can be successfully used to evaluate standards in the area of quality inspection processes.

Keywords: audit, quality inspection, standards, improvement.

1. Introduction

Quality inspection consists in the evaluation of specific properties of a product and/or a process against client-defined specifications or internal regulations of the company (Borkowski, and Knop, 2016, p. 25). Quality inspection is also defined as a regulatory process which aims to correct the differences between the defined standard and the actual results of the process (Lisowski, 2004). Apart from 'evaluating', quality inspection itself also requires evaluation. Quality inspection is first and foremost expected to be effective (Kujawinska et al., 2018) and efficient (Hamrol, 2015, p. 309). There are many methods for assessing the effectiveness and the efficiency of inspection processes, with measurement system analysis procedures – MSA or ratio analysis – deemed particularly recommended (Knop, and Borkowski, 2011; Starzyńska, 2018). Apart from effectiveness and efficiency, the quality of quality inspection processes in terms of their compliance with requirements (procedures,

standards, regulations) is also (primarily) important. Requirements for quality control processes should be defined and documented in order to avoid any grounds for questioning their existence. This is due to the fact that 'if there is no requirement, there is no non-conformity' – a failure to meet (documented) requirements is the basis for determining a non-conformity. Requirements concerning the way in which a quality inspection process should be conducted can be found in the inspection plan or in inspection instructions. Standards related to quality inspection can assume different shapes and forms (document, table, physical reference standard, light signals). Their presence is indispensable for evaluating the quality of quality inspection processes. Standards also constitute a basis for the improvement of quality inspection processes. Verification of compliance with quality inspection standards may be an element of daily and defined activities of the quality inspection staff or take place as part of periodic audits of quality (inspection) systems. Usually, these audits assume a structured form, they are performed by specific individuals with confirmed qualifications (training and certificates), and they are announced beforehand. Such audits have certain flaws (e.g. one can prepare for the audit in advance, auditors may not be impartial). Other forms of audit exist to replace 'traditional' audits; fast and simple, requiring no specialist, often hours-long training, involving verification of a selected aspect, an audit process/area 'point' only, and auditor-friendly due to the involvement of visual forms, where practically any member of the organisation can act as the auditor. These audits are called kamishibai audits. The aim of this article is to analyse the possibility of using this type of the audit in the field of quality inspection process implementation. Such audits may be a tool for evaluating the quality of implemented quality inspection processes and verifying compliance with standards in the area of the quality inspection process implemented.

2. Method

The subject of this analysis is the kamishibai audit. Kamishibai is a Japanese term for paper theatre (Paatela-Nieminen, 2008, p. 91), picture theatre, or illustration theatre (Słownik japońsko-polski, 1997, p. 300). It is a traditional Japanese art of telling stories through pictures (Nash, 2009). It all started in the 12th century Japan, where kamishibai was used as a simple and effective way of communicating with illiterate people. Nowadays, the kamishibai theatre is used in schools and kindergartens, where it serves as a teaching aid (De las Casas, 2006; McGowan, 2015).

The term kamishibai has been incorporated into the lean manufacturing concept, and it exists within it as an audit tool. The kamishibai audit is one of the tools of this concept (Rewers et al., p. 135), used in the Toyota production system and others (Kaizen Institute, 2013). Within the lean environment, the kamishibai audit is a layered audit system (Kuc,

2009; Niederstadt, 2014) covering a specific area and verifying compliance with standards within it through direct observation. It is a standardised method of 'inspecting' a specific area/zone, combined with detailed knowledge of the standards applicable to a given field, aimed at verifying whether a standard is complied with. The purpose of the kamishibai audit is ensuring 100% compliance with standards in a given audited area (Skałecki, 2017) through verifying whether work is performed in the best possible, reliable and productive manner, subject to the quality required (Firlik, 2017). In today's turbulent environment, numerous companies aim to increase productivity while decreasing costs (Nowicka-Skowron and Ulewicz, 2016, p. 149), while the kamishibai audit may be a lean tool enabling accomplishment of those goals. The kamishibai audit enables auditors to obtain new knowledge of the process/area audited; it enables its improvement through efficient implementation of 'gemba walk' and 'gemba kaizen' (Bremer, 2016; Imai, 2006). Popular areas of kamishibai auditors' interest include OHS and environment protection management, 5S, TPM, lean management related criteria, or ISO. The kamishibai audit may be implemented at production plants, laboratories, universities, financial institutions, healthcare facilities, etc. (Poots, 2016).

The kamishibai board and cards, which are visual management (VM) tools (Knop, 2016, p. 237-251; Ortiz Ch., and Murry, 2010) and visual control (VC) tools (Borkowski, and Knop, 2013, p. 25-28), are an integral element of the kamishibai audit. The kamishibai board is referred to as the green and red board because of the colours used. The colours indicate the result of the audit. They correspond to the colours of kamishibai cards. Kamishibai cards placed on the kamishibai board visually indicate which area, and to what extent, was positively assessed, and which one was not (Fig. 1). The kamishibai card contains a set of the same audit questions, in green on the one side, and in red on the other side. Green outwards, the card indicates a positive result of the audit; on the other hand, red indicates a negative result. A negative result means that at least one of the audit questions was answered negatively (Kamishibai – audytuj standardy w prostszy sposób, 2017).

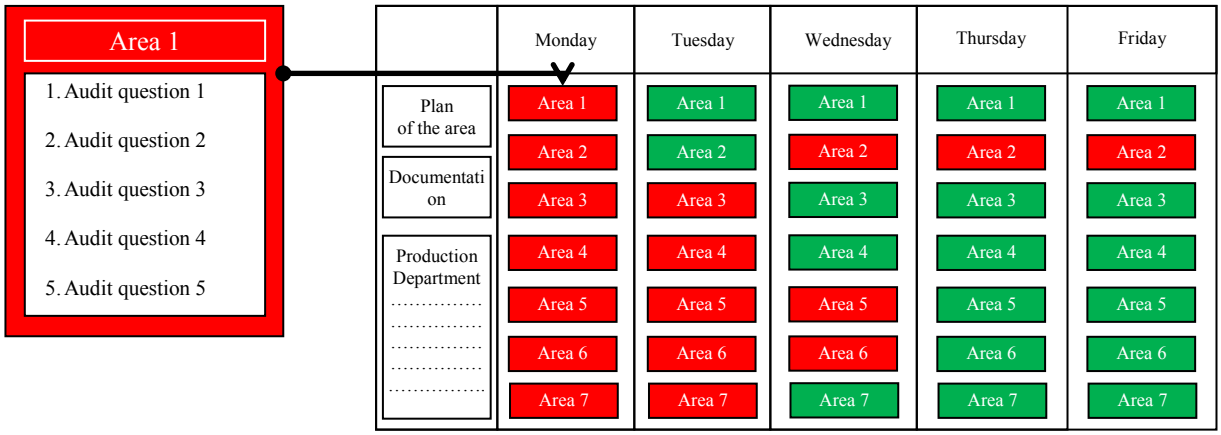


Figure 1. Dependency between the kamishibai board and the kamishibai card. Source: author's own elaboration based on (Kamishibai – audytuj standardy w prostszy sposób, 2017).

Both the cards and the board can come in various forms, design and execution. The number of questions on kamishibai cards may also differ, or they may feature no questions at all (in which case the colour of the card indicates whether the audit has had a positive or a negative result) (Johnston, 2012). Kamishibai audits can be carried out every day, month, or even hour, depending on the needs of the audit team (Fines, 2017).

3. Results

3.1. Kamishibai system implementation in quality inspection processes

Kamishibai audits may cover virtually any process and area of activity in a company (Miller, 2009). Quality inspection processes may be covered by the kamishibai audit as well. Attempts have been made to implement the kamishibai audit to monitor quality inspection processes. It was assumed that kamishibai audits would be implemented in four steps, with step zero being a decision on the implementation of the audits and appointment of a working group:

0. Decision on implementation and appointment of a working group

Making a decision on implementation is step zero of the kamishibai audit implementation process. The decision is made by the management, based on the produced evidence of tangible benefits of having such a system in place. One of the anticipated benefits of such audits is the reduction of the number of errors regarding compliance evaluation in the product quality inspection process (Knop et. al., 2018, p. 857-867). The implementation decision may result from the benchmarking carried out, be imposed by the company owners, or arise from the company needs in that respect. The implementation working group should comprise owners of individual processes/areas to be covered by the future kamishibai audit, and it should have an appointed project manager.

1. Board design

Designing of the kamishibai board is stage one of the kamishibai audit implementation process. The board may be designed independently, generally available designs may be used (the so-called off-the-shelf solutions – purchase of a finished solution), or a board already used in another company may be used (benchmarking), the solution may be transferred then, or an original version of the board may be developed. Sieradz, Poland based company Scanfil, an electronics manufacturer, decided to develop an original solution based on the board used by a foreign division of the company (Pik et al., 2007). The board and its structure have been shown in Fig. 2.

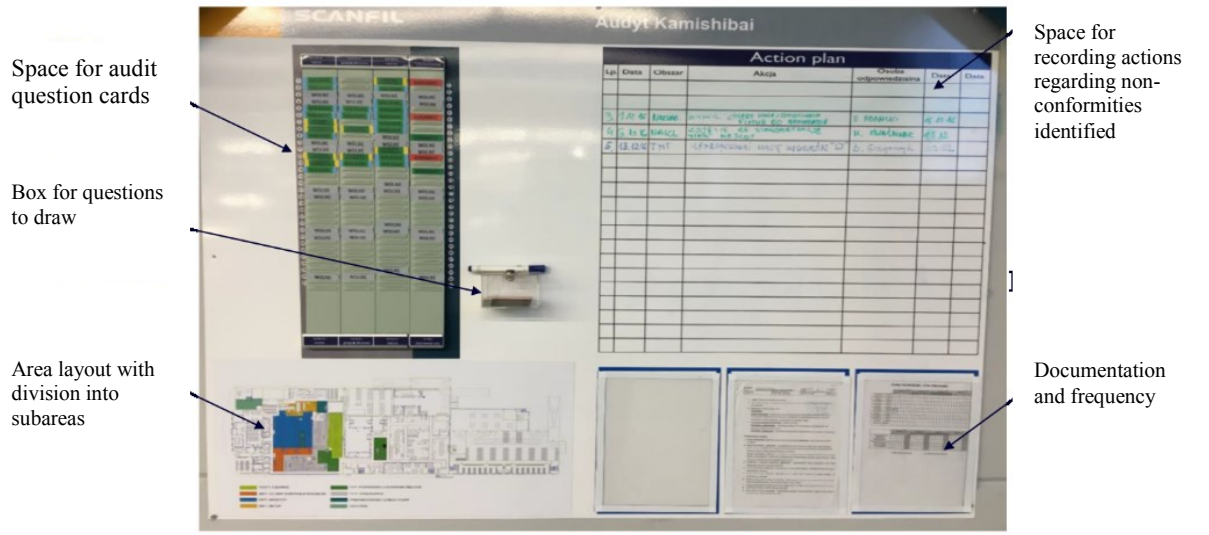


Figure 2. Kamishibai board design at Scanfil, Sieradz, Poland. Source: Pik et al., 2017.

A example off-the-shelf board has been shown in Fig. 3.

The advantage of the original solution is the ability to adapt the structure of the board (its size, shape, elements and their arrangement) to one's own requirements. In the case of an off-the-shelf board, it is not possible; a finished solution is based on.

2. Draft questions for quality inspection 'area(s)'

2.1. Development of a question database

First, prior to developing a list of questions, one needs to define and select the quality inspection areas to be covered by the kamishibai audit. A quality inspection area audit may cover any site in the production building or outside it, where the quality inspection process is carried out, namely (options):

- a work station,
- an inspection station at a work station,
- a general inspection station,
- a special inspection station,
- a final inspection station,
- a specialised laboratory,
- a test run station (Knop, 2015).

Depending on the quality inspection area to be audited, a relevant list of questions needs to be developed, and the questions need to be transposed into kamishibai cards accordingly. Development of the list of questions should be based on the existing standards in the quality inspection area audited, namely documents or other 'carriers' of information, i.e. e.g.

- inspection plans,
- inspection instructions,
- control and measurement equipment manuals,
- operating instructions,

- OHS instructions,
- standard operating documents (SOP, WES, OPL, others)

presenting the best practices in the quality inspection area audited.

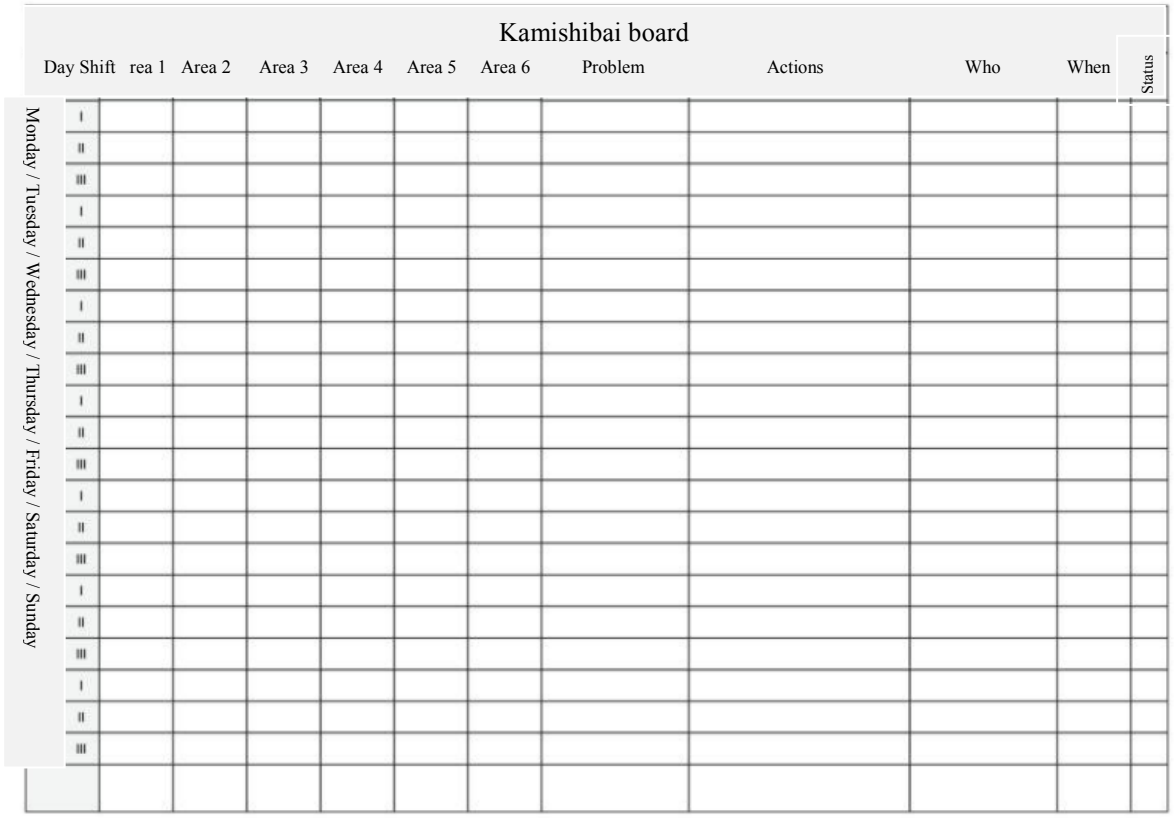


Figure 3. Dry wipe magnetic kamishibai board – an off-the-shelf solution. Source: www.wally.com.pl.

The standard should be 'documented' and communicated to the employee beforehand so there are no grounds for contesting it (its existence and applicability) during audits. An example standard regarding callipers technical condition has been developed; it has been shown in Fig. 4. It is a standard developed in a visual form, in the form of a 'problem' OPL (Rosak-Szyrocka et al., 2017). It may be used to verify whether the callipers technical condition is correct. In this form, a standard may constitute a tool used during kamishibai audits. It is developed in a visual form, which ensures its communicativeness and friendliness to employees – potential auditors.

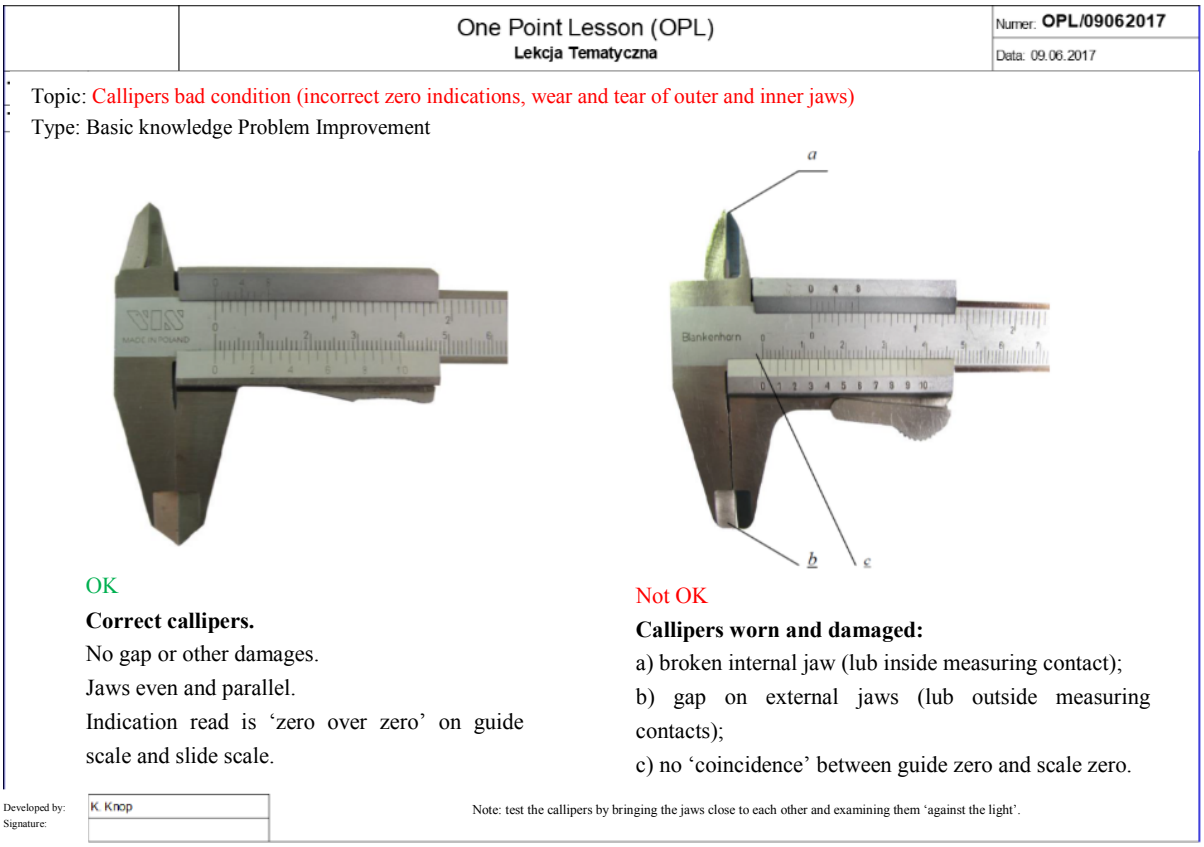


Figure 4. A problem – standard OPL as a document used during kamishibai audits. Source: author's own study.

The next step is to develop a list of audit questions. During an audit, one may verify compliance with a standard itself (whether employees act in accordance with the adopted standard documentation), working conditions in the workplace, or the condition of its environment (cleanliness, order in the workplace, provision of required documentation, labelling at the work station and in its environment, etc.).

An example list of audit questions regarding a quality inspection area has been presented below:

1. Is the control equipment (e.g. callipers) in good condition?
2. Is the control station clean and tidy?
3. Is everything in place at the control station, and is there space for everything?
4. Does the operator use the control equipment listed in the inspection plan/inspection instruction?
5. Is the control equipment described in accordance with the standard?
6. Is the standard regarding the inspection activity carried out available at the work station?
7. Does the employee know the content of the standard dedicated to their process?
8. Does the employee perform inspection activities in accordance with the sequence presented in the standard operating procedure?

9. Have suspicious parts been classified as non-compliant?
10. Does the employee use the required PPE during inspection?

Audit questions may be universal or special. Universal questions enable verification of the compliance with a specific standard within different quality inspection areas (inspection stations), while special questions are dedicated to a specific quality inspection area only.

2.2. Question distribution to individual cards

Distribution of questions to individual cards is a very important task of the working group responsible for the implementation of the kamishibai system. Given the number of questions on a single card being one of the criteria, distribution may be carried in two ways:

1. 1 card = 1 question.
2. 1 card = several questions.

Given the thematic range, audit questions may be distributed according to a specific criterion, e.g. 4M/5M, or an original distribution criterion may be developed, e.g. 5S, OHS, Process, HR, Quality, etc. (in analogy to the procedure used in developing the affinity diagram –a new quality assurance tool (Hamrol, 2016, p. 290).

When distributing questions to individual cards, one should remember the following principles:

- a single kamishibai audit in a specific audit area should be as short as possible,
- there should be several audits per week,
- card 1 should feature an adequate number of questions to verify the standards in a given area of quality inspection,
- a single audit should not excessively distract the employee of the audited area from their duties.

Fig. 5 shows examples of developed kamishibai cards the purpose of which is to verify compliance with the standard regarding the callipers proper technical condition. Card 1 features one audit question; card 2 features several such questions. The number of questions we put on card 1 will affect duration of the audit itself. The cards shown below are universal, which means that they may well be used at those inspection stations which use the measurement equipment (callipers) in question.

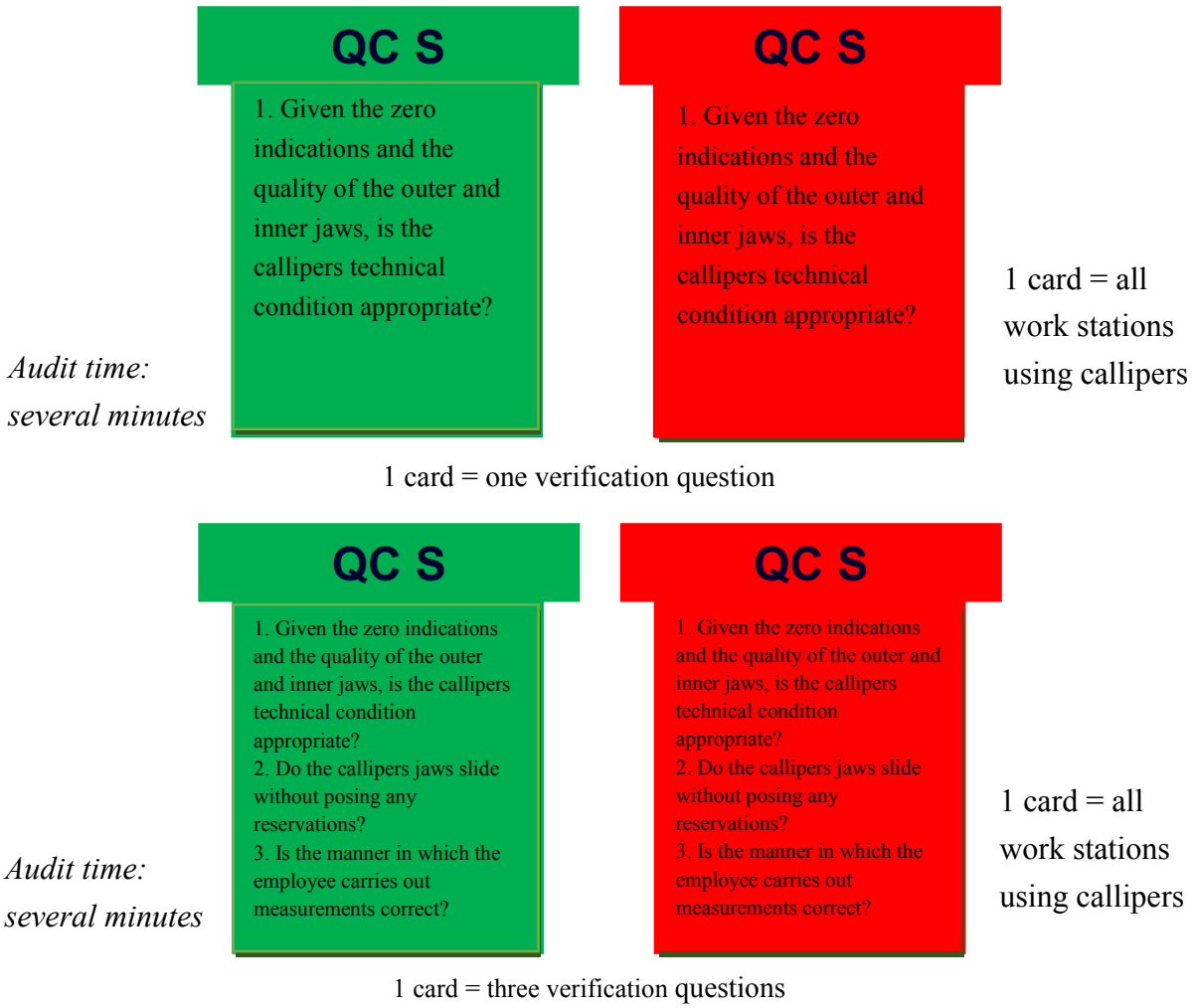
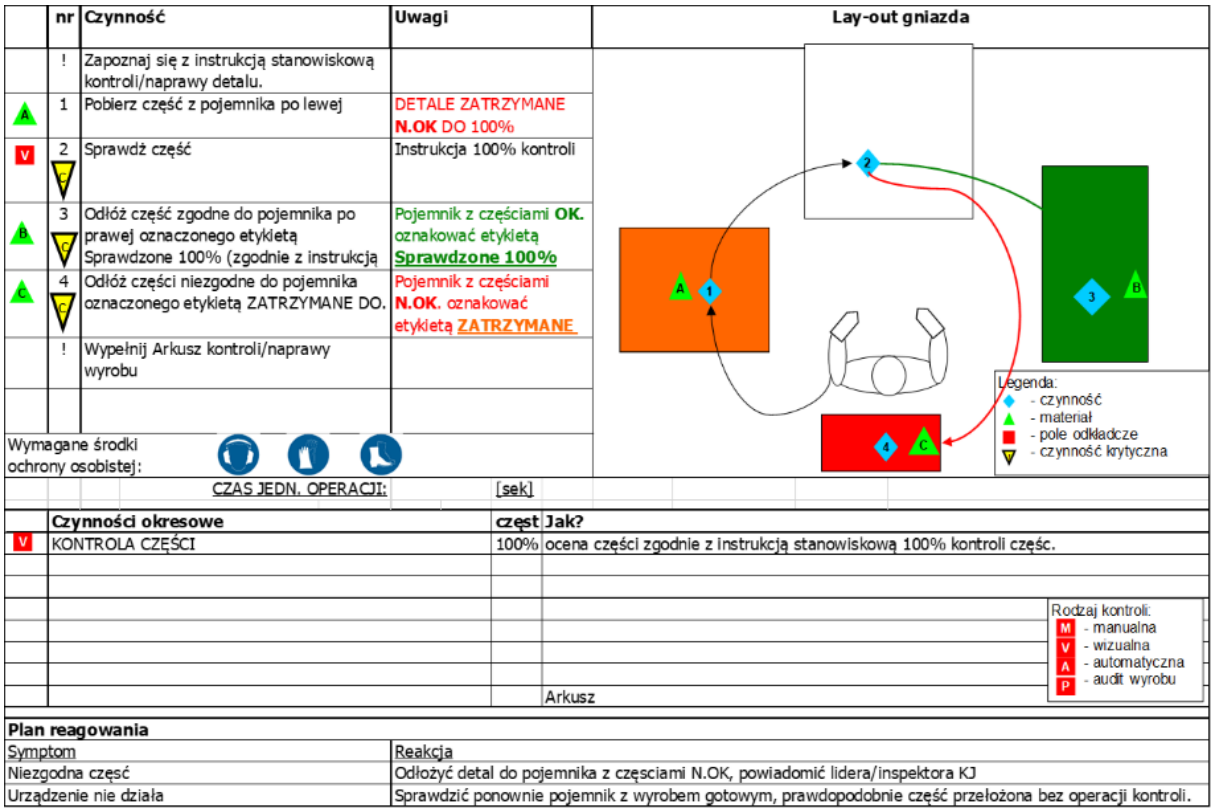


Figure 5. A kamishibai card verifying the standard regarding the callipers technical condition, developed according to the following pattern: a) 1 card = 1 audit question; b) 1 card = several audit questions. Source: author's own study.

Kamishibai cards may also be special cards, i.e. they may be developed with respect to a specific inspection station; – in this case, audit questions will verify standards applicable to that station only. One will also need a 'reference point', i.e. a standard to be verified; preferably, it should be presented in a visual form. It has been assumed that at the inspection station X covered by the audit, it is a standard operating procedure (SOP) (Fig. 6).



	nr	Czynność	Uwagi
	!	Zapoznaj się z instrukcją stanowiskową kontroli/naprawy detalu.	
A	1	Pobierz część z pojemnika po lewej	DETALE ZATRZYMANE **N.OK** DO 100%
V	2	Sprawdź część	Instrukcja 100% kontroli
B	3	Odłóż część zgodne do pojemnika po prawej oznaczonego etykietą Sprawdzone 100% (zgodnie z instrukcją	Pojemnik z częściami **OK.** oznakować etykietą **Sprawdzone 100%**
C	4	Odłóż części niezgodne do pojemnika oznaczonego etykietą ZATRZYMANE DO.	Pojemnik z częściami **N.OK.** oznakować etykietą **ZATRZYMANE**
	!	Wypełnij Arkusz kontroli/naprawy wyrobu	

Lay-out gniazda

Legenda:
- czynność
- materiał
- pole odkładcze
- czynność krytyczna

Wymagane środki ochrony osobistej:

CZAS JEDN. OPERACJI: [sek]

	Czynności okresowe	częst	Jak?
V	KONTROLA CZĘŚCI	100%	ocena części zgodnie z instrukcją stanowiskową 100% kontroli częśc.

Rodzaj kontroli:
- M - manualna
- V - wizualna
- A - automatyczna
- P - audit wyrobu

Arkusz

Plan reagowania	
Symptom	Reakcja
Niezgodna część	Odłożyć detal do pojemnika z częściami N.OK, powiadomić lidera/inspektora KJ
Urządzenie nie działa	Sprawdzić ponownie pojemnik z wyrobem gotowym, prawdopodobnie część przełożona bez operacji kontroli.

Legend (top to bottom, left to right):
No. / Action / Comments / Socket layout
Read the detail inspection / repair work station instructions.
Collect parts from the container on the left. / Details retained. / Not OK up to 100%.
Check the part. / 100% inspection instructions.
Put compliant parts in the container on the right, labelled 100% inspected (according to the instructions). / Container with OK parts to be labelled 100% inspected.
Put non-compliant parts oin the contained labelled RETAINED. / Container with NOT OK parts to be labelled RETAINED.
Fill in the product inspection / repair form.
Legend
activity
material
storage space
critical actions
Single operation time / seconds
Periodic actions / frequency / How?
Part inspection / 100% / part evaluation according to 100% inspection instructions.
Inspection type
manual
visual
automatic
product audit
Form
Response plan
Symptom / Response
Non-compliant part / Put detail in container with NOT OK parts. Notify quality inspection leader / manager.
Device not working. / Check container with finished product again. Probably part relocated without inspection.

Figure 6. Standard operating procedure (SOP) at inspection station X as a standard. Source: author's own study.

Based on the guidelines presented in the standard (SOP), an example kamishibai card to verify compliance with the standard has been developed (Fig. 7). An audit of the type takes a dozen or so minutes.

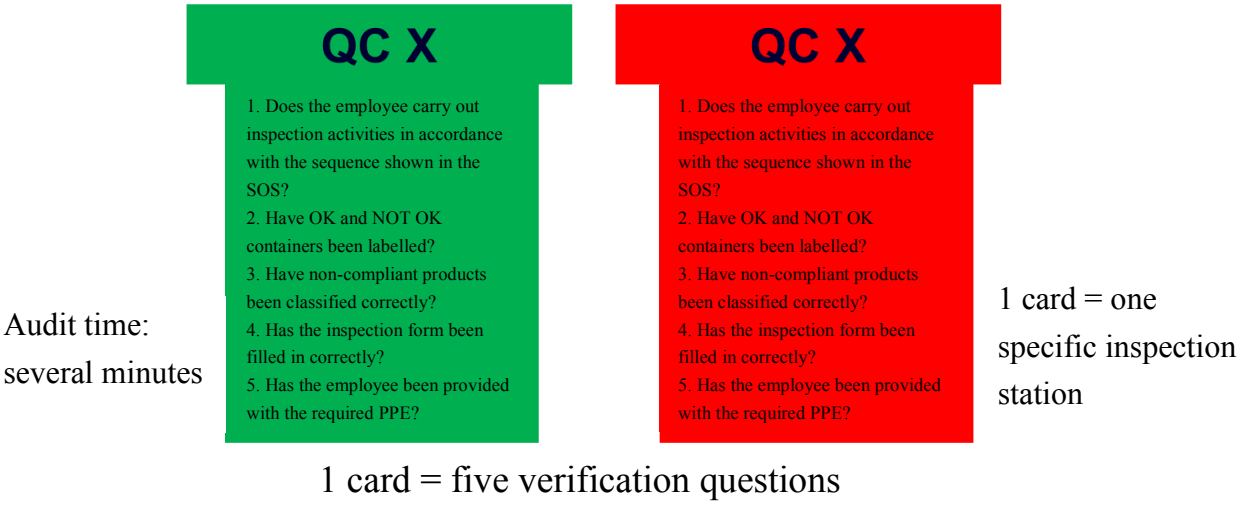


Figure 7. A kamishibai card verifying compliance with the standard at inspection station X, developed according to the following pattern: 1 card = several audit questions. Source: author's own study.

All the example kamishibai cards shown regard a situation in which compliance with the standard is verified with one document. It is a recommended kamishibai card design. One may also develop kamishibai cards the questions of which will relate to several standard operating documents; in this case, the audit will obviously be more time- and labour-intensive.

3. Development of questions for manager cards

In the kamishibai system, any employee may be an auditor (from a line employee to a mid- or high-level manager). Every employee – auditor should be acquainted with the kamishibai audit implementation procedure, and they should be trained in that respect. Apart from being able to carry out audits, managers also play a different role; it should be their objective to ensure that their procedure is observed. To that end, manager-dedicated cards need to be developed. Managers may verify whether audits are carried out, if board entries are up-to-date, or whether employees – leaders know the purpose of the audits in their areas. An example manager-dedicated kamishibai card has been shown in Fig. 8.

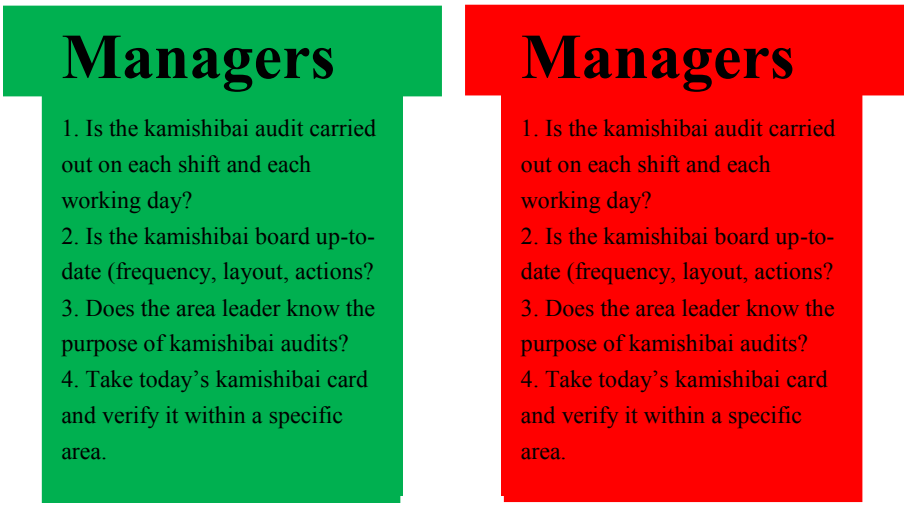


Figure 8. A kamishibai card verifying compliance with the standard at inspection station X, developed according to the following pattern: 1 card = several audit questions. Source: author's own study based on (Pik et al., 2017).

4. Audit implementation

Audit implementation covers evaluation of standards in quality inspection areas/processes. Such audits should be planned beforehand, i.e. there should be an audit schedule, and persons should be appointed to carry them out. Who and when is to carry out an audit – this fact should not be known to the employees of the audited areas before (so that they cannot prepare themselves for the audit). Audits in specific areas may be carried out periodically (for example, monthly, weekly, daily), or they may be carried out at irregular intervals. The frequency of audits in a specific area may depend on the number of 'non-conformities' identified during audits: the more negative answers to audit questions (and, consequently, more red cards on the board), the more frequently audits may be carried out in that area. On the other hand, the fewer non-conformities identified, the less frequently audits may be carried out. Audits should not be discontinued even after several positive results due to the changing nature of the conditions prevailing during their implementation (different shifts, different employees, different working conditions, environment). Factors supporting more frequent kamishibai audits in a specific area may include:

- a new employee at a work station,
- a large number of non-conformities identified during previous audits,
- no static stability of the process and/or its low quality capability,
- low effectiveness of inspection processes identified in other examinations (e.g. through MSA procedures – the value of Cohen's cappa indicating a low level of compliance on the part of inspectors),
- implementation of a new standard in the work area,
- problems with standard observance at the work station.

Audit results in the form of red cards should initiate corrective action. Persons responsible for carrying out such action and the deadline for the latter should be identified. Implemented

corrective action should be evaluated in terms of its effectiveness. Kamishibai audits may also be a starting point for improvement action, as a result of which standards may be changed.

Board/Question list review and updating

Kamishibai audit tools (board and cards) are dynamic tools and, as such, they should be updated to reflect changes to applicable standards (after they are changed). The kamishibai system should be subject to supervision, reviews and audits, meaning that it may also be subject to change. The most important principle is that if there is a flaw of the kamishibai system, it needs to be changed. Changes should be reviewed and recorded (depending on their originators). The kamishibai system should always be up-to-date.

Card/question shuffling

In order to avoid a situation in which audits in a given audited area are carried out with the same cards and questions, kamishibai cards may be shuffled, which will result in the randomness of the scope of the audit in that area.

3.2. Prerequisites for kamishibai audit success and method of reinforcing their effectiveness

Kamishibai audit success depends on several factors. Kamishibai audits may not be carried out without support from the management – managers should monitor the correctness of their implementation, support the leaders of the audited areas in the audit implementation, and they should support the employees, both the auditing and the audited ones. A basic prerequisite for the kamishibai audit success is employee training aimed at acquainting them with the purpose, form and procedure of the audit. During such training, it should be highlighted that kamishibai audits are not a form of control, that they are not aimed at punishing employees when something proves wrong, but, above all, to seek opportunities for improvement. For this form of the audit to be accepted and perceived positively, the company needs to have a mature and 'healthy' corporate culture based on 'why', not on 'who' (Miller, 2009). One of the lean systems, TQM, Six Sigma, should be implemented in the company before the kamishibai system is – this is a basic prerequisite for the system success, although it is not sufficient. Systematics, discipline and consistency are required to ensure that the system is able to last and be perceived as an important support tool in the improvement process (Niederstadt, 2014b). In that respect, an important role is played by the management who should demonstrate their involvement and support. The primary objective of the kamishibai audit is not to seek perpetrators and punish them (Miller, 2009). It is very important that everybody should understand that – kamishibai audits should not be associated with yet another action against the employees, with a system of penalties and sanctions.

In order to evaluate the effectiveness of the system (Ulewicz, 2013, p. 38) of kamishibai audits in the quality inspection process area, one may set *key performance indicators*, and

then measure them over time. Example KPI's determined with respect to kamishibai audits are as follows:

- WN – rate of audits completed with positive results (%):
  a) Objective = 100%,
  b) [Number of audits with positive results ('green' cards, "green") in a specific area and period of time/Number of all audits in this area and period of time]*100%;
- WN – rate of positive answers obtained during the audit (%):
  a) Objective = 100%,
  b) [Number of positive answers obtained during the audit/number of all (positive and negative) answers obtained during the audit]*100%.

In addition, a suggestion system may be used. A negative result of the audit may be a starting point for the employee of the area audited to suggest preventive measures (suggested improvements), which will make it possible to increase the employees' involvement in the change and improvement process.

4. Discussion

Ultimately, there arises a question regarding the advantages and disadvantages of kamishibai audits in the context of their applicability to quality inspection areas and processes. The authors have decided to investigate the problem.

Among positive aspects of kamishibai audits in quality inspection areas and processes, one should first indicate their simplicity and speed which result from the fact that they only cover a selected aspect related to quality inspection (or several points), and that they 'communicate' with their addressees visually. Other advantages include:

- low time- and labour-intensity: it takes little time to carry out an audit, and it does not take much effort on the part of the employee – auditor,
- evaluation unambiguity: because the audit is supported with visual management tools, there is no risk of 'differing interpretation' of a situation by the auditor during the audit,
- evaluation objectivity: the audit is not announced, which makes it possible to verify the actual condition within a given area (the employees are not able to prepare themselves for the audit),
- versatility: the audit may be carried out by any employee, irrespective of their position in the company (short training is sufficient), and it may cover virtually any quality inspection area and process,
- proactive, preventive function: the audit makes it possible to manage the quality inspection process, suggesting how to act in advance and prevent adverse events and

situations (the audit may implement controlling tasks (Ulewicz et al., p. 26) related to quality),

- flexibility: because of the time/time period – kamishibai audits may take several or a dozen or so minutes, and their frequency may differ; because of the place – they may simultaneously cover one quality inspection area/'point', or they may cover several selected areas (points); because of the form – cards and boards may come in various forms,
- interaction: kamishibai audits may be carried out independently, or they may be a component of other audits (for example, quality management system internal audits according to ISO 9001), or they may be a 'one-minute manager' (Johnson and Blanchard, 2011),
- further added value – because audits may be carried out by different employees, they may have different views of the problems identified as well as of the standards themselves; it ensures a 'fresh look' which may be used in the quality inspection standard and process improvement,
- improvement opportunity: the audit enables identification and elimination of deviations from standards in the area/process analysed as well as improvement of standards and quality inspection processes themselves.

Among negative aspects of the kamishibai audit implementation, one should indicate the following:

- costs of: procurement/design and development of the board and cards, training and delegation of staff, and assigning additional responsibilities to them,
- lack of acceptance: kamishibai audits may can be negatively perceived by – audited employees as yet another form of control or surveillance of employees; in addition, if they are combined with a system of punishment, they will certainly not bring about the expected tangible results,
- lack of objectivity: this may only happen when the auditing and the audited employees are personally related to one another,
- lack of knowledge and involvement: auditors not believing the audits will change anything, management not monitoring the timeliness of audits, auditors' support, substantive and financial assistance in the solving of problems and implementation of solutions,
- lack of consistency: audits may not be systematically carried out, dates of audits may not be met, corrective measures may not be specified and implemented, which is a quick way to fail.

Most of the identified potential problems related to the kamishibai audit are related to one factor – people, as it is people on whom a lot depends in the kamishibai system, it is people who create the system, and it is people who should be helped – made particularly aware of the

need to act in accordance with the standard. A culture of mutual support, understanding and involvement appears to be required for the successful implementation of these audits in the field of quality inspection processes.

5. Summary

The aim of the article was to prove the possibility of using kamishibai audits in the field of quality inspection process implementation. As it has been proven, kamishibai audits may be successfully applied in the field. Example kamishibai cards and audit questions have been developed that may be used in the area. It has been indicated that the implementation of kamishibai audits requires adequate preparation (training, development of the board and the list of questions...) and a lot of involvement on the part of the management. Advantages of their application exceed the initial effort and the costs incurred. Increasing the level of employees' knowledge and competencies regarding quality inspection processes and their standards in the audited areas, identification of problems and implementation of corrective measures are the advantages supporting the implementation of such audits in the field of quality inspection. Each kamishibai audit should be perceived by the employees as an opportunity for improvement. This requires ongoing communication and understanding of the audit principles by all the employees. Owing to that, kamishibai audits will constitute an important added value, and they will be an important and acceptable tool of continuous improvement (kaizen) within the company.

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THE ROLE OF STAKEHOLDERS IN THE ENTREPRENEURIAL DISCOVERY PROCESS

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Abstract. The effectiveness and efficiency of the entrepreneurial discovery process is a complex issue and requires close cooperation, participation and involvement of all interested parties. The essence of the process is to establish and strengthen contacts between various groups of stakeholders in innovation ecosystem for the better management of intelligent development, generating and implementing innovation and increasing value added. The article presents part of the research results on entrepreneurial discovery process conducted by a team of Central Mining Institute commissioned by the Silesian Voivodeship, which included the practical implication of the prepared model of the entrepreneurial discovery process that facilitates the acquisition and interpretation of data on expectations and conditions for the region's innovative development.

Keywords: entrepreneurial discovery process, innovation, innovation policy.

1. Introduction

The issue of the entrepreneurial discovery process (EDP) at the national level was widely presented in a report prepared by the World Bank at the request of the Ministry of Development entitled: Toward an innovative Poland: the entrepreneurial discovery process and business needs analysis (W kierunku…, 2015). The main objective of the World Bank's work was to achieve a situation in which the improvement of efficiency and the setting of investment priorities would be determined by mechanisms consisting in a bottom-up process of identifying the demand, needs and potential of enterprises and allowing entrepreneurs to have a say on innovation policy. Thus, the World Bank provided a set of techniques and methods included in a coherent and comprehensive model that engages the spheres of: economy, science, public administration and civil society in contributing to innovation policy and setting priorities for public intervention. This model is called the entrepreneurial discovery process, and its result is the adjustment of public support instruments to the real

needs of Polish enterprises. The model is based on the general scheme of entrepreneurial discovery processes and uses the following tools in its implementation:

- direct interviews with the managers of small and medium-sized enterprises which are supposed to help identify the real sources and barriers of innovation, which are impossible to discover using standard questionnaires,
- Smart Labs, which are a series of workshops, during which carefully selected representatives of business and science communities are put together to assess the potential of a given economic area,
- maps of innovation that are a new method for monitoring technological trends on the basis of enterprises' applications for funding,
- crowdsourcing, that is the use of electronic forms of reaching out to entrepreneurs who are not yet cooperating with public administration.

The main objective of the conducted by Central Mining Institute team studies was to use the model of entrepreneurial discovery process to identify the areas of advantage relevant to the formulation of an innovation development policy in Silesia Region on the basis of smart specialisations (Entrepreneurial discovery…, 2017). The carried out research included two stages. In stage I, a coherent methodical framework for conducting and implementing the entrepreneurial discovery processes in the Silesian Voivodeship was developed. This base on the available knowledge and previous experience as well as practices from the regional, national and European level. Stage II is a practical application of the entrepreneurial discovery process developed in stage I in Sielsia Voivodeship with the use of the available data and with conducting qualitative research for the selected pilot area within defined spatial, time and sectoral boundaries. Data provided by the Polish Patent Office, the Central Statistical Office and the Marshal's Office of the Silesian Voivodeship were used in the research. The studies were carried out on a deliberately selected group of entrepreneurs and experts involved in innovation process implementation.

The article presents the experiences from the work on the model of the EDP for the Silesian Voivodeship. This allows in the future the identification of the priorities for national and regional innovation support programs. The benefits of EDP come not only from the final results, but also from the EDP process itself because it "aims to identify areas with the potential to achieve critical mass based on local (endogenous) resources, e.g. qualified labour, natural resources, clusters, R&D expertise, etc. (Mieszkowski, Kardas, 2015). Stakeholders representing the quadruple helix (business, R&D, society, administration) should be empowered and actively participate in the process of discovering viable potential areas", it "is a learning process to select research, development and innovation (R&D+I) as well as non-technological activities in which a region can hope to excel. It’s a vision about opportunities in existing or emerging sectors" (W kierunku…, 2015; www.know-hub.eu…).

2. Stakeholders as a key group of actors of the innovation ecosystem

The EDP is a basic element of RIS3 strategy and the smart specialisation framework. As part of the EU innovation network, the RIS3 strategy should focus on the process of systematic identification, verification and modification of public policy priorities. The EDP should help in choosing smart specialisations in a bottom-up approach, determined by the market and technological capacities discovered by companies, which should be at the center of the innovation process. As part of this process, public administration should, based on the identified needs of entrepreneurs, design and address support for the implementation of innovations so that it influences the increase in the development potential of companies and, as a consequence, of regions (s3platform.jrc.ec.europa.eu…). The EDP should also help in removing the barriers to cooperation between the private and public sector, identifying companies that could benefit most from public support and adapting public support instruments to the priority needs of companies (www.visionary.lt…; Hausmann, Rodrik, 2003; Foray, 2015). The EDP model consists of three key stages (Fig. 1).

Figure 1. Universal elements of the EDP. Source: own study based on: Gianelle, C., Kyriakou, D., Cohen, C., Przeor, M. (Eds.) (2016). *Implementing Smart Specialisation Strategies. A Handbook.* European Commission.

For the purposes of the conducted research, a review and identification of good practices in the field of methodology of conducting entrepreneurial discovery processes in the context of innovative development on a European scale was also carried out. To this end, the European Commission documents containing guidelines for conducting the entrepreneurial discovery process (Gianelle, Kyriakou, Cohen, Przeor, 2016) were analysed along with examples and the literature in this area. A successful course of the EDP requires close cooperation, participation and commitment from all stakeholders. It is very important to establish and strengthen contacts as well as to generate knowledge and added value, which would probably not be achieved without such close cooperation between the private and public sector. Interviews with company representatives seem to be a key tool for actively establishing cooperation with business. In addition to awareness-building activities, there are a number of other ways to initiate cooperation between business and Business Environment Institutions and R&D institutions. Good practices in cooperation between business and science are presented in the examples from, i.a., Great Britain and Belgium. *Knowledge Transfer*

Partnerships is considered the highest standard of cooperation between universities and industry in Great Britain. KTP is a nationwide programme that helps businesses to improve their competitiveness and productivity through the better use of knowledge, technology and skills that reside within the UK Knowledge Base. The programme is based on a tripartite partnership model in which a university graduate is delegated in order to transfer academic knowledge so as to satisfy a company's key need, and the knowledge transferred from the company to the university allows the enrichment of teaching and the increase in the usefulness of the ongoing studies. On the other hand, the Belgian Baekeland Mandates programme is aimed at supporting research conducted to obtain scientific and technological knowledge as a basis for economic implementations (Adametz, Jones, Grussenmeyer, Marinković, Mayr, 2013). On the example of Spain, Soledad Diaz shows the synergy effects of interaction between all members involved in the process of creating and using innovations (representatives of academia, entrepreneurs, representatives of public administration units (local governments); representatives of local communities/society) and members of the Science and Technology Park as a factor determining the development of the region (www.regionalstudies.org/…). Periañez-Forte and Navarro also point to the essence of cooperation between the Regional Government of Andalusia and business (small and large enterprises), scientific community, science and technology parks, etc. in order to identify key challenges and establish an action plan within the framework of RIS3 strategy (Periañez-Forte, Navarro, 2016).

Public support under the new EU financial perspective should be developed on the basis of the real needs of enterprises. These needs can be identified by visiting enterprises and conducting an in-depth analysis of the data obtained from their representatives, which is a key element of the EDP and constitutes a significant contribution to the policy on smart specialisation strategies. Interviews conducted directly with entrepreneurs should be an essential element of the EDP and provide a key input to the smart specialisations and RIS3 policy. The *Growth Services Range* programme in New Zealand as well as *GazelleGrowth* programme and *Regional Centers of Growth (Regionale vaekstuse)* in Denmark are examples of good practices in the field of support programmes for companies with high growth potential (OECD, 2010).

3. The EDP model for the identification of regional areas of advantage

The first phase in the EDP model in the context of innovative development of the Silesian Voivodeship strongly refers to the paradigm of *evidence-based development policy*. The collected evidence, due to the nature of smart specialisation (competitive advantage in very specific areas), must capture the position of the voivodeship in relation to trans-regional references in statistical terms. They must also refer to those areas of reality in which the

economic sector, technologies and R&D sector meet. On the basis of the available evidence base, it was possible to indicate the areas of economic, scientific and technological advantage in the Silesian Voivodeship. The use of conversion maps made it possible to present these areas in one universal way, i.e. using the Polish Classification of Business Activities codes. The list of key areas of advantage emerging from the works carried out is summarised in Table 1.

Table 1.
Regional areas of advantage

Polish Classification of Business Activities section	Polish Classification of Business Activities department	Economic sector
B	**05**	coal and brown coal mining
B	**09**	service activity supporting mining and quarrying
C	**13**	manufacture of textiles
C	**15**	production of leather and leather products
C	**19**	manufacture and processing of coke and refined petroleum products
C	**22**	manufacture of rubber and plastic products
C	**24**	metal production
C	**25**	manufacture of finished metal products, excluding machinery and equipment
C	**26**	manufacture of computer, electronic and optical products
C	**27**	manufacture of electrical equipment
C	**28**	production of machinery and equipment, not classified elsewhere
C	**29**	manufacture of motor vehicles, trailers and semi-trailers, excluding motorcycles
E	**38**	activities related to the collection, processing and disposal of waste; recovery of raw materials
E	**39**	activities related to revegetation and other service activities related to waste management
F	**42**	Works related to the construction of civil engineering structures

Source: own study.

It should be noted that the above-mentioned areas of advantage were indicated as crucial not only because of their strong economic, scientific and technological potential, but also due to their strong relationship with the emerging industries and the green economy. All further expert work was aimed at defining the possible advantages (specialisations) of the voivodeship based on the collected and analysed statistical evidence. Expert works included mainly interactions with entrepreneurs and the study of their needs as to the preferred forms of support for innovative development, but also interactions with the research sphere, the offer of which is a real response to the needs of entrepreneurs. The second phase of the entrepreneurial discovery process is aimed at the identification of needs. Due to the vastness of the selected areas of advantage, it cannot be included in one study and it is linked to constant verification and updating of the evidence base. The pilot area was selected for further works.

4. Methodology for conducting direct interviews with stakeholders and sample characteristic

The proposed set of research tools and methods includes broad participation and interaction between participants of the EDP. The developed model of the entrepreneurial discovery process in the context of innovative development of the Silesian Voivodeship involves deliberately combined and modified methodologies, which guarantees that the results obtained with its use are comparable on a national and international scale. The entrepreneurial discovery process in the context of innovative development of the Silesian Voivodeship included expert works for the selected pilot area with particular emphasis on the identified area of advantage, i.e. sections 22 and 28. Expert works were carried out with the use of a number of methods and tools - foresight research, personal interviews, CATI, CAWI, online questionnaires, maps of innovation. Works in this phase of the EDP focused mainly on the interaction with entrepreneurs in the form of personal interviews, and it was complemented by the data obtained from the research sphere, the offer of which is as it were a real answer to the needs of entrepreneurs. By way of personal interviews with entrepreneurs, the information on expectations and conditions of innovative development was collected, and the precise needs of entrepreneurs were identified in terms of innovative solutions that would allow to achieve competitive advantages at the regional level. The collected information was supplemented with the results of the foresight process carried out in the R&D sector and among the members of the Silesian Innovation Council, which allowed for a preliminary outline of the visions and scenarios of innovative development of the Silesian Voivodeship in the 2020+ perspective. To ensure methodological compliance of the developed EDP model during the implementation of personal interviews with entrepreneurs, a set of methods developed by the World Bank at the request of the Ministry of Economy was taken as a starting point.

In order to create a database of enterprises operating in identified sectors of advantage, according to the established methodological approach, the content of websites and search engine of national economy entities were analysed (rynkometr.pl; www.krs-gus.pl; wyszukiwarkaregon.stat.gov.pl/…), the data obtained from the Marshal's Office of the Silesian Voivodeship and the Central Statistical Office, the BEI database, as well as instructions from companies already participating in interviews, especially in the area of their leading customers and/or suppliers were used. During the identification of enterprises for conducting personal interviews, the following criteria were applied:

- an enterprise registered in the Silesian Voivodeship,
- activities (Polish Classification of Business Activities code) in the area of the sectors of advantage selected for the Silesian Voivodeship,
- mainly large enterprises (champions),
- enterprises conducting R&D activity.

A representative group of 191 enterprises from the Silesian Voivodeship was selected. Out of the 191 selected entrepreneurs, 32 expressed their willingness to participate in a personal interview. Interviews with company representatives were conducted on the basis of a standardised questionnaire prepared for this purpose, including open and closed questions. The questionnaire was developed on the basis of the experience of the World Bank, in accordance with international good research practices on entrepreneurship and innovation, and after an in-depth literature study. In addition, a pilot study was conducted prior to the main study, the aim of which was to verify the correctness of the established test procedure. As a result of the pilot, changes/additions were made in the scope and type of questions asked in the interview questionnaire in accordance with the conclusions and experiences of the pilot. This was important in order to optimise the questionnaire so that it would be maximally adapted to the specificities of the Silesian Voivodeship and provide as much relevant feedback as possible, while being comprehensible and respondent-friendly.

During the interviews, the answers received were accurately recorded; it was ensured that the answers are complete, and the completed questionnaires as well as obtained information are kept safe and confidential. Each interview began with outlining the essence and objectives of the entrepreneurial discovery process in the context of innovative development of the Silesian Voivodeship until 2020, and the sectors of advantage in the Silesian Voivodeship selected on the basis of quantitative data analysis were indicated. Then, based on the prepared questionnaire, a structured, moderated discussion focused on the elements important for the growth and development of innovation in the voivodeship was conducted. At the end, a short summary was made and any additional Entrepreneur's questions were answered. In addition, after the interview, additional comments/observations were noted. The interview lasted about 1-1.5 hours.

The research tool was a questionnaire consisting of 63 (quantitative and qualitative) questions. The obtained answers were processed and generalised with the use of statistical methods. The answers to qualitative open questions allowed to synthetically supplement the results of quantitative research in terms of the identification of factors conducive to the development of innovation, barriers to development and directions of expected public support in this area in the Silesian voivodeship.

Entrepreneurs for direct personal interviews were selected primarily from the sectors identified in statistical surveys and analyses as potential areas of advantage in three domains: economy (Polish Classification of Activities sectors), technologies (patent statistics in terms of the International Patent Classification) and R&D area, excluding intelligent specialisations of the Silesian voivodeship. Personal interviews were conducted with representatives of enterprises. Half of the surveyed enterprises employ more than 217 employees. The smallest company employs 3 people and the largest has 11,889 employees. Figure 2 shows how the number of employees in the surveyed enterprises changed in the years 2014-2016.

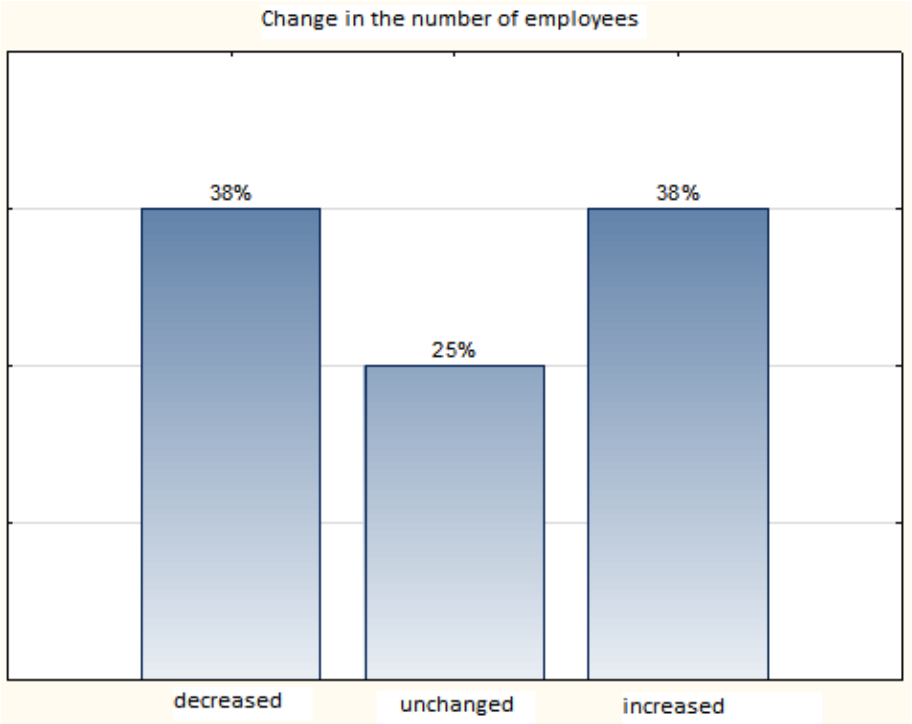

Figure 2. Change in the number of employees in the surveyed enterprises in 2014-2016. Source: own elaboration.

63% of the surveyed enterprises have an international reach. 57% of the respondents declare that part of the total revenues of the company comes from innovative products or services. 63% of the surveyed companies identified themselves as the market leader.

5. Results and discussion

The results of direct interviews were grouped according to the structure of the interview questionnaire:

Factors driving innovation

There are many factors that drive innovation in enterprises (from macro, meso and micro level). During the interviews, the focus was mainly on factors stimulating innovation from the enterprise level, which results from the established objectives of the entrepreneurial discovery process, in a bottom-up approach, determined by the market and technological opportunities discovered by the companies that are at the center of the innovation process.

All surveyed entrepreneurs, when asked about the three most important factors stimulating innovation, pointed to customers and suppliers as the most important factor (Fig. 3), due to the continuous, direct impact on the operations of enterprises caused by striving to meet the expectations of customers regarding the products and services offered. Following the

expectations of customers determines the competitiveness of the company, reflects its potential, that is, resources, skills and adaptability to changes taking place in the environment, which provides an advantage over other entities operating in the same sector.

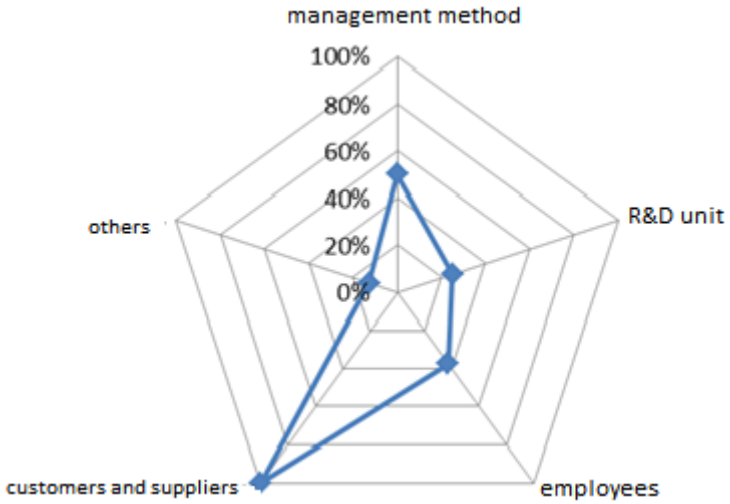

Figure 3. Factors driving innovation. Source: Own elaboration.

Stankiewicz (Stankiewicz, 2000, p. 95-111) defines the competitiveness of enterprises as a system comprising four elements: the potential of competitiveness, competitive advantage, competitive instruments and competitive position, understood as the competitive result achieved by the enterprise in a given sector. Such approach reflects a number of important factors and conditions that affect the competitiveness of enterprises. On the basis of research conducted in 56 micro and small enterprises, Jabłońska-Porzuczek and Smoluk-Sikorska (Jabłońska-Porzuczek, Smoluk-Sikorska, 2017) determined the competitiveness factors of companies. The paper discusses the main internal determinants affecting competitiveness, among which the most important are: high product quality, their price, the range of the assortment and the possibilities of financing the development. The quality of service and customer relations as well as the image of the company were also considered very important. The respondents also emphasised the importance of modern production technologies and innovation.

During personal interviews, management was also indicated as an important driver of innovation, which suggests that activities related to introducing management practices for innovations, as well as all information and education activities aimed at increasing awareness of the importance of innovations among the management staff would be of great benefit.

The surveyed entrepreneurs also pointed to the initiative of their own employees as the driving force of innovation. Including employees in the works on new products and services is an opportunity to discover new sources of growth, get first-hand information about market trends, customers and competition, as well as increase the involvement of the staff in the implementation of projects. 71% of the respondents declared the existence of a system of incentives for employee development, while 63% of the companies have an incentive system for employees to take innovative initiatives.

The respondents confidently pointed to the need to apply eco-innovative technologies in already existing, strong industry sectors, resulting from the historical circumstances of the region, as the key to the competitiveness of the region. The introduction of eco-innovations would allow companies to incur lower environmental charges and avoid potential penalties as well as reduce costs while at the same time positively affecting the investment capacity of the enterprise. At the same time, however, the issue of capital-intensive nature of such initiatives was raised. Therefore, projects aimed at introducing ecological and innovative processes or products are often postponed until later due to the need to involve a large amount of resources, especially at the research stage, and in addition, they carry a considerable risk of failure.

While assessing their own achievements and establishing goals for the future, enterprises take into account their own situation as well as the situation prevailing on the market, hence the immediate market environment, mainly competition, is always taken into account in the development of plans and innovative strategies of enterprises. In almost half of the companies surveyed, innovation strategies are included in the company's overall strategy, while 38% of enterprises have a separate innovation strategy – this applies mainly to companies that have a stable position and are long-established on the market. 13% of the respondents claim that there are no records regarding the innovation strategy in the company's strategy.

When asked about the attitude of management towards the market situation, entrepreneurs most often pointed to the reactive and proactive attitude. The vast majority (approx. 80%) of the respondents claim that risk-related decisions concerning the introduction of innovations in the company were made. Risk is of significant importance especially in the implementation of innovative projects – the level of risk in a given project is directly proportional to its innovativeness. It is worth noting that there is a considerably higher risk during the implementation of innovative projects in popular areas and much lower in niche areas. The ability to take risks is an important feature in creating innovation, it ensures the company's development and contributes to building market value. However, mere knowledge and appropriate character traits are not sufficient for an entrepreneur to deal with risks, a specific risk management method is also very important.

The supplementary question referred to eco-innovation. Entrepreneurs were asked if they were interested in eco-innovations and whether they are introducing such solutions in their activities. The respondents pointed primarily to the importance of this type of innovations in the context of development of the post-industrial region of the Silesian Voivodeship. Many companies invest in environmentally friendly solutions because only in this way can they ensure an increase in their competitiveness and further functioning in the face of increasing legal restrictions (especially those that involve the reduction of all types of emissions). Eco-innovations are seen as solutions that can save large enterprises from bankruptcy, nevertheless, it was pointed out that funds for the implementation of projects reducing the burden on the environment are small and entrepreneurs do not know where to apply for them.

Sources of information about innovations

Sources of information about innovations are defined as entities and tangible or intangible resources that provide information on technical solutions that can be implemented in the given conditions.

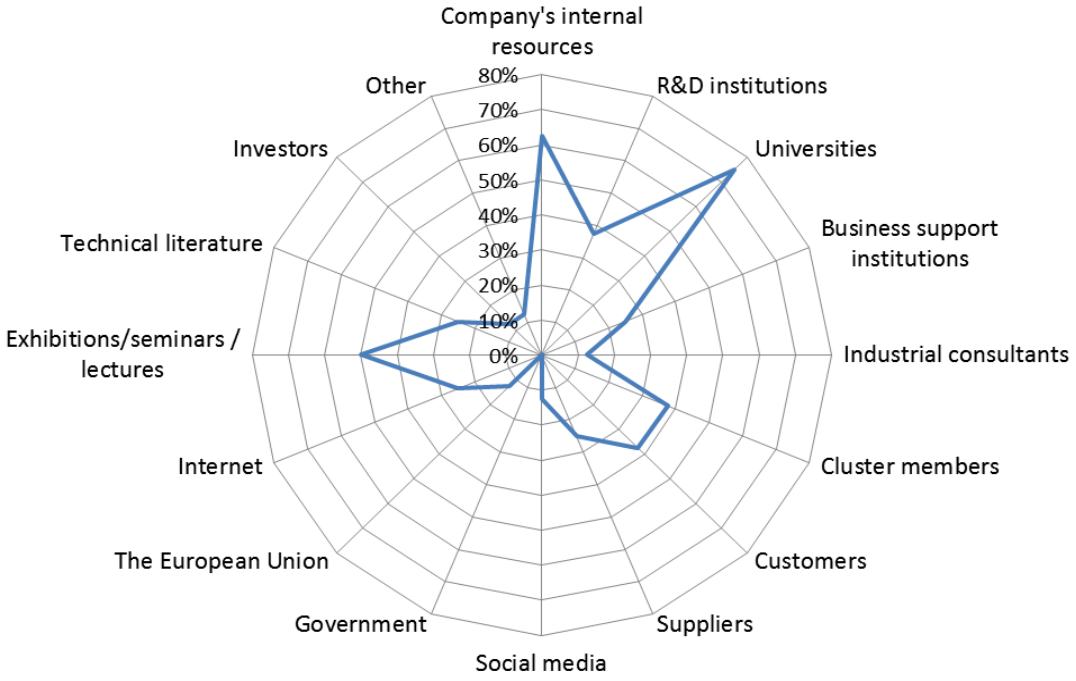

Figure 4. Sources of information about innovations. Source: own elaboration.

Figure 4 shows which sources of information about innovations are used most often by the surveyed entrepreneurs. Identification of innovations is the phase in which entrepreneurs learn the most, both about their own enterprise and the business reality that surrounds them. Universities and other academic institutions, internal company resources as well as exhibitions/seminars/industry lectures were indicated as the key sources of obtaining information about innovations.

Another important source of information for innovative activities are internal resources of the company, that is employees' knowledge. This information shows entrepreneurs' awareness of the positive effects that the R&D and development based on the company's internal resources can bring. Highly developed countries place great emphasis on incurring expenditure on R&D and developing innovative solutions, drawing on the endogenous resources of the company, using the knowledge and skills of the staff.

The analysis carried out by Dzikowski (Dzikowski, 2015, p. 3-9) showed that the most frequently indicated sources of information for innovations in the medium-high and high technology industry in Poland are: customers (57.56%), internal sources of the enterprise (40.66%) and conferences, fairs and exhibitions (40.30%). Similar results were obtained by Szopik-Depczyńska, Konecka and Stajniak (Szopik-Depczyńska, Konecka, Stajniak, 2016) during the survey on the impact of information sources on the innovative activity of industrial enterprises representing the transport sector. In addition, the research conducted by

Tomaszewski (Tomaszewski, 2015) also showed that the sources of innovation were at the same time sources of information about innovations. Using information about innovations from a given source favored the occurrence of innovation cooperation with the given source, which coincides with the results described in this paper.

The information obtained during interviews indicate that entrepreneurs rarely use the resources of Business Environment Institutions – BEI (science and technology parks, business incubators, technology transfer centers, contact points), pointing to ignorance of such institutions operating in the Silesian voivodeship, support opportunities and services they offer. Entrepreneurs who had the opportunity to use BEI (approx. 20% of respondents) raised the issue of poor quality of services they provide, an overly conventional and unadjusted approach to individual needs and problems of enterprises. The results obtained during the interviews are to a large extent consistent with the World Bank's conclusions (W kierunku…, 2015) regarding the functioning of BEI.

Financial aspects

Since financial constraints are often one of the barriers to the implementation of innovative activities, the interviews also included questions about the company's revenues. In order to ensure the comfort of the subjects and increase the comparability of their answers, the values are presented in brackets. 86% of the surveyed entrepreneurs are companies with total revenue exceeding PLN 5,000,000 in 2016. The remaining 14% were smaller companies with relatively low incomes, not exceeding PLN 250,000. At the same time, it is noteworthy that only in the case of companies with the highest income, part of the revenue came from innovative activity.

In the opinion of the respondents, it is important to be able to raise external funds for investments in the field of innovation as well as for training activities and projects related to the exchange of experience and supra-regional or supranational cooperation in order to maintain ongoing innovation activity. Although as many as 50% of the entrepreneurs did not use public support measures in the last 3 years, in some cases this was not due to lack of interest, but rather to lack of effectiveness in raising funds. Only 12% of the respondents did not apply for support for innovations in the last 3 years. Most of the respondents applied on average once a year. Only 13% were more active in this area.

Barriers to innovation

The results obtained during personal interviews indicate that the biggest barrier for companies in developing innovative solutions is often the lack of funds for the launch of new projects and innovative undertakings, as well as difficult access to such funds, especially for large enterprises. As in the case of growth barriers, entrepreneurs pointed to the capital-intensive nature of innovative investments and the associated high risk. The qualitative data obtained in the course of numerous discussions with entrepreneurs raise the issue of too complex, complicated and difficult procedures of access to public funds allocated for

innovative undertakings. The problem of financing current or planned projects often arises in organisations' activities. In the case of larger investments, if the enterprise does not have sufficient financial resources, it is possible to obtain financial support from the EU, national or regional funds. However, at every stage, preparation of application, acquisition, use and closure of the project, there are numerous barriers that entrepreneurs encounter. If there is a separate post or R&D department in the company structure (over 60% of the surveyed companies have a R&D department, but it consists of several people) which deals with filing applications, then the works related to the preparation of the application will focus there. In the case where there is no separate R&D department, a project team is most often appointed when the need arises. The surveyed entrepreneurs also pointed to technical and legislative constraints as well as company management. Data collected by the World Bank (W kierunku…, 2015) also indicate a strong correlation between the quality of the company's management practices as measured by the quality of employee efficiency assessment system, management structure and quality of human resources management, and the intensity of innovation in the company. The legal environment is also considered by the respondents as a significant barrier to innovation, pointing out that EU regulations are more business-friendly than domestic ones.

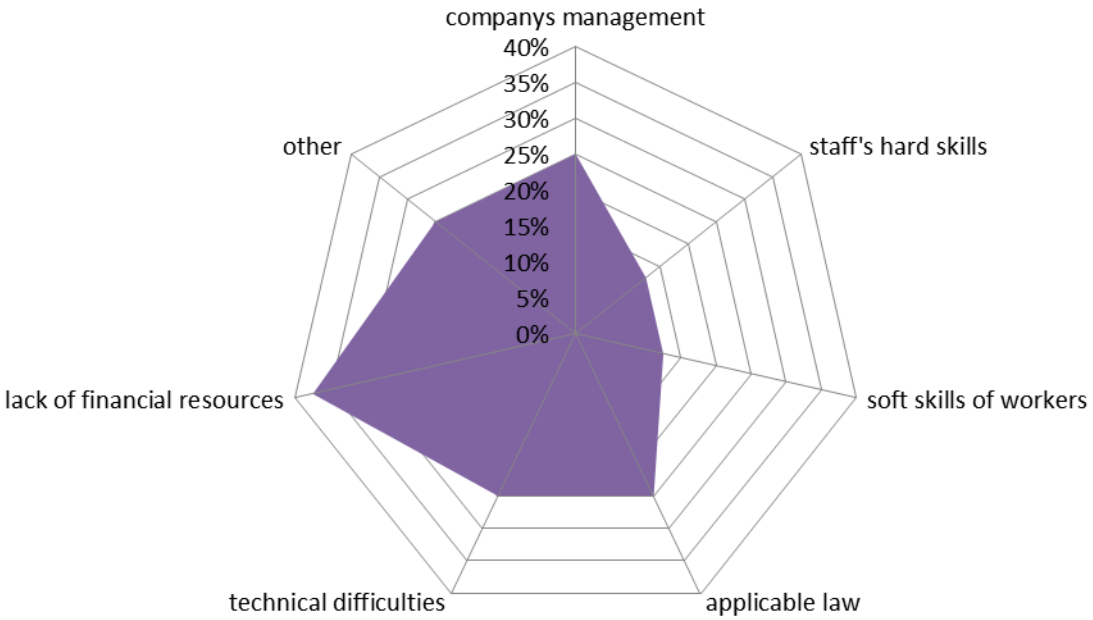

Figure 5. Barriers to innovation. Source: own elaboration.

Types of innovations implemented in the surveyed enterprises

The innovations most frequently introduced in the surveyed enterprises were product innovations at the national and company level. Marketing and organisational innovations were the least frequently introduced innovations. This may mean that companies do not fully appreciate the productivity potential associated with improving business processes, marketing skills and organisational practices.

6. Summary

The conducted research indicates that the conduction of the EDP is conditional upon close cooperation, participation and involvement on the part of all stakeholders. EDP enabling establish and strengthen of contacts as well as to generation of knowledge and added value, which would probably not be achieved without such close cooperation between the private and public sector. Interviews with company representatives seem to be a key tool for actively establishing cooperation with business.

Personal interviews were conducted among 16 entrepreneurs from the Silesian Voivodeship, selected within previously identified sectors of advantage. Interviews were conducted in the form of a moderated discussion based on a standardised questionnaire containing 63 quantitative and qualitative questions.

There was identified several factors that drive innovation in enterprises in Silesia region, however, all surveyed entrepreneurs indicated customers and suppliers as the most important factor. The respondents pointed to the need to apply eco-innovative technologies in already existing, strong industry sectors, resulting from the historical circumstances of the region, as the key to the competitiveness of the voivodeship. This was justified by lower environmental charges and avoidance of potential fines, as well as by reducing operating costs while positively affecting the investment capacity of the company, contributing to the protection of the environment and to sustainable development policy. Universities and other academic institutions, internal company resources as well as exhibitions/seminars/industry lectures were indicated as the key sources of obtaining information about innovations.

In the opinion of the respondents, it is important to be able to raise external funds for investments in the field of innovation as well as for training activities and projects related to the exchange of experience and supra-regional or supranational cooperation in order to maintain ongoing innovation activity. However, the majority felt that the effectiveness of the system for applying for public support, both at the regional and national levels, is not sufficient. What was emphasised above all was the complicated procedures for applying for funds and the long duration of the project evaluation process, which hinders the possibility of joining subsequent projects, without knowing the outcome of the previous ones. The main barriers to growth were the capital-intensive nature of investments and the accompanying high risk, investment expenditures, long-term decision-making processes at every level as well as the limited availability of EU funds, especially for large enterprises.

The biggest barrier for companies in developing innovative solutions is often the lack of funds for the launch of new projects and innovative undertakings, as well as difficult access to them, especially for large enterprises. The surveyed entrepreneurs also pointed to technical and legislative constraints as well as company management. The increase in expenditure on innovation is an opportunity for economic development of the region. However, for financial support of innovation, it is necessary to create appropriate institutional, system, legal and educational facilities. Research contributes to a further deepening of the knowledge on the

implementation of the EDP process and the possibility to use its results in the programming of regional development.

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DYNAMISM, HOSTILITY AND COMPLEXITY OF THE ORGANISATION'S ENVIRONMENT. EMPIRICAL VERIFICATION OF THE CONSTRUCT

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Abstract: There is no set of constructs or measurement tools in the subject literature that would be widely accepted. In this paper three dimensions of the organisation's environment namely dynamism, hostility, and complexity, were reviewed. These dimensions are common to most environment research but, especially on the native background, only a few researchers have attempted to synthesize these dimensions in the one research approach. The aim of the paper is synthesis of three dimensions of the organisation's environment and an empirical verification of whether the existing business practice dimensions of the organisation's environment correspond to the dimensions laid down and proposed on the theoretical level. In the paper, three dimensions of the organisation's environment - dynamism, hostility, and complexity were characterised, a research tool developed for measuring them was presented. The approach uses data from a sample of fifty-three new technology-based firms in Poland. Factor analysis was used to explore the viability of these environmental dimensions. The results of the conducted research indicate that the organisation's environment is a multidimensional construct and could be described by dynamism, hostility and complexity.

Keywords: organisation's environment, dynamism, hostility, complexity, factor analysis.

1. Introduction

The starting point for these considerations is the strong conviction that each organisation is "an open system that interacts with its surroundings, namely, it functions and exists thanks to its environment" (Urbanowska-Sojkin, Banaszyk, Witczak, 2007, p. 17). The environment influences the conditions of operating of the organisation (Aldrich, Wiedenmayer, 1993, Baum, Locke, Smith, 2001), defines the rules of the game as well as development opportunities, creates opportunities, but also barriers and threats. Understanding the management of the organisation is, therefore, not possible without understanding the environment in which it operates.

Organisational theory and strategic management have conceptualized environment as one of the key constructs for understanding performance. R. Lenz and J. Engledow (1986) distinguished five approaches to modeling environments: the industry model, the cognitive model, the organizational field model, the population ecology and resource dependence model, and the era model. These approaches are based on presumptions with regard to environmental structure and presented the causes and nature of environmental change, and how managers gain knowledge from their environments. L. Bourgeois (1980) has developed three environmental perspectives. One perspective is a focus on the group external to the organization while the second perspective focuses on the attributes of external forces. The third perspective consists of managerial perceptions concerning these environmental attributes such as dynamism, complexity, and hostility. Furthemore, the literature emphasises the impact of business environment on the performance of the organisation (Ketchen, Thomas, Snow, 1993) indicating or suggesting the importance of dimensions like dynamics, hostility and complexity of the environment for future research in this area (i.e. Zahra, 1993; Zahra, Neubaum, Huse, 1998; Baum, Locke, Smith, 2001; Wei, Wu, Yang, 2009; Bratnicka, Dyduch, 2014). The dynamics of the environment is reflected in "unpredictability of consumers' and competitors' behavior, speed of changes in market trends, industry innovation, research and development", hostility is "a competition level, number of competition dimensions, legal restrictions" and the complexity of the environment means "differences in marketing and production requirements in various market segments" (Miller, 1987, p. 62).

G.G. Dess, D.W. Bread (1987), D. Miller (1987) and M.P. Sharman, J.W. Dean (1991) have similar approach towards the close environment of the organisation, while differences in the naming of these dimensions can be observed, for example, the dynamic of the environment is interchangeably referred to as instability (Baum, Wally, 2003), and the availability of resources as the opposite of hostility (Sharfman, Dean, 1991). Given the above, the following research hypothesis was put forward in this article: The environment of the organisation is a multidimensional construct described by dynamics, hostility and complexity.

The main goal of the article is to check empirically whether the dimensions of the organization's environment in the economic practice coincide with the dimensions presented and proposed on the theoretical level. The article includes the characteristics of the dimensions of the organisation's environment, presentation of the research tool developed to measure them, description of the selection of the research sample and the analysis methods used as well as the presentation of the research results.

2. Dimensions of the organization's environment – an attempt to conceptualise

Many modern organisations have to deal with the implications for dynamic, hostility and complexity of the environment in which they operate. It is increasingly difficult to predict or even determine the likely directions of future changes. The concept of dynamics of the environment is an important determinant affecting the efficiency of enterprises (Baum, Wally, 2003). The dynamism involves many variables, for example, it is related to the speed at which the environment changes (stability-instability) or the pace of change and each aspect contributes to uncertainty (Gathungu, Aiko, Machuki, 2014). Dynamism illustrates the level of unpredictability of the environment which is visible in the variability and uncertainty of phenomena that are beyond the control of the enterprise (Dess, Beard, 1984). The dynamic environment thus reflects the high unpredictability of customers' and consumers' behaviour and a significant degree of changes in market trends or innovations (Miller, 1987a, b; Miller, Friesen, 1983). Dynamism refers to continuous changes in the competitive environment of enterprises (Yeoh, 1994) and even though it creates opportunities for development, it causes turbulences that may reduce the efficiency of enterprises (Slater, Narver, 1994). Limiting the negative impact of environment uncertainty due to dynamism has become the leading managerial challenge (Grant, 1991).

Hostility – often considered the obverse of munificence – is indicative of the scarcity and intensity of competition for environmental resources (Covin, Slevin, 1989; Zahra, Covin, 1995). Hostile environment, perceived as the external environment adversely affecting the mission and performance of enterprises (Miller, Friesen, 1982), can be described as intense competition, low margins, cumbersome and complicated legal regulations, lack of manpower and raw materials or limited growth opportunities (Zahra, Neubaum, Huse, 1998). In addition to competition, environmental hostility refers to legal, political and economic constraints (Miller, 1987), low customer loyalty and severe consequences of wrong strategic decisions (Covin, Slevin, Heeley, 2000). In hostile environment, apart from market uncertainty, there is also technological uncertainty, and thus rapidly changing technologies, which may accelerate the ageing process of products and, as a result, affect the efficiency of the company. In sectors characterised by high technological uncertainty, the greatest risk is associated with the fact that key competences of the company become more and more obsolete, and the most efficient performance of routine activities may not be sufficient in the face of changes occurring in the environment (Sorensen, Stuart, 2000).

Complexity in the business environment is generally defined as proliferation and diversity of factors and issues in that environment. The greater the number of factors in the general business environment a manager perceives must deal with, and the greater the differences among those factors, the more complex the business environment (Aragon-Correa, Sharma,

2003). Complexity indicates the degree of perceptible diversity and comprehensiveness of the environment of the enterprise (Miller, Friesen, 1982). Diversity results from the comparison with many market segments and various needs and expectations combined with fierce competition (Porter, 1980). Complexity increases the perception of comprehensiveness of the strategic decision-making process (Dess, Beard, 1984) and expenditure on the resources of the company and makes it more difficult for the organisations to maintain and satisfy the customers' needs.

Theory, as well as numerous empirical studies prove that the environment exerts a strong influence on enterprises and, at the same time, emphasise that the influence is particularly significant "(...) when enterprises are small and have limited resources compared to their competitors" (Miller, 1987, p. 689). Suggestions of the influence of dimensions of the environment such as dynamics, hostility or complexity on the development patterns of young, technological enterprises are confirmed by contributions made by R. Katil, S. Shane (2005) or B. Clarysse, J. Bruneel, and M. Wright (2011). Young enterprises, especially those belonging to the high-tech sector, usually operate in a very turbulent environment (Dickel, Rasmus, Walter, 2007) which is characterised by a significant acceleration of changes on the markets or related to the technology and by the explosion of available information (Slater, Narver, 1995). In this environment, enterprises developing and commercialising their own technologies have to deal with many new and developing markets and technological data which change very quickly. L.J. Bourgeois, K.M. Eisenhardt (1988), describe highly dynamic markets through the changes that are so fast and discontinuous that the information collected at the beginning of the development cycle of a new product may become outdated when it is marketed.

In this way, all information concerning the market is particularly sensitive and delicate due to its time availability (Glazer, Weiss, 1993). Immediate and direct access to the market knowledge greatly affects the ability to gain a competitive advantage, mainly due to the shortened innovation development cycle (Calantone, Garcia, Droege, 2003) and the possibility of outstripping competitors by launching new products earlier. This is of key importance in a turbulent environment where product life cycles become shorter and technological breakthroughs are made at a faster pace.

Therefore, the ability to quickly respond to emerging technical and market information becomes one of the key factors in success (Iansiti, 1995). Enterprises competing in an environment in which there is a high level of turbulence must flexibly adapt to changing conditions in order to survive (Gathungu, Aiko, Machuki, 2014). Therefore, the research hypothesis put forward was verified on the example of a selected group of enterprises, young companies included in the high technology sector. In the next part of the article, in order to confirm the existence of three dimensions of the organisation's environment: dynamics, hostility and complexity in economic practice, the operationalisation and empirical studies of the organisation were carried out.

3. Research tool

In literature, there is no set of constructs and commonly accepted tools measuring the organisation's environment. Some scientists treat the environment as a fully objective phenomenon observable by means of rigorous measurement procedures (e.g. Castrogiovanni, 2002), and others emphasise the cognitive nature of this phenomenon, caused by making it meaningful, attention and beliefs (e.g. Aragón-Correa, Sharma, 2003). As a result, the environment can be described either based on objective sources or subjective assessments of the organisation's members (Boyd, Dessa, Rasheed, 1993). It is worth noting that by using perceptual indicators, we put emphasis on managerial perception that shapes behaviours in terms of organisational strategies and practices adopted. Moreover, when the environment is subject to frequent changes, the perception based on available data is likely to capture current realities to a greater extent than long-term trends (Boyd, Dessa, Rasheed, 1993). In addition, the presentation of the environment from the point of view of the company's members enables the avoidance of interpretative errors occurring in the case of data aggregation (Ketkar, Sett, 2010). Therefore, in research, using an approach that captures the differences in the environment by means of a number of dimensions reflecting the subjective observations of respondents (Bradley, Shepherd, Wiklund, 2011; Kraus, Rigtering, Hughes, Hosman, 2011), especially observations of owners of high technology companies (Dickel, Rasmus, Walter, 2007) or small enterprises (Wiklund, Patzelt, Shepherd, 2009), perceptual indicators were used.

In the studies, the described dimensions of dynamics, hostility and complexity were used to characterise the environment. The measurement of the environment dynamism was based on five issues borrowed from the tool developed by D. Miller, P.H. Friesen (1982). A scale consisting of one item developed more than 30 years ago by P. Khandwall (1977) and two issues borrowed from the tool of D. Miller, P.H. Friesen (1982) was used in order to investigate the environment in terms of hostility. The validity and credibility of the scale was confirmed by previous research which showed its significant positive correlation with the effectiveness of the organisation (e.g. Naman, Slevin, 1993, Kraus, Rigtering, Hughes, Hosman, 2011). Two questions were used to measure the complexity of the environment, one adapted from the tool of D. Miller (1987) and the second one based on the research of K. Bratnicka (2012). A research tool for measuring the organisation's environment is presented in the table (Table 1).

Table 1.
A research tool for measuring the organisation's environment

Environment dimensions	Little		Average			A lot	
	I definitely do not agree	I do not agree	I rather do not agree	It is hard to say whether it is true or not	I rather agree	I agree	I definitely agree
Dynamism							
1. Changes in marketing practices are frequent.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. The ageing rate of products/services is very fast.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3. Competitors' behaviour is unpredictable.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4. The supply of products/services and customers' behaviour are unpredictable.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. The pace of changes in the production/ service provision technology is very fast	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Hostility							
6. The environment of the enterprise is very risky, one false step can lead to a big failure.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7. The market activities of key competitors became more hostile.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8. The market activities of the main competitors more and more influence the scope of the activities of the company (prices, supplies, services, quality, etc.).	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Complexity							
9. The variety of production methods and marketing techniques necessary to meet the various needs of customers has grown considerably.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10. The industry is characterised by frequent price wars.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Source: Prepared on the basis of the indicated sources.

In the original version, the individual questions had the character of a forced choice on a seven-point scale spread between two opposing statements. The tool has been transformed into a Likert scale, where individual issues make it possible to measure the scope of dynamics, hostility and complexity of the environment. All items were then measured on a seven-point Likert scale from 1 ("I definitely disagree") to 7 ("I definitely agree").

4. Results of empirical studies

In the first pilot studies, the owners or managers managing twenty-three organisations participated were studied. Due to the area of scientific interest, the research was limited to enterprises belonging to the high technology sector, where the classification of Eurostat was adopted as the selection criterion. The research resulted in the verification of the research tool,

its modification consisting in the change of some vague wording. In the second stage, appropriate empirical studies were carried out based on data obtained from fifty-three companies in order to test the research hypothesis. Similarly, the questionnaire was addressed to the person managing the entity as these persons have the most profound knowledge about the environmental practices of their firms (Calantone et al., 2002). The data were collected at the end of 2016. The studies were used triangulation procedure of data and methods (internal documentation of companies, interviews and observations).

60% of fifty-three companies included in the sample were enterprises involved in production and service activities and 40% of enterprises carried out service activities. Moreover, the group of enterprises studied included young enterprises the average age of which was around 5.6 years. As part of the research sample, the following sectors of advanced technologies were identified (according to the Eurostat classification): activities related to software (62.01.Z), production of measuring, control and navigation devices and instruments (26.51.Z), production of basic pharmaceutical substances (21.10.Z), production of medicines and other pharmaceutical products (21.20.Z), production of other chemical products not elsewhere classified (20.59.Z), research and development works in the field of biotechnology (72.11.Z), scientific research and development works in the field of other natural and technical sciences (72.19.Z). Due to the size of enterprises measured by the number of employees, micro and small enterprises accounted for 100% of the population studied.

The aim of the study was first to analyse the reliability of the scales used. The reliability analysis was carried out using Cronbach's alpha. It was assumed that all Cronbach's alpha values of test reliability should exceed 0.7 (Nunally, Bernstein, 1994) in order to be internally consistent and reliable. Ultimately, the following Cronbach's alpha values were achieved: 0.859 for dynamics, 0.867 for hostility and 0.847 for complexity. All values are high and above the acceptable value of 0.7, which means that the analysed dimensions are characterised by internal consistence and reliability. Similarly, for all dimensions, the composite reliability value was above the acceptable 0.7. Also, the Average Variance Extracted criterion met the formal requirements for all dimensions, amounting to a level above 0.5. A factor analysis was carried out to verify the correctness of environment dimensions composition.

Factor analysis allows checking the correctness of aggregated variables construction or, possibly, construction of new dimensions. Therefore, in this study factor analysis served as a cognitive and verification function. Factor analysis allows to reduce the number of variables by replacing them with metaproperty-factors. The determined main factors reflect the structure of correlations between the examined properties and also have a substantive significance. Two basic method groups can be distinguished in factor analysis (Gatnar, 1998): Principal Component Analysis and the classical Factor Analysis. Both groups are treated as variations on the same research procedure, even though they are not such; however, they do yield similar results. Before commencing with factor analysis, it is imperative to check the

suitability of the variables selected. The Keizer-Meyer-Olkin (KMO) test, which takes values adopts values from 0 to 1. The closer to 1, the better explained the correlation matrix structure is. It is assumed that the KMO value should be higher than 0.7 (Nunally, Bernstein, 1994).

The general factor analysis algorithm can be presented in the following steps (Gatnar, 1998): (1) obtaining a linear correlation matrix between primary standards, (2) estimating the value of factor loadings (through classical Factor Analysis or Principal Component Analysis), (3) rotation and interpretation. A few (a dozen or so) main factors can be extracted as a result of this procedure. In the case of Principal Component Analysis, their number is equal to the number of considered properties, while in classical factor analysis it will be smaller than that. Further analysis does not require the inclusion of all obtained factors because the first few explain the majority of common variance. The matter of extracting the number of factors is the most subjective element of the analysis. The most frequently applied criteria for extracting the number of factors include the screeplot, the Keiser criterion as well as the Joliffe criterion and explained variance.

In the conducted research, the KMO value was 0.801, which is a good explanation of the correlation matrix structure being a result of common factor influence and indicates that exploratory factor analysis can be used to extract the main factors - metaproperties (Figure 1).

Factor	Eigenvalue	Explained variance %	Cumulative eigenvalue	Cumulative explained variance %
1	6.101	55.466	6.101	55.466
2	2.135	19.411	8.236	74.877
3	0.946	8.601	9.183	83.478

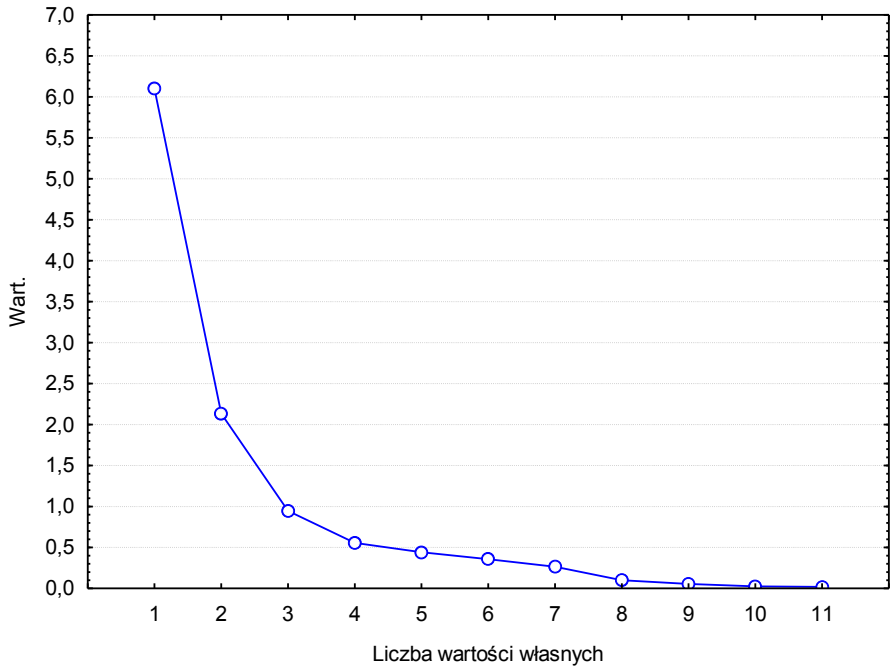

Figure 1. Factor analysis. Source: own elaboration.

The screeplot criterion shows that three dimensions of the organisation's environment exist (Table 2), which is also confirmed by the Keiser criterion. Principal component analysis (PCA) was used to extract the factors. In turn, the VARIMAX normalised rotation method, which minimises the number of variables in possession of high factor loadings through orthogonal rotation, was applied in order to preserve the orthogonality of factors. Results in bold indicate the factors which are grouped and can describe a given dimension together.

Table 2.
Factor analysis for the screeplot and Keiser criteria

	Factor 1	**Factor 2**	**Factor 3**
Statement 1	**0.730**	-0.222	0.475
Statement 2	**0.956**	0.006	0.132
Statement 3	**0.797**	-0.003	0.371
Statement 4	**0.918**	-0.197	0.301
Statement 5	**0.915**	0.132	0.283
Statement 6	0.432	**0.757**	0.265
Statement 7	0.208	**0.914**	0.224
Statement 8	0.409	**0.774**	0.223
Statement 9	0.514	0.282	**0.643**
Statement 10	0.569	0.191	**0.682**
Explained variance	3.263	2.374	3.546
Share	0.297	0.216	0.322

Source: own elaboration.

Results presented in Table 2 indicate that all three dimensions of the organisation's environment in terms of dynamics (factor 1), hostility (factor 2) and complexity (factor 3) coincide with the dimensions proposed on the theoretical level of this paper. Therefore, statements 1 to 5 are strongly correlated with factor 1 and show a weak correlation with factors 2 and 3. Statements 6 to 8 have a strong correlation with factor 2 and weak correlation factors 1 and 3. In the case of statements 9 and 10, the strongest correlation occurs with factor 3. The three dimensions themselves are constructs which possess reliable scales. Moreover, analysis of the preimage matrix diagonal, the values of which ranged from 0.535 (statement 3) to 0.881 (statement 9), showed that that the 10-item questionnaire met the KMO measure requirements in relation to each individual item. Therefore, factor analysis confirmed the validity of classifying the individual variables and questions under the dimensions whose existence had been theoretically assumed. The research results above allow us to accept the hypothesis stating that the environment of an organisation is a three-dimensional, higher-order construct comprising dynamics, hostility and complexity dimensions.

5. Discussion and conclusion

Based on the conducted research, it can be concluded that the organisation's environment is a multidimensional construct, described by dynamics, hostility and complexity, with the existence of the theoretically discerned dimensions confirmed empirically. However, the indicated research procedure has certain limitations resulting from the adopted research technique, research tool and the research sample itself. Operationalisation of variables based on statements assigned to describe the identified phenomena is burdened by subjectivism. Likewise, the use of a questionnaire survey to assess organisational phenomena causes the assessments of statements relating to environment dimensions to be naturally subjective. The research sample was narrowed down to high-tech companies. Therefore, it seems to be an interesting idea to attempt to use the adopted scale for further in-depth research and assessment of the environment in research based on another type of entities. What is more, the organisation's environment construct used in the surveys is highly complex, hence further continuation also requires a reiteration of the reported research using, for example, different scales of measurement. It is worth to emphasise that the continuous efforts undertaken to measure the organisation's environment provide more knowledge about this matter. Thus, a possibility exists to compare many studies and draw broader or more in-depth conclusions.

The issue of organisation's environment discussed in this article is as interesting as it is important. Conducting a comprehensive analysis of the environment in which an organisation performs its activities is extremely important, as it is commonly known that whoever makes better predictions for the future states of the environment has a greater chance of success due to the fact that the growth and survivability of an organisation is dependent on the existing and future external factors in which it operates by planning, organising and implementing market service processes (Penc-Pietrzak, 2000, p. 60). Knowledge about the organisation's environment and changes therein should be constantly updated, analysed and checked. A variety of information sources should be used to collect this knowledge. This is a key condition of making the right decisions on market opportunities. In turn, the ability to shape relationships with the environment constitutes an important source of competitiveness and an exceptional achievement of the organisation. It allows to acquire missing knowledge and organisational resources without incurring unnecessary costs (including social costs) and respond flexibly to changing circumstances. Furthermore, it provides a free, open flow of communication, initiating the ethics of cooperation, thus minimising the costs and risk (Adamik 2007, p. 381).

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MECHANISMS OF CHANGES OF ORGANISATIONAL CULTURE IN CORPORATE ENVIRONMENT

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Abstract: The article attempts to explain the importance of organisational culture in corporate environment. In particular, it highlights certain mechanisms of changes occurring in the organisation in the organisational culture perspective. Organisational culture offers certain standards and values, and it systematises reality, meaning that it highlights what is important and avoids what is irrelevant to the organisation and its employees. Given that, it is a tool enabling identification of opportunities and threats arising from changes as well. Many companies, for instance IBM, Procter&Gamble, Exxon, ABB or Siemens have managed to undergo the change process without changing their developed and consolidated standards and values. The purpose of this article is to diagnose the ways of conscious development of organisational culture in corporate environment, and illustrate the same with the example of selected banks. The article analyses the scientific and the literary output researching the aforementioned issue. It is an introduction to the author's own empirical studies aimed at analysing the mechanisms of changes of corporate culture.

Keywords: organisational culture, values, changes, human resources, corporation.

1. Culture in the organisation

It is not easy to refer to one, widely recognised and used definition of organisational culture (Juchniewicz, 2016). Its components are also subject to different interpretations, which further complicates standardisation of the term. The first attempt to define organisational culture was made by E. Jacque in 1951. According to him, it may be defined as a 'customary and traditional way of thinking and acting, shared more or less by all the members, which new members need to learn and at least partially accept in order that they may be accepted in the company' (Jacques, 1951, p. 251; Zbiegień-Maciąg, 2013; Galata, 2007). According to G. Hofstede, culture it is the collective programming of the mind which distinguishes one social group from others. The programming of the mind is a process partially shared by some people, and partially unique for a specific individual or a group (Hofstede, 1984).

A classic, an expert and a culture researcher, E. Schein, explains it as a set of reasonable rules of conduct, discovered, established and further developed by a group, used to solve

problems of alignment with the environment and internal integration, which, if considered legitimate, are also supposed to prepare new members of the organisation to perceive, think and feel the said problems in a consistent manner (Stoner et al., 2001). It was also Schein who divided organisational culture into three characteristic levels (Pocztowski, 2007; Sitko-Lutek, 2015).

- artifacts (visible and recognised, yet difficult to interpret elements of organisational culture (verbal, behavioural, physical),
- values, standards and behaviours (elements of organisational culture at a higher level of awareness, related to, inter alia, attitudes towards work, power, status, client, quality, profit, loyalty and standards, i.e. ways of realising values),
- main beliefs and assumptions (hidden, unrecognised, undisputed elements of organisational culture relating to, inter alia, environment, truth, human nature, nature of human activity, and social relations).

Many years after the first theory developed by E. Jacque, B. Nogalski and R. Ronkowski (2007) explain organisational culture in a similar manner; to them, it is a set of common beliefs, goals, attitudes and corporate values which does not need to be expressed, for example, in writing, but which shapes the way in which employees act and collaborate, and which strongly influences the way in which they perform work without any particular instructions.

In 1952, anthropologists A.L. Kroeber and C. Kluckhohn analysed more than 160 definitions of organisational culture, thus coming to the conclusion that most of those concepts were related to the concept of the group, i.e. organisational culture referred to the group, to what links individuals in groups, and to what they share, i.e. shared assumptions, standards, values, knowledge or beliefs (Galata, 2007; Zbiegień-Maciąg, 2013). They also divided the organisational culture definition into six types (Galata, 2007).

1. nominalistic – definitions presenting the classic form of early ethnological definitions,
2. of uniform diversity – a group of definitions trying to reconcile the unity of an object with the diversity of its manifestations,
3. normative – definitions stress human behaviours abiding by standards, patterns, values, models and other, symbolically significant, produced and delivered systems being the factors shaping human behaviours,
4. psychological – this group of definitions focuses on the psychological mechanisms of development of culture (i.e. mechanisms of learning, forming habits or internalising standards applicable within a specific population, etc.),
5. structural – definitions within this group primarily relate to the structure of a specific culture; consequently, they deal with its primary elements and their internal interrelations,
6. genetic – definitions focus on the problem of the origin of culture, and they attempt to explain that origin.

Among numerous concepts of organisational culture, one may refer to two basic approaches to understanding its essence. In the first one, it is one of the elements of a coherent system enabling smooth operation of an organisation; in the other one, it is a metaphor of the organisation, a process creating values, standards and rules that shape human behaviours, organisational behaviours included (Gassea, Tremblay, 2011, p. 303-314).

Despite the absence of a master definition of organisational culture, one may distinguish several characteristic features that most of them share. Firstly, organisational culture is historically determined, meaning it reflects the history of the organisation; secondly, it is holistic, meaning it covers a certain wholeness being more than just a sum of its components; thirdly, it is a social creation, meaning its development is affected by people within the organisation; fourth of all, it is related to the objects of anthropological research, such as symbols and rituals; fifthly, it is a so-called soft concept; and last of all, it is difficult to change (Puto et al., 2016). Summarising the above, the foregoing characteristic features might be defined in accordance with the method presented in Table 1.

Table 1.
Characteristic features of organisational culture

Features characterising organisational culture		
Conscious and subconscious acceptance of specific group cultural patterns (symbols, rituals, standards) by people, and people abiding them;	multilevel and multidimensional nature (organisational culture is a soft concept of various types);	feedback between organisational culture and behaviour of people within the organisation (organisational culture alignment with the organisation management strategy).

Note: author's own study.

2. The role of organisational culture vs. changes

In the organisational culture shaping process, numerous factors affect one another, as a result of which shared ideas, applicable rules and shaping behaviours are established within a specific organisation. The environment of a specific organisation, i.e. value systems and basic cultural values prevailing within a given population, region or nation are also important.

Culture determinants also include factors inside the organisation, i.e. the authority structure, the features and the type of the organisation, the employees' personalities, their needs and value systems, their qualifications as well as professional and personal experience. And there are leaders who should identify values to be shared by the entire group, thus creating an axiological system for employees. It is quite important due to the differences between subordinates and superiors that arise from different value systems, belonging to different professional, age or gender groups.

So, before an organisations decides to radically change the way in which it operates, thus changing any element of its organisational culture, it should note the role which culture plays in the life of the organisation; in general, it is of dual nature (please refer to Table 2).

Table 2.
External and internal functions of organisational culture

Functions of organisational culture	
External	**Internal**
– to facilitate the understanding of the mission and the strategy of the organisation, and identification of the primary objective of the organisation by the participants; to enable integration of the participants; – to enable improvement of the ways of operation and to reformulate objectives if a change is required; – to define the borders of the group as well as acceptance and rejection criteria, to enable the shaping of borders between groups;	– to develop a common language and conceptual categories enabling prompt and clear communication between employees; – to identify the borders of a specific social group as well as acceptance or rejection criteria giving the sense of belonging and isolation; – to meet colleagues' emotional needs and to facilitate friendships in relation to shared beliefs and social experiences; – to enable integration around the centres established to implement the company's objectives, and to increase the employees' involvement; – to specify the rules of authority and the criteria of the status, to enable avoidance of conflicts related to authority, negative emotions and aggressive actions; – to determine the way in which authority may be gained; – to specify how and when persons in authority, their decisions and proposals may be criticised; – to consolidate the work ethic; – to reinforce the sense of duty and responsibility in general.

Note: author's own study based on: Sulkowski L. (2002). *Procesy kulturowe w organizacjach*. Toruń: Dom Organizatora; Kopczewski M., Pączek B., Tobolski M. *Istota kultury organizacyjnej w zarządzaniu przedsiębiorstwem produkcyjnym*. Retrived from: http://www.ptzp.org.pl/files/konferencje/kzz/artyk_pdf_2012/p084.pdf, 2018.01.03.

Moreover, organisational culture is correlated with the structure and the leadership style; in complex organisations, for instance corporations, interpersonal relationships may be less frequent, while the formalisation may be greater, and the sense of community is reduced (Bylok, Robak, 2009). Considering some typologies of organisational culture, one may come to the conclusion that explorative and creative organisational culture is the most appropriate for corporations wishing to change (Asnoff, 1985; Stańda, 1994). Explorative culture emphasises the constant search for change, while creative culture emphasises the constant search for innovative changes. Given the foregoing, changes will also concern organisational culture itself (e.g. its previously preferred values or standards, rules or rituals), not only the management model.

3. Mechanisms of changes of organisational culture in corporate environment

Corporate culture needs to be the source of its success and integration of employees, and it needs to make human resources grow stronger. Managers play an enormous role in ensuring that corporate culture does not 'eat' employees, i.e. it does not introduce any changes that are detrimental to the company and bad for the employees. An improperly implemented corporate policy may contribute to a serious crisis or even result in the collapse of the company.

Implementation of organisational changes in a corporation is usually a deliberate, structured process controlled by the manager. Changes may either be forced (e.g. due to amendments to the labour law), necessary (e.g. to improve the implementation of selected processes), or they may occur automatically (e.g. through the behaviours of new employees). Successful implementation of changes in a corporation primarily depends on appropriate identification of the need for changes, and it also requires meticulous development and implementation of the change project. The project should also cover a diagnosis of the corporate culture so that changes of its elements (values, rules, standards) are allowed for in the course of reorganisation of organisational activities. M. Czerska suggests division of the cultural change process into six steps (Czerska, 2003, p. 46):

1. Development of the company strategy.
2. Diagnosis of the current organisational culture.
3. Analysis of discrepancies between the current and the desired organisational culture.
4. Development of a project of selected methods to correct the organisational culture.
5. Control of the new culture.

It should be remembered that corporate culture develops and stabilises over many years, and it becomes deeply rooted in the organisational values, but sometimes, for various reasons, it requires change. In the opinion of S.P. Robbins (2001), a cultural change may take place when:

- there continues or arises a dramatic crisis which contests the status quo and the existing culture, e.g. a technological breakthrough, etc.,
- there is a change of leadership that will result in a change of basic values, habits and standards,
- the organisation is young and small, which facilitates the change of its organisational culture due to the incomplete or yet to be fully consolidated values,
- there is the so-called weak culture – the more prevalent the culture and the more accepted its values by its members, and the stronger the culture, the more difficult it is to implement any changes.

In the world of absolutely every corporation, cutting the coat according to the cloth and aligning the strategy with the prevailing as well as anticipated market trends is a minimum

required to achieve a certain level. In today's turbulent environment, corporate organisational culture should support the company's efficiency on the market while strengthening its position. Therefore, it is important to identify the strength and the openness of its culture. The strength of the culture depends on three factors: clarity, prevalence and rooting depth (Romanowska, 2001; Aniszewska, 2007).

1. Clarity means unambiguity and legibility of models, standards and symbols. Employees have clear views of what behaviours are desirable, what behaviours are undesirable, and what the applicable standards are.
2. The degree of prevalence means the scale in which the culture is known to and shared by employees.
3. The rooting depth refers to the degree of acquisition and application by the members of the organisation of its models and symbols, and the time of their application.

A strong culture is characterised by a high level of the foregoing aspects. It has many advantages, but it also has disadvantages (Table 3).

Table 3.
Advantages and disadvantages of a strong organisational culture

Advantages	Disadvantages
– strong motivation, – loyalty, – better cooperation, – low investments in inspections, – low number of conflicts, – efficient communication, – fast information processing and decision making, – faster problem solving and plan implementation, – stability and reliability.	– blocking of new orientations, – barriers to development and change, – fear of change, – difficult to change, – consolidation of traditional motifs of success, – lack of flexibility and innovation.

Note: Olszewska B. (ed.) (2004). *Podstawy zarządzania. Przedsiębiorstwo na progu XXI wieku*. Wroclaw: Wydawnictwo Akademii Ekonomicznej im. Oskara Langego; Steinmann H., Schreyögg G. (1998). *Zarządzanie. Podstawy kierowania przedsiębiorstwem. Koncepcje, funkcje, przykłady*. Wroclaw: Oficyna Wydawnicza Politechniki Wrocławskiej.

According to Deal and Kennedy (1982), many organisational problems arise from its weak culture; thus, it appears that a strong organisational culture is a guarantee of success, but it still may cause problems to companies, for example corporations, in terms of implementing changes. A strong culture of large companies results in the companies shutting others out, fossilization and reproduction of patterns and models, meaning striving for the status quo, or conformism. Consequently, a strong organisational culture may hinder innovation which many companies just want to implement. Thus, attention should be paid to the so-called weak (soft) cultures.

Paradoxically, they may be characterised by openness expressed in the degree of ease with which the organisation accepts new ideas or members. Open cultures facilitate innovation, while closed cultures hinder information flow.

Weak cultures are more susceptible to changes. P. Gagliardi believes that organisations that do not learn from their experiences solve problems in the traditional and routine way. When tension grows within the organisation, and efficiency decreases, there occurs the vicious circle; on the other hand, when the current system of values is changed, when manifestations of traditional attitudes and behaviours may be fought, we are dealing with a 'cultural revolution'. Gagliardi believes that such a cultural change requires a change of personnel and employment of more creative people. Slow changes of the current system of values and standards, influencing the social subsystem, take place during a cultural change implemented the 'evolutionary' way. First, the existing culture is diagnosed; then, a plan of improvement of the system of values in place is developed so that valuable elements are retained and unfavourable elements are changed (Koźmiński, Piotrowski, 1997).

Returning to Deal and Kennedy`s (1982) opinion on the superiority of the strong over the weak one, what we may ultimately find in their considerations is a statement that the company itself should choose the kind of culture that will bring the best results, which in turn will lead to implementation of difficult changes in the direction that the managers have found to be advantageous.

A cultural change is a long-lasting, even years-long process. When planning it, one should allow for difficulties and objections on the part of employees who are usually reluctant to change. Planning an organisational culture change should start with outlining a new vision, which means clarification of new strategic objectives. A new HR policy, covering a training programme or a reduction of the number of employees, is the primary tool of a cultural change (Koźmiński, Piotrowski, 1997; Alvesson, Sveningsson, 2015).

There are many ways of conscious shaping of corporate organisational culture. One of them is to identify preferred values in the mission, and to develop catalogues of organisational values. J. Michela and W. Burke claim that in order to change the culture, we must first understand it (Michela, Burke, 2000). Such an approach makes it possible to treat corporate organisational culture as a normative binder. Another way may be to change the employee promotion or the employee development rules, leadership styles, etc. Among the tools, one should mention, inter alia, selection of the employee selection and recruitment criteria, identification of the competence profile for the purpose of the interim assessment, the motivation system and the ways of employee development, for instance mentoring or coaching (Bylok, Robak, 2009). On the other hand, H. Kraemer notes that a change of organisational cultural values should be accomplished through leadership which, on the one hand, shows the desired values, and, on the other hand, favours internalisation of those values by employees (Kraemer, 2011).

Another approach to the organisational culture change is shown by M. Essawi and O. Tilchin who focus on effective internalisation of desired organisational values by employees. (Teneta-Skwiercz, 2017, p. 350-352, cf. Essawi, Tilchin, 2012, p. 175-178).

However, the model of the organisational culture change which they present leaves many unsolved issues, just to name the absence of a diagnosis of the existing culture. Moreover,

cultural values and standards are partially visible and recognised elements which may be successfully changed; it is more difficult when it comes to basic assumptions which constitute invisible and unrecognised foundations of any organisational culture, and changing them is not quite so simple.

According to B. Fryzeł (2005), determination of employees' attitude towards corporate culture and its values are of significant importance in the implementation of changes to the organisation and its culture, and the differences in their perception often arise from employees' gender. For instance, women tend to be more conservative about changes than men. According to the research cited by the author (Fryzeł, 2005, p. 37): '(...) persons displaying an innovative attitude towards changes appreciate such values such as maturity and full of experiences more than conservative persons, but they value salvation, national security and equality less.' Revolutionary changes do not always meet with approval, especially if they involve personnel changes; in such instances, tools used to shape organisational culture in terms of human resources management become important. Radical changes are quite risky; they reject the old cultural system, and they often introduce a completely new one. One may expect significant changes of the structure, employment, separation of powers, and processes (Cameron, Quinn, 2011). Revolutionary cultural changes are justified when the situation within the company changes to the worse, and its climate and atmosphere become a burden on the employees. It is for a reason that scientists consider organisational culture to be the most significant obstacle to the creation and use of organisational knowledge resources (De Long, Fahey, 2000).

Organisational culture changes as exemplified by selected banks

'In 2011, after many years of growth and dynamic acquisition of the bank loans market, the situation began to change to the detriment of Lukas Bank, then Crédit Agricole. It was caused by the increasing competitive activity and the growing number of new regulations. Until then, the company's organisational personality could be described as dynamic, full of extraordinary people whose average age was about 30. Most executives were promoted to those positions. The bank could boast of a high increase of the market share, good financial results and a rapidly growing customer base. When the situation began to worsen, more traditional rules and leadership style were implemented within the team. This made the previous entrepreneurial culture start to disappear. Soon, numerous subcultures within the organisation became visible, and the team's creativity decreased. The management of the bank knew they were not able to restore the original energy without significant organisational culture changes. First, however, they needed a reliable, research-based diagnosis of the current culture and a structured approach to change. At this point, support from the outside turned out to be of assistance. The company decided to get back to the roots. If the corporate strategy answers the question 'why?', meaning what we want to do to accomplish strategic objectives and organisational visions set, then organisational culture answers the question 'how?', meaning how people will want to act, behave, implement the strategy every day. Culture means standard behaviours prevailing within

the organisation, either supporting or hindering implementation of the strategy. And that was why Crédit Agricole decided to focus on its culture.

Over three years, two studies were carried out to compare conclusions and observe changes. The first study was carried out in 2011, at Lukas Bank, meaning before the name was changed to Crédit Agricole. The second study was carried out in 2014, meaning after the rebranding (...) It researched factors affecting the current culture to identify priority areas at the bank that demanded changing. The entire process assumed that the ideal, i.e. the target organisational culture would be determined beforehand. The first study showed a very strong passive style, negatively affecting employees' commitment and innovation. People did not accept individual goals, although the goals themselves were not considered to be difficult to accomplish, but they were not sufficiently discussed with the managers.

The most important element of further proceedings was to identify change agents among the managers to develop the leadership within the organisation. To that end, workshops and training sessions were held, and the goal and the method of achieving the desired organisational personality were developed together. (...) Unfortunately, the second study showed that passive behaviours had become even more frequent throughout the organisation. The level of self-realisation decreased. Indirect criticism increased. The rate of dangerous behaviours increased, among top managers in particular. Why did that happen?

Leaders', including the managing person's, personal commitment and involvement in the project is the key success factor of the cultural change. Partial commitment, even 'delegation' of the cultural change to lower organisation levels, may only lead to certain modifications of the culture, its improvement in individual areas, but it will not lead to broadly interpreted transformation of culture.

Inclusion of all the leaders in the process, their commitment and persuading them to implement the cultural change is one of the greatest challenges.

Crédit Agricole learns from its mistakes. Today, the management model behaviours much more effectively. A flat organisational structure has been implemented, the number of managers has been reduced, and the assumptions of free and open communication between employees have been continually implemented. However, it should be emphasised that the implementation of the foregoing changes is a long-lasting process, and culture management never ends (https://www.hbrp.pl/…).

L. Zbiegień-Maciag (2013, p. 141) provides another example of creating a new culture at Bank Inicjatyw Gospodarczych S.A. The bank was established in 1989 as one of the first private banks. It undertook to restructure another bank facing bankruptcy. As of 1993, the bank developed, ultimately showing a much better condition. For many years, there were two separate legal entities, i.e. BiG S.A. and BiG Bank S.A., operating simultaneously, and having similar structures and procedures. Their specificity involved:

- relying on the experience of people from different banking institutions, supported by Western consultants, which led to the transfer to the banks of the experience of the countries operating in free market conditions for a long time,
- supplementing the personnel with people willing to take risks; they became the core personnel.

The foregoing undertakings resulted in an increase of the number of employees, from 300 in 1989 to 700 in 1995. Further changes, once the bank became listed, assumed further targeted selection of employees characterised by prompt making of frequently risky decisions, coping with stress at work, and making the right choices. They started to implement activities aimed at planning employee career paths, increasing their commitment, and annually assessing their performance to clarify all the rules applicable at the bank. This shaped the bank's own standards and cultural values which, in the years to come, would evolve as the organisation developed and the environment changed. In 2003, following a merger, the bank was transformed to Bank Millenium.

As the foregoing examples show, organisational culture creations or changes are always accompanied by certain complications which most frequently result from human nature and mentality, and which may prevent changes. Thus, it appears that all the mechanisms of organisational culture changes require complete commitment of both leaders and other members of the organisation. Only with thorough and team work, shaping of people's awareness as to the change of the cultural system within the company, may the desired community effect and understanding of the principles, values and standards setting the direction of actions and efforts be accomplished.

4. Conclusions

Culture is an extraordinary and a unique creation in every organisation; it integrates and disciplines to work through consolidated standards, rules or principles. It strengthens the sense of group unity in the face of numerous undertakings and existing threats. It is because of the threats and the changes arising for various reasons that corporate culture should offer acceptance mechanisms which enable adaptation to new conditions. Given the foregoing, culture plays a positive role in the transformation process, and it should definitely not be ignored when planning the change strategy. Still, it should be noted that without thorough commitment of the transformation leader, or even multiple leaders and all the team members, the intended purpose cannot be achieved, and the dialogue between the superiors and their subordinates will enable understanding of the importance of new standards and values, internalisation of which requires time.

The author of the article plans to make an attempt to explore several dozens of corporations in terms of their flexibility towards changes of organisational culture that adapts to the current market requirements and the multiculturalism of corporations. The aim of the study will be to develop a model (or models) of a mechanism of changes of organisational culture, shaped by a group of similar internal or external stimuli.

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FORECASTING IN ECONOMIC SCIENCES IN THE CONTEXT OF CHAOS THEORY

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Abstract: The aim of the article is to determine the epistemological status of forecasting in economic sciences in the context of chaos theory. Achieving the aim required the use of logical analysis and conceptual construction. The article defines two criteria for recognising a given system as being chaotic. The first one (subjective) concerns the appearance of the complexity characteristic of indeterminism. The second one (objective) concerns the occurrence of the sensitivity of the system to the initial conditions. The study examines the occurrence of both traits in economic systems and finally concludes that the epistemological status of forecasting in economic sciences is negative.

Keywords: forecasting, chaos theory, epistemology.

1. Introduction

Any scientific theory is required to fulfil three functions – **descryiptive**, **explanatory** and **predictive** (Przybyła, 2001, p. 25). The subject literature discusses the possibility of implementing the predictive function in economic sciences (Dittmann, Szabela-Pasierbińska, Dittmann, and Szpulak, 2017). The most radical approach, referred to as **instrumentalism**, assumes that the main objective of formulating any scientific theories is forecasting (Popper, 2002, p. 54). In that approach, their effectiveness is more important than meeting the criterion of the scientific truth. In instrumentalism, any intellectual aspirations are treated as measures that help to meet the practical needs (and therefore, instrumentalism is a special type of pragmatism) (Grobler, 2006, p. 257). Representatives of instrumentalism in the philosophy of science include, among others, E. Mach, M. Schlick or L. Wittgestein (all belonging to the so-called Vienna circle) (Popper, 2002, p. 54). Instrumentalism has many supporters among the representatives of economic sciences – one of the most famous of them was M. Friedmann (winner of Nobel prize) (Friedmann, 1953, p. 8-9). On the other hand, in the history of economic thought, a number of people taking the approach opposite to the predictive function of the economic theories can be indicated. A representative of such an approach was e.g.

J.S. Mill who propagated the futility of the predictive function of economic sciences (Gorazda, 2014, p. 179). Among the critics of the predictive function of economic sciences, the representatives of the Austrian school should be mentioned, in particular: L. von Mises, M.N. Rothbard, J.H. de Soto, M. Skousen, or H.H. Hoppe (Hoppe, 2011).

Doubts concerning the fulfilment of the predictive function of scientific theories by economic sciences are illustrated in the subject literature through repeated questions about the reliability of economic forecasts (Gospodarek, 2012, p. 121). However, in any science, the issue of reliability of forecasts is secondary in comparison to its detailed philosophies (e.g. philosophy of mathematics, philosophy of physics, philosophy of economics), especially in the epistemological area. And therefore, the basis for determining the reliability of weather forecasts is the epistemological status of weather forecasts the basis for the reliability of the sociological forecasts is the epistemological status of sociological forecasts, and the basis for the reliability of economic forecasts is the epistemological status of economic sciences. Even though numerous discussions concerning the reliability of forecasts can be found in the literature, it can be seen that there is no epistemological basis for forecasting in economic sciences. This article is to fill the gaps in this scope, at least partially.

The aim of the study is to determine the epistemological status of the economic forecasting. The theoretical basis for achieving the aim indicated in this study is the theory of chaos. Due to the fact that the aim of the study is of a systematising and cognitive character, the methods of logical analysis and conceptual structure were used.

2. Chaos theory

In Polish, the simplest meaning of **"chaos"** is disorder (sjp.pl/…). The etymology of the term "chaos" is probably related to ancient Greece where it was used in order to describe the matter from which the world was created. The universe – order emerged from chaos – disorder (Tatarkiewicz, 1981). In the 1960s E. Lorenz gave rise to a new field of knowledge, which is called the **chaos theory** (Lorenz, 1963, p. 130-141). Thus, the concept of chaos aroused the interest of researchers from many fields and disciplines of science (Krupski, 2010). However, the meaning of the term "**chaos**" causes a lot of mistakes and misunderstandings related to the interpretation and the description of the chaos theory. Adopting the attitude of philosophical determinism[1] allows us to assume that all states and phenomena of reality result from **cause and effect phenomena** (Mises, 2012, p. 21-22). This means that chaos is *a priori* impossible in the real world because it is ruled by deterministic laws. This does not mean, however, that all these laws are known to humans, or that they can

[1] Such an approach – which is contrary to indeterminism - is currently presented by a number of philosophers, e.g. Woleński J., Honderich T., Dennett D., Searle J. or Harris S.

be understood by them. Inability to get to know the cause and effect relationships that led to the state of the given system may result from three elements (Tempczyk, 1995, p. 198-199):

1. Too many components of the system – **complexity problem.**
2. Problems with the observation of system components - **measurement problem.**
3. Inability to solve systems of differential equations describing the system dynamics – **computational problem**.

Consequently, the term "chaos" does not characterise random (chaotic) phenomena but a specific type of order (Krupski, 2010, p. 5; Krupski, 1999). So, it is not so much that "chaos" is used in a sense differing from its original (and colloquial) sense but as that chaos theory uses the term "chaos" in a sense completely opposite to its original (and colloquial) one. Recognising the contradiction resulted in the literature widely using the term "**deterministic chaos**" (Wyciślak, 2009, p. 37-38). Logic refers to it as a **name absurd** as the name connotations feature mutually exclusive properties (e.g. square wheel, married bachelor, etc.). Thus, **deterministic chaos** is essentially **deterministic order** (cosmos within the meaning assigned to it by ancient Greeks), which only appears to be disorder (chaos). Consequently, this article further uses the term name absurd, that being **deterministic chaos**[2]. Subject matter literature indicates that **deterministic chaos is a property of certain systems**, and it is presented as a property of **physical systems** (nature components) or as a property of **abstract systems** (mathematical systems).

The dynamics of physical systems (inherently non-linear) is determined by the **deterministic laws of nature** (physical laws). In some physical systems, the level of complexity is so high that the external observer may perceive their evolution as indeterminate, as only the effects of a series of determinate processes occurring in a given system can be perceived. Thus, the observer may perceive the determinate system as chaotic, which is obviously only apparent. Therefore, **the first criterion for** considering a given **system to be deterministically chaotic** is the **complexity** as a result of which **determinate physical processes** may be perceived as **random** (chaotic) (Heller, 2008, p. 101; Ćwik, Jóźwiak, and Mariański, 2011, p. 97-105). At the same time, the condition of some physical systems in time t+1 is highly dependent on the state of the system in time t. Even a minimal change of state of the system in time t (initial conditions) may sometimes cause significant changes of the system in time t+1. This means that the state of some physical systems is very sensitive to their previous states. **Another criterion for** considering a **physical system to be deterministically chaotic** is therefore high sensitivity of its state to its previous states (Krupski, 2008, p. 211-213).

[2] It seems unjustified to formulate the concept of "order theory" instead of "chaos theory" because it would destroy a linguistic tradition abruptly. It was considered that it would be better to use a name absurd than the term chaos which in fact would mean order. Thus, and first of all, we do not abandon the linguistic tradition when using the name "deterministic chaos"; second of all, we bear in mind that in fact we describe phenomena which have nothing to do with disorder.

Thus, a prerequisite for considering a physical system to be chaotic is, first of all, its **high complexity of simulating chaos** and the **high sensitivity of the system state in *t*+1 to the state of the system in time *t***. Both of the foregoing prerequisites, however, are characterised by a very low level of precision. So defined criteria hinder classification of systems into chaotically determinate and chaotically indeterminate ones. Physical systems have been observed for thousands of years, it was not until the 20th century that E. Lorenz, owing to the ability to mathematically model the dynamics of physical processes, formulated the main principles of chaos theory. The ability to mathematically model complex physical phenomena makes it possible to determine strict criteria for the existence of deterministic chaos.

In abstract (mathematical) systems, chaos is understood as a property of certain equations or systems of equations, differential equations in particular. Abstract systems chaos is easiest to understand when illustrated with an example. The sequence of twenty numbers may be considered: 0.3000; 0.8190; 0.5781; 0.9512; 0.1811; 0.5783; 0.9511; 0.1814; 0.5791; 0.9506; 0.1831; 0.5834; 0.9479; 0.1927; 0.6067; 0.9306; 0.2519; 0.7349; 0.7599; 0.7117. Although all the listed numbers are in the range (0.1), but it is intuitively sensed that their consecutive values are random. The randomness of those numbers is only apparent, though. It is in fact a sequence resulting from the following, very simple **recurrence equation**:

$$x_{n+1} = 3.9\, x_n\, (1-x_n)^3 \tag{1}$$

In mathematics, the formula for $f(x) = ax\,(1-x)$ is called logistic mapping. For parameter a of the value of 3.9, further values resulting from the recurrent equation (1) appear to be a sequence of random (chaotic) numbers (Galias, 2003, p. 31). Such numbers are referred to as pseudorandom numbers. Pseudorandomness of this sequence of numbers thus represents **the first property** of **deterministic chaos** relating to the abstract (mathematical) systems – **the apparent indeterministic complexity**. Therefore, the occurrence of another property of deterministic chaos in these types of systems should be taken into account – **sensitivity of the system to changes in the initial conditions**. In the sequence expressed with a recursive formula (1), the first value of the sequence (which is 0.3000) was replaced with the value of 0.2900. Further numbers of a so created a sequence are as follows: 0.2900; 0.8030; 0.6169; 0.9217; 0.2815; 0.7888; 0.6497; 0.8876; 0.3890; 0.9269; 0.2642; 0.7581; 0.7153; 0.7943; 0.6373; 0.9015; 0.3464; 0.8829; 0.4031; 0.9384. For instance, a change of the value of the first one by barely 0.01 (3.33%) results in:

- a change of the value of the fourth number in the sequence by more than 50%,
- a change of the value of the sevent number in the sequence by more than 50%,
- a change of the value of the thirteenth number in the sequence by more than 300%[4].

Therefore, it turns out that at least some equations or systems of equations are characterised by the apparent indeterministic complexity and high sensitivity of the system to changes in the initial conditions. Thus, the deterministic chaos may be regarded as the

[3] It is assumed that the first number in the sequence (x_0) is 0.3.
[4] Pearson correlation coefficient between the first ten values of both sequences is barely 0.55.

property of certain systems which consists in apparent indeterministic complexity and high sensitivity to the changes of the initial conditions – regardless of whether one is dealing with physical or abstract (mathematical) system.

3. Essence of economic systems

Identification of **deterministic chaos** in economic systems requires the verification of the occurrence of its two basic properties, namely **apparent chaotic complexity** and sensitivity of the system to the **change of the initial conditions** (Siemieniuk, and Siemieniuk, 2015, p. 183-184). Achievement of the established objective requires prior presentation of the assumed terminological convention concerning economic systems.

Market is the basic concept for economics. In this paper, it was assumed that the **market** is **the whole of interchangeable relationships between the entities** (Mantura, 2015, p. 15). The whole of entities and relationships that are interchangeable between them can be treated as a type of **dynamic system** in which active people are one of its elements. The science that analyses the market is called economics. Thus, the **economics** may be understood as the **science of the general relationships which are interchangeable between the entities**[5]. **Market** as a whole of relationships interchangeable between entities constitutes **the system** understood as a **system meeting the formal conditions of the network through the adaptation of at least two linked subsystems** (Kempisty, 1973, p. 430)**,** or as a **set of elements and relationships between them** (Mazur, 1976, p. 8-12). Thus, **any system in which the phenomenon of exchange between parties** occurs can be called an **economic system**. The biggest possible system is, therefore, a system composed of a set of relationships of exchange between all people. This system has a number of subsystems. Examples of specific categories of economic subsystems include e.g.: family, company, region, country, or the stock market.

[5] The nature of the exchange relationship is its symmetrical character. Parties to the exchange are always an operating entity and another external entity. These Parties influence each other on the basis of feedback. The subject of the exchange is a concept with a wide range of meaning - it may include products, services, commodities, works, goods, information, emotions, feelings, etc. Examples of economic macrosystem **entities**: manufacturers, suppliers, buyers, households, banks, stock exchanges, states, local self-governments and many others.

4. Apparent chaotic complexity of the economic systems

In the systems theory, economic systems are considered to be among the most complex systems in general. Sometimes, an imprecise term of "large systems" is used to determine the scale of such systems. Large systems include, e.g.: manufacturing plants, branches of the economy or the national economy (Pszczołowski, 1978, p. 238). Both enterprises and the free market as a whole are considered to be "extremely complex" (Kempisty, 1973, p. 430). At the same time, despite the fact that the immanent element of all economic systems is individuals that carry out the exchange processes – people, this system is dynamic. The assumption that economic systems immanently contain the first property of chaotically determined systems requires, apart from stating its complexity, the demonstration that this complexity is apparently chaotic. The term "apparent" or "apparently" is, of course, imprecise and depends on the subjective perception level of the cognitive subject.

As the sense of chaos is not an objective phenomenon, it is impossible to use intersubjective tools to measure it. However, significant similarities between the phenomena of a physical character (e.g. weather phenomena) and phenomena of economic character can be noticed. Presenting the deliberately chosen example, Figure 1 shows the structure of air temperature in May 2017 in Poznań. A line graph formed is characteristic of the dynamic physical system on the basis of which E. Lorenz formulated the grounds for the deterministic chaos theory.

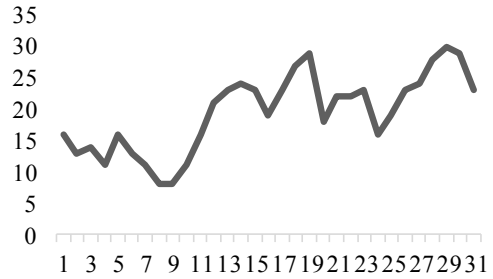

Figure 1. Temperature in Poznan in May 2017. Source: author's own study based on http://www.accuweather.com/pl/pl/pozna/276594/may-weather/276594, 29.06.2017.

On the other hand, figure 2 shows the WIG20 closing quotations in May 2017.

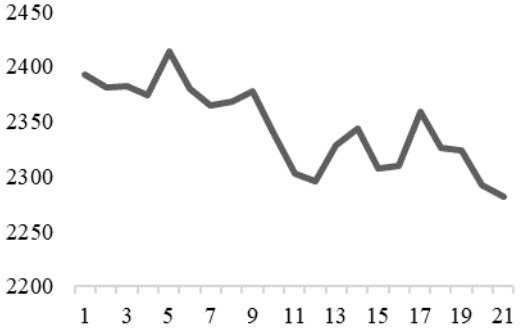

Figure 2. WIG20 closing quotations in May 2017. Source: author's own study based on http://inwestycje.pl/gielda/profil/WIG20, 29.06.2017.

Clearly, the presented graphs show the similarity between the examples of the phenomena of physical and of economic nature. Thus, if in the subject literature numerous physical processes (e.g. weather) are assigned a property of apparent chaotic complexity, it can be *analogically* concluded that this property occurs also in case of economic systems.

In the case of the impossibility of discovering absolute and deterministic laws governing economic systems that significantly impede their understanding, it is possible to use the models being a substitute for cause and effect cognition[6]. The most popular collection of tools of this type is proposed by **probability theory**. Processes which can be understood only by building probabilistic models (and not by formulating a series of deterministic laws) can be described as apparent chaotic processes. **If such systems are at the same time complex, we call them apparent chaotic complex systems.**

Despite the considerable complexity of the physical processes, a number of researchers (such as E. Lorenz) are able to model them – e.g. using differential equations. In the case of economic system, the determining of equations describing the behaviour of people is impossible. It is caused, among other things, by the absence of any constants describing human actions (Mises, 2000, p. 27-32). In the case of many natural processes, certain constants have been known for hundreds of years. Thus, the deterministic chaos occurs less often in dynamic economic systems than in dynamic physical systems, e.g. concerning the weather.

5. Sensitivity of economic systems to initial conditions

Even though the complexity of the economic system was analysed from a holistic perspective, it is easier to settle the issue of sensitivity of the economic system to its previous states on the basis of nominalism. In fact, each individual person constitutes one of subsystems of the economic system. At the same time, the opinion, according to which all the conditions associated with the exchange processes of every human being are a complex system in themselves, seems indisputable. The identification of properties of sensitivity in the system consisting of a single human being will, therefore, enable the carrying out of the *a minori ad maius* reasoning, under which the sensitivity of all economic systems to the change of the initial conditions must be recognised.

The processes of exchange performed by people constitute particular cases of actions, and therefore, of any intentional behaviour (Kotarbiński, 1969). Immanent elements of every human action are, apart from objectives, measures of action, and therefore, these elements of

[6] R. Cantillon pointed out that "*even if the assumption concerning the truthfulness of the established cause-and-effect relationships was correct, the complexity of the studied matter rather condemns the attempts to formulate strict laws to failure*"; after: Gorazd, M.: op.cit., p. 122.

reality, which in the opinion of the person performing the action are aimed at achieving the objectives. One of the most important factors determining the structure of objectives and measures of action of each individual is the **knowledge** possessed by him/her, and therefore, the set of his/her judgments about reality (Woleński, 2007, p. 368). Knowledge of the cognitive subject has a direct impact on both the nature of the objectives specified and the perception of the measures that would be used to achieve them. Feedback can be noticed between the subject and actions taken by him/her, which consists in the fact that the obtained information about the effects of the action performed influences the knowledge of the person performing it and, at the same time, on the structure of objectives and measures of the action obtained. Thus, the knowledge acquired during the performance of actions changes the basis of the further behaviour of individuals) (Gorazda, 2014, p. 11). If the knowledge which is the result of one action may substantially change the basis of the behaviour for the next action, the opinion according to which the economic system consisting of a single human is sensitive to initial conditions appears appropriate. On the basis of *a minori ad maius* reasoning, it can be concluded that all economic systems are sensitive to initial conditions.

Therefore, specific properties of economic systems include:

1. **Complexity**, which in the opinion of the observer may be apparently indeterministic.
2. High **sensitivity** of the state of the system in relation to the previous states.

Thus, economic processes are characterised by deterministic chaos.

6. Epistemological status of forecasting in economic systems

The source literature points to a number of restrictions concerning the forecasting in the scope of systems which are characterised by deterministic chaos. For example, the forecasts concerning the states of weather (physical) systems do not exceed the 30-day horizon. Each forecast exceeding the period of two weeks is based on statistical forecasting which builds on historical data and not on the status and evolution of the physical system. Therefore, the epistemological status of weather systems forecasting should be – in the short period (not longer than 30 days) – regarded as positive and in a period exceeding 30 days – as negative.

In the case of chaotically determined economic systems, no mathematical equations describing the evolution of such systems are known. The computational problem is correlated with the occurrence of the problem of the complexity of these systems. At the same time, despite the fact that the immanent component of any economic system is the human knowledge, it is impossible to determine the initial state of the system analysed. Thus, in economic systems, it becomes impossible to forecast the future states because of the coexistence of three problems: complexity, calculation and measurement problem.

Considering the above, it should be stated that the epistemological status of forecasting in economic sciences is negative – both in the short and in the long period.

7. Conclusions

The aim of the study is, therefore, to determine the epistemological status of the economic forecasting. The theoretical basis for achieving the aim indicated in this study is the theory of chaos. Due to the fact that the aim of the study was of a systematising and cognitive character, the methods of logical analysis and conceptual structure were used.

The most important achievements of the study include:

1. Carrying out a logical analysis of the concept of deterministic chaos.
2. Indicating a subjective criterion for recognising the system as chaotically determined – the apparent indeterministic complexity.
3. Indicating an objective criterion for recognising the system as chaotically determined – system sensitivity to initial conditions.
4. Stating that both conditions are met by economic systems.
5. Indicating that epistemological problems associated with the reliability of the forecasts, i.e. complexity problem, measurement problem and computational problem in the economic system are exemplified with higher intensity than in physical systems.
6. Making a statement concerning the fact that the epistemological status of forecasting in economic sciences is negative.

On the basis of the conclusions presented, it can be stated that the objective of the article was achieved.

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PROTECTION OF THE ENVIRONMENT AS AN EXPRESSION OF THE CORPORATE SOCIAL RESPONSIBILITY

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Abstract: Corporate social responsibility (CSR) is becoming increasingly often an essential element of a strategy of modern enterprises. CSR activities include a wide range of relationships with stakeholders, that is entities who are associated with the activity of an organization or are under its influence. The natural environment is one of most important stakeholders. The CSR strategy implements the postulate of the pursuit of sustainable development, that is, the development where the economic issues are treated equally to social and environmental issues. Over the years there were taken many initiatives which were aimed at the promotion of this idea. The article discusses the selected initiatives, paying a particular attention to the elements concerning the natural environment.

Keywords: corporate social responsibility, sustainable development, ISO Standards, Eco-Management and AuditScheme (EMAS), Cleaner Production UNEP IE Framework.

1. The essence of corporate social responsibility

The idea for corporate social responsibility (CSR) was both in the 1930s in the United States. The premise was initially dismissed, and it was only in the 1950s that the business environment started to develop it, considering the role and responsibility of business for the society. At that time, Howard R. Bowen used the term "social responsibility" for the first time, defining it as "the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action that are desirable in terms of the objectives and values of our society." (Bowen, 1953)

The history of corporate social responsibility is therefore long. However, it was in the 1990s that the theory gained momentum (particularly in the United States, Western Europe and Japan). Since then, companies have been taking on responsibilities derived from the social responsibility of business. Social organizations display this responsibility by acting according to the law and by respecting the collective agreements signed with their social partners. They are also obligated to fulfill the requirements formulated by sustainable development, and strive

to improve the quality of life of the current and future generations. Therefore, corporate social responsibility is a concept, by which companies build their strategies by voluntarily including social interests and environment protection, as well as relations with various stakeholder groups. Corporate social responsibility is the responsibility of businesses for the effects of their activities on third parties. It can be therefore claimed that companies take social responsibilities upon themselves that ultimately limit their choice options. To be recognized as a socially responsible company, a business must go beyond mere observance of applicable formal and legal requirements (an obligation which applies to all legally operating organizations), but needs to take additional responsibilities, such as environment protection. W. Gasparski claims that corporate social responsibility is an effective management strategy which contributes to the increase in competitiveness of businesses at global level by conducting effective social dialogue at local level, and which shapes the conditions for sustainable social and economic development (Gasparski, 2004). Responsible business is a strategic, long-term approach based on the principles of social dialogue and the search for solutions that are beneficial for the company and its environment, its employees, all stakeholders and the society, within which the company operates. The idea of corporate social responsibility has been spreading all over Poland, going beyond companies with foreign capital (Pakulska, Rutkowska, 2018).

Corporate social responsibility is an element of the company's strategy, one that can also contribute to its competitive advantage. Therefore, CSR produces measurable economic results. Socially responsible companies draw the public attention to their focus on the stakeholders' interests (Nakoneczna, 2008). Social responsibility therefore stands for socially reliable business, conducted transparently in full observance of the law and ethical standards, taking responsibility for the society, the client, the environment, the employee and the investor. The contemporary definition of this idea is closely related to the concept of sustainable development. Corporate social responsibility is an investment in the company's reputation, one that produces long-term benefits for the company. Among many CSR advantages are building a positive image, building a good reputation of the company in the environment and solidifying the interest, favor, trust and loyalty of current and future stakeholders, such as clients, suppliers and investors, as well as improving the situation of the company, e.g. by improving the satisfaction and loyalty of employees. The positive impact on the resolution of social, economic and ecological problems is also noteworthy.

2. CSR and the natural environment

Business activity is based on the human use of natural, capital and human resources. For ages, natural resources were recognized as given by the environment in abundance and worthless as devoid of the human labor factor. Dynamic socioeconomic development which

started in the 20th century led to a significant degradation of the natural environment. Deteriorating quality of the environment, i.e. a set of features defining the degree, in which satisfies economic needs, was first recorded in the 1980s-1990s. The concept of eco-development – sustainable and rational development which recognizes environmental requirements as superior to economic development – was the response to this trend (Pakulska, 2002). The problem of environmental threats has become one of the most burning problems of the contemporary world. Initially, the authorities alone adopted total responsibility for the environment, as they legally defined permissible business interventions in the natural environment. Gradually, companies started to include pro-environmental measures in their strategies, both within their business milieus and beyond. Apart from measures to limit their negative impact on the environment (e.g. by the implementation of environmental management systems), these companies started to get involved in various pro-ecological initiatives, such as the world cleanup or tree planting projects.

The purpose of a CSR strategy is to achieve sustainable development, i.e. development, in which social and ecological issues are treated equally to economic issues. The strategy assumes three dimensions: the social, the economic and the environmental dimension. An important role is assigned to the natural environment and its protection, since they are an extraordinary stakeholder, compared to the others (the environment is sometimes referred to as a silent stakeholder, since the environment cannot defend itself against the harmful effects of companies). Therefore, strict principles of conduct should be established for the natural environment. A socially and environmentally responsible company is a company that observes all applicable environmental regulations and has established a rational management of environmental resources. A responsible company must promote sustainable development and avoid the waste of natural resources. Environment pollution and inconsiderate use of its resources are the result of technologies, production methods applied and economic growth. A company's responsibility for the environment is perceived as its responsibility for the ecological effects of its activities. Companies should therefore strive to limit the pollution emitted to the maximum, use the resources in a rational manner, and minimize their negative impact on the environment (Nakoneczna, 2008). The scope of environmental measures includes the safety of environment during production (damages, accidents, risk), substance emission control, the use of renewable and non-renewable resources, product and service distribution and design. As part of their pro-ecological enterprises, companies have implemented environmental management systems and have applied environmental marking (eco labels).

CSR can therefore impact the quality of life of the stakeholders and can result in environment quality improvement. Since CSR is referred to as the "responsibility of businesses for their impact on the society", we can construe it as total activities of businesses which contribute to achieving sustainable socioeconomic development.

3. International initiatives promoting CSR

Since the 1990s, the CSR idea has gained in importance, as expressed by the emergence of international and national organizations aiming to promote the issues that lie at the roots of corporate social responsibility. These have been also raised by dedicated agendas, commissions, and government institutions, the first of which was the Caux Round Table (1989) which associated the leading business representatives from Europe, the United States and Japan. The Round Table adopted global standards for moral behavior in business. According to them, business should be conducted with respect to the rules of the country it is conducted in. One of the seven rules adopted concerns respect to the natural environment (The rule is: Respect to the natural environment) (Nakoneczna, 2008).

The most important initiative for the promotion and implementation of CSR ideas in the world was the adoption of nine ethical principles in 1999 (currently, there are ten principles) referred to as the Global Compact (GC). They were proposed by UN Secretary General Kofi Annan at the Global Business Forum in Davos. A company can voluntarily join the initiative by reporting to the UN General Secretary. After joining the GC, the company is obligated to draw up an "Annual report on the progress of implementation of ten rules of the Global Compact Initiative for stakeholders". No company is however required to prove the observance of GC conditions. One of the rules also refers to environment protection: it states that business should (Kietliński, Reyes, Oleksyn, 2005):

- support all preventive measures concerning environment protection,
- take measures to promote higher environmental responsibility,
- support the development and promotion of environmentally-friendly technologies.

In the Global Compact, the natural environment was included in one of 4 areas that are governed by strict rules. This area also includes: preventive approach to the natural environment, engaging in initiatives which aim to promote environmental responsibility standpoints, as well as the application and promotion of environmentally-friendly technologies. GC is currently the largest voluntary initiative in the world (associating more than 12 thousand companies from 145 countries, including 183 companies from Poland, put of which the first one joined the GC in 2001) (http://www.globalcompact.org.pl/).

Another initiative which raised environmental issues was the Global Resources Initiative (GRI) which published the first set of GRI Sustainable Reporting Guidelines in 2000 (updated in 2004, 2006, 2014). GRI guidelines currently include 35 environmental indicators, including 16 basic indicators and 19 supplementary indicators. Similarly to GC, there are no procedures in place for verifying the observance of these guidelines (Kietliński, Reyes, Oleksyn, 2005).

The development of the CSR idea in Europe gained new momentum in 2001, when the European Commission published the Green Paper devoted to corporate social responsibility. The document described corporate social responsibility as voluntary inclusion of social and

ecological issues in the company's activity. It was defined as "a concept whereby companies decide voluntarily to contribute to a better society and a cleaner environment. Where corporate social responsibility is a process by which companies manager their relationships with a variety of stakeholders who can have a real influence on their licence to operate, the business case becomes apparent. Thus, it should be treated as an investment, not a cost, much like quality management. They can thereby have an inclusive financial, commercial and social approach, leading to a long-term strategy minimizing risks linked to uncertainty. Companies should pursue social responsibility internationally as well as in Europe, including through their whole supply chain". (http://emas-register.eu/statistic.php?view=all_sites).

In 2001, the European Commission published the White Book, or the so-called "European Governance", in which the need to notify the public opinion of measures taken to promote corporate social responsibility in the EU was emphasized (Corporate Social Responsibility: A Business Contribution to Sustainable Development). Communication titled "Implementing the Partnership for Growth and J00obs: Making Europe a Pole of Excellence on Corporate Social Responsibility" was published in March 2006. In 2010, the European Commission indicated that companies have started to implement CSR as a means to improve their image (Kietliński, Reyes, Oleksyn, 2005, Koneczna, 2014).

Standards of conduct for international companies, as prepared by 37 OECD states are an important global document. Similarly to the previous documents and initiatives, their implementation is voluntary. Among the OECD environment protection principles are (2004):

- pursuit of permanent, sustainable development,
- care for human life and health,
- surveying and monitoring environmental impact,
- consultations with local communities and employees,
- assessing the impact of goods produced and services on the environment,
- counteracting extraordinary threats,
- making production processes more ecological,
- promoting ecological awareness among clients,
- employee training.

4. Standards and systems supporting the management of corporate social responsibility in environment protection

Various standardized programs, such as standards from the ISO 14000 or the EMAS systems, as well as non-standardized programs, such as the Clean Production Program serve to assist organizations which want to act responsibly in relation to the natural environment.

The International Organization for Standardization (ISO) is an international organization which associates domestic standardization organizations. It is a non-government organization, although some member organizations operate within government structures. ISO establishes practical norms in all disciplines, and their observance is voluntary.

The beginning of ISO 14001 is dated for 1991, when a group of 100 experts from 20 countries and 11 international organizations started to work on this standard. Their goal was to support the concept of sustainable development, as coined at the Earth Summit in Rio de Janeiro. The result of their work was a series of 14000 standards (see the table) (Nakoneczna, 2008). In applying the standards from the 14000 series, companies can perfect their environmental management, which has become particularly important due to growing standard requirements and growing costs of pro-environmental enterprises implemented by companies.

ISO 14001 is based on ISO 9000 which concerns quality management in companies. The purpose of this standard is to ensure continuous improvement of environment quality. ISO 14001 contains requirements which, when fulfilled, qualify the company for receiving a certificate of conformity for the functioning of environmental management (Koneczna, 2014). ISO 14001 is one of the most popular environmental management standards, as certificates of conformity with its requirements were issued for 300 thousand certified organizations from more than 170 countries (http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail. htm?csnumber =42546).

Table 1.
ISO 14000 series standards

Description	Standard
Environmental management system	ISO 14001, ISO 14004
Ecological audits	ISO 14010-14012, ISO 14015
Eco-labeling	ISO 14021, ISO 1024, ISO 14025
Assessment of outcomes of environmental activity	ISO 14031, ISO 14032
Life cycle assessment	ISO 14040-14043, ISO 14048, ISO 14049
Terminology and definitions	ISO 14050
Ecological aspects in production standards	ISO 14061

Source: Matuszak-Flejszman, A. *Jak skutecznie wdrożyć system zarządzania środowiskowego według normy ISO 14001*. Poznań: Wydawnictwo PZiTS.

The ISO standard refers to the corporate social responsibility of business and was approved on 1 November 2010. Accordingly, "the purpose of the [CSR] strategy it to ensure the responsible impact of decisions and activities (products, service, processes) on the society and the environment by employing transparent and ethical behaviors contributing to the development of sustainable well-being and health of a society, considering the expectations of all stakeholders, applicable laws and cohesion with the organization (Kapitał społeczny dla gospodarki. O CSR, ISO 26000, www.odpowiedzialnafirma/o-csr/iso-26000). This standard defined corporate social responsibility as an obligation "of an organization to include social and environmental aspects in the decision-making process, and to take responsibility for the impact of decisions made and activities performed on the society and the environment. This stands for

a behavior that is both transparent and ethical, contributing to sustainable development, employed in full observance of the law and in cohesion with international standards. This also means that corporate social responsibility is embedded in the structure of the organization, practiced in its operations and considers the expectations of all stakeholders" (CSR społeczna odpowiedzialność biznesu w Polsce, 2014). One of the outcomes of this behavior is contributing to sustainable development, including health and common well-being.

The basic areas of social responsibility, as specified in the 26000 standard, include the natural environment. The standard indicates that, regardless of its type of activity, a company should minimize its impact on the environment, rationally manage its resources and waste and take measures to benefit the environment (Społeczna odpowiedzialność biznesu: fakty a opinie, 2014). In this sense, it is possible to take measures which are oriented at care for the environment and reducing the consumption of natural resources as a result of its activities. According to ISO 26000, the most important CSR areas in environment protection are:

- rational use of raw materials and energy,
- raising awareness in environment protection,
- consideration of environmental assumptions in company management.

ISO 26000 is not a social responsibility system, but serves as a guide for CSR implementation. Other factors assessed thereunder are: impact on the environment, which includes such areas as: consumption of water and access to water, effectiveness of use of raw materials, extension of time of use a finished product (product life cycle) and the impact of company operations on climate changes. Other analyzed aspects include the conservation of ecosystem biodiversity and the basic functions of ecosystems by supplying nutrients, water, controlling soil quality and preserving the organisms which take part in pollinating plants, regenerating pollutions and waste, improving the pro-environmental use of urbanized and farming areas, the use of soil and natural resources in a sustainable manner (ISO 26000 Social responsibility, Rabiański, 2013, Koneczna, 2014).

The eco-management and audit scheme (EMAS) has been developed by the European Union. Companies joining the scheme undertake to assess their impact on the environment, which is verified by an accredited environmental auditor and renewed periodically. EMAS was established in 1993 and complies with ISO 14001. Its purpose is to facilitate companies in their improvement of pro-environmental activity by establishing and implementing environmental management standards. EMAS identifies direct and indirect environmental aspects (http://emas-register.eu/statistic.php?view=all_sites). Direct aspects are related to the activity, products and services of the organization, ones that the company directly supervises, and apply to:

- legal requirements and limitations included in permits,
- emissions to air,
- release to waters,

- production, recycling, reuse, transport and disposal of solid and other waste, hazardous waste,
- use of land and soil contamination,
- use of natural and other resources (including energy),
- use of additives and auxiliaries, including intermediate products,
- local problems (noise, vibrations, unpleasant odors, dust, visual effects, etc.)
- threats related to transport,
- threats related to environmental accidents and the impacts of incidents, accidents and potentially extraordinary situations on the environment,
- impact on biodiversity.

Indirect environmental dimensions include, among others:

- issues related to product life cycle,
- capital investments, granting loans and insurance activity,
- new markets,
- selection and structure of services (e.g. transport or catering),
- administrative and planning decisions,
- product offer structure,
- effects of environmental activity and contractor, subcontractor and supplier practices.

EMAS is not as popular as ISO 1440, as proven by the mere number of registered organizations (below 4 thousand), the majority of which are based in Germany, Spain and Italy (with 63 organizations in Poland) (http://emas-register.eu/statistic.php?view =all_sites).

The Clean Production Program was created at the end of the 1980s in the United States. It is coordinated by UNEP and assumes the implementation of an integrated strategy for preventing the degradation of the environment with processes, products and services offered by companies. The purpose of the program is to increase the effectiveness and risk reduction for humans and the natural environment. These programs can be used in each branch of industry, for each product and service. In production, they serve to reduce the consumption of raw materials, water and energy, as well as to reduce the contaminants released. Their purpose is to reduce the negative impact of the organization's activities on the environment and on human health during the product's complete life cycle. The International Clean Production Declaration announced in 1998 was signed by 67 signatories. Once every two years, the signatories undergo verification to check their observance of their obligations. Clean Production Programs are recognized as the first stage in the construction of an environmental management system. There are currently 22 Polish institutions and 35 Polish organizations listed in the register.

By joining the program, an organization undertakes to implement measures in all areas, such as:

1. "management – by encouraging the participants of the production process to adopt sustainable production and consumption practices,
2. awareness, organization and trainings – developing awareness, education and trainings inside the organization,
3. integration – activities aiming at the integration of preventive strategies by performing assessments of ecological measures, ecological accounting, ecological impact, life cycle and assessment of Clean Production,
4. research and development – works devoted to the development of innovative solutions promoting ecological and effective products and services,
5. social communication – obligation to share experiences in implementing preventive strategies and information on their benefits to external process participants,
6. implementation – taking measures to implement Clean Production, including preparation of reports on the progress of works as part of a management system, investing in new, environmentally-friendly technologies, cooperation with UNPEP and other partners in supporting the declaration and reviewing the effects of its implementation (Nakoneczna, 2008).

5. Summary

In this day and age, each respectable organization must take measures that contribute to the corporate social responsibility of its business. Measures related to the natural environment and its protection are an important group of enterprises. Consumers are paying growing attention to the socially and environmentally responsible aspects of business activities. The public opinion, non-government organizations and civic initiatives have forced the business world to respect the principles of sustainable development (Bokszańska, 2011). Therefore, at this point, questioning corporate social responsibility seems impossible. Interest in CSR is "trendy", particularly in the United States or in Western Europe. However, the trend has also surfaced in Poland.

Poland has taken active part in the completion of corporate social responsibility objectives, as expressed by the development of Global Compact and Caux Round Table agendas and in the creation of industrial ethical codes. The first initiative related to the promotion of corporate social responsibility strategies was established in 2001 when the first Global Compact meeting took place. The Responsible Business Forum was created at that time. The RBF is currently the largest non-government organization dealing with CSR issues and their promotion. CSE

development has become particularly apparent after 2009, when the RESPECT[1] index was first quoted on the Stock Exchange. At that time, a corporate social responsibility team was appointed as an auxiliary body to the Council of Ministers. The goal of the team was to promote CSR, establish better communication and promoting the best solutions in corporate social responsibility and developing a vision of sustainable development for Polish companies by 2050 (Koneczna, 2013).

Wide-scale implementation of corporate social responsibility occurred with the establishment of international corporation branches in Poland. Establishing new offices, these companies transferred their agendas. Today, they have become the elements of strategies in companies with foreign capital and companies with national capital alike. Of course, this does not mean that these companies have never supported their local communities or implemented any projects contributing to the environment (e.g. limitation of emissions or tree planting initiatives). However, these were usually project-limited, often single-time, not contributing to a holistic approach. To treat these useful measures like corporate social responsibility, they should form an organizational strategy and should be included in an annual CSR report.

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MUSICIANS' TIME MANAGEMENT BASED ON THIRD HABIT OF STEPHEN R. COVEY

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Abstract: The article deals with an issue of time management of professional musicians. This issue was investigated due to a theory presented by Stephen R. Covey in a third habit in *The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change*, especially the matrix of time management. The study presents the results of case studies based on questionnaires and research interviews.

Keywords: time management, musicians, Stephen R. Covey.

1. Introduction – the theory of self-management in time according to the third habit by Stephen R. Covey

The requirements of the contemporary market has now embraced the professions which have been customarily included in the artistic milieu (Pluta, 2013). Outstanding works or art or talented artists have encountered problems with reaching through to a wide group of recipients, if their project is not supported by adequate promotion and management. Artists are therefore forced to employ properly trained partners to care for the marketing and financial parts of their activity. Otherwise, artists are forced to acquire adequate competences themselves (including establishing their own business, by which they are transformed into entrepreneurs), without neglecting their primary work which is to nourish the creativity that comes with their profession. The abundance of tasks and issues to be resolved requires proper planning. Time management is a part of this planning.

The issues of time management and self-management were described in literature devoted to management sciences (Bieniok, 2010; Raffoni, 2010; Rogusznik, 2010; Wieprzycka, 2013; Allen, 2016). Planning, organization, motivation and control, which are the basic functions of management, are often considered in temporal categories. In this respect, notions derived from project management (Lock, 2013; Olejniczak, 2014) or logistics (Łapuńka, Pisz, 2014) can prove helpful, together with many other aspects related to management. A plurality of positions, combined with the fact that there are new issues being released on the market, accompanied by

the reissues of old publications devoted to time management and self-management in time and targeting both scientists and specialists in management, as well as practicing managers and individuals who simply want to raise their effectiveness and counteract procrastination, proves that this subject is still valid, sought by a wide group of recipients, as it offers a broad theoretical and practical dimension.

This article will raise the issue of time management and self-management in time (Wojtoszek, 2014), as exemplified by the widely understood musician profession. This term encompasses instrumentalists, vocalists, music theorists, event managers or teachers working as educators in public and private schools, specialists working in cultural institutions, musicians performing various jobs (e.g. instrumentalists, orchestra musicians, hired soloists, cultural event managers), or any other entrepreneurs providing musical services.

The issue will be presented in the light of Stephen R. Covey's theory, as described in his *7 habits of highly effective people* (Covey, 2016), which has been quoted in many a theoretical and practical study devoted to the subject of time management (Randak-Jezierska, 2013; Wieprzycka, 2013). In his book, first published in 1989, Covey describes the third of seven habits in terms of a time management matrix, according to which tasks are classified according to their importance and urgency. Classified in this manner, activities are ordered in four quadrants of the matrix. The first task group are important and urgent tasks, the second one – important, but not urgent, the third one – not important and urgent, and the fourth one – are not important and not urgent (Table 1). The matrix itself and the classification of tasks according to their importance and urgency are based on a matrix developed by the 34th President of the United States, Dwight D. Eisenhower (Randak-Jezierska, 2013; Sierpińska, 2013).

Table 1.
Time management matrix according to Stephen R. Covey

Important	**Quadrant I** **Important/Urgent**	**Quadrant II** **Important/Not urgent**
Not important	Quadrant III Not important/Urgent	Quadrant IV Not important/Not urgent
	Urgent	Not urgent

Source: Covey, 2016.

Tasks classified in the first quadrant are "crisis situations", such as, for instance, deadline driven projects or pressing problems requiring immediate resolution. The second quadrant includes, among others, preventive measures, planning, finding new opportunities, or building relationships with souse or partner. Activities assigned to the third quadrant can appear to be important and urgent, but they are ultimately not as important as tasks classified in quadrants I and II. The last, fourth quadrant includes activities that bring nothing to the table. These are the so-called "time-wasters", such as certain telephone calls or correspondence (Covey, 2016; Randak-Jezierska, 2013).

According to Stephen R. Covey, tasks from the second quadrant are the "heart of effective self-management", since they contribute most to accomplishing subsequent goals, and thus

facilitate personal growth. To ensure effective self-management, one needs to pursue the maximization of time "spent" in the second quadrant by minimizing the amount of tasks from the remaining quadrants. To do this, one needs to avoid important and urgent tasks and crisis situations which require immediate reaction by establishing a correct hierarchy and planning and prevention, one that is characteristic to the second quadrant. Tasks from the third quadrant should be considered and, depending on whether it is possible to delegate them, they should be assigned to suitable people, or dismissed completely. In turn, tasks from the fourth quadrant can be eliminated completely.

It is probably not possible to devote one's entire time to tasks from the second quadrant, as one can never anticipate all urgencies and accidents, crises, unexpected orders or tasks. There are also times when tasks from the third quadrant need to be categories as well, since, due to their form, they can appear equally important or urgent. Plus delegating tasks sometimes requires an investment of time in explaining the new responsibilities. According to Stephen Covery, this is worth doing, as the end result is a significant increase in effectiveness and satisfaction in one's life (Covey, 2016).

The purpose of this article is to present the notion of time management by musicians, applying assumptions of this theory. Specific tasks, needs, barriers and methods of perceiving the importance and urgency of tasks attributed to professional musicians will be identified with the use of research tools, i.e. a questionnaire and research interviews. The article will also answer a question whether musicians' understanding of issues related to management is shaped similarly to Stephen R. Covey's description of the third habit.

2. Research methods

Eight professional musicians whose artistic experience is the basis of their gainful profession, or without which they would not be able to fulfill their professional responsibilities were invited to examine the notion of time management by musicians, based on the theory presented in Stephen R. Covey's third habit. The study undertook to verify whether professional musicians classify their tasks according to the matrix proposed by Stephen R. Covey, and whether important but not urgent activities are deemed the most important according to the third habit theory. The second research assumption was to check how the distribution of responsibilities would look like for the respondents according to the matrix proposed by Covey, and whether it would differ from the current state, as diagnosed. Apart from this, the purpose of the study was to define the tools used by musicians in their self-management in time, and to describe professional musicians' approach to delegating tasks – these aspects were also included in the third habit described by Stephen R. Covey. A questionnaire supplemented by a research interview was selected as the research method. The choice of these methods stemmed

from the fact that, implementing a case study and detailed interviews with each respondent, it was possible to gain insight in the motivations, the exact understanding of the theory of self-management in time, to identify specific tasks and activities with each respondent, and to prioritize them (which would be much more difficult, if not impossible in the case of extended questionnaires themselves). This way, the study referred to the factual time management methods employed by musicians following Stephen R. Covey's theories.

All respondents are between the age of 25 and 45. They were selected to achieve the highest diversity in terms of education, forms and places of employment, and career development. Attention was also paid to the reliability of the respondent and the possibility of verifying the information obtained from them. The musicians participating in the study are characterized by the following features:

- Respondent A – instrumentalist, doctoral student, lecturer at a public school, co-worker in a non-public institution.
- Respondent B – instrumentalist, student of a music school, runs their own business.
- Respondent C – instrumentalist, employee of a public institution, co-worker in a non-public organization.
- Respondent D – music theorist, lecturer at a public school, worker in a public institution.
- Respondent E – instrumentalist, student at a music school, co-worker in a non-public institution.
- Respondent F – instrumentalist, worker in a non-public institution, teacher in a non-public school.
- Respondent G – instrumentalist, student at a music school, co-worker in a non-public institution.
- Respondent H – vocalist, doctoral student, teacher in a non-public school, worker in a non-public institution.

In December 2017, each participant filled out a research questionnaire, in which the following issues were raised:

- Tool used in time management.
- Completion of the time management matrix with responsibilities attributed to the musical profession – current state.
- Estimation of time devoted to tasks from each quadrant – current state.
- Completion of the time management matrix with responsibilities attributed to the musical profession – "ideal" state which the respondent pursues or would like to pursue.
- Estimation of time devoted to tasks from each quadrant – "ideal" state which the respondent pursues or would like to pursue.
- Differences between the current state and the desired state.
- Delegation of tasks.
- Other comments and suggestions.

Apart from completing the questionnaires, the respondents also took part in interviews (in person, by telephone, or by online chats), in which musicians shared their views, problems, limitations, opportunities and plans regarding self-management in time.

3. Research results

A data analysis was carried out on the basis of the questionnaires collected and results accumulated.

Asked about the tools used to manage time, musicians listed calendars, in various forms (e.g. paper or online versions), paper task lists and post-it notes with tasks, attached in different places, task plans, spartphones, and even their own memory, on which they often rely. The paper calendar was the most recurring response.

Completing the time management matrix in the current state version, nearly all musicians placed instrument practice in the first quadrant. A vocalist included current repertoire practice in the first quadrant as well. Apart from these, this quadrant included such tasks as: didactic work, professional work, broadening knowledge and experience, playing concerts and attending rehearsals, overseeing accounting and administrative issues and replying to e-mails (these tasks were classified as important and urgent by the person running a business, i.e. respondent B), developing a new repertoire to be used in their profession, professional advancement, building a human relations capital, writing and publishing scientific articles (these tasks were indicated by the music theorist, i.e. Respondent D), learning for doctoral examinations and developing piano skills (the two last items were listed by Respondent H, a vocalist).

Quadrant II included such tasks as: preparing a new repertoire, searching for new partners for artistic projects, practicing the instrument (this was listed here by only one instrumentalist who did not place this task in quadrant 1), broadening knowledge, learning foreign languages, starting teaching practice, building motivation to take up tasks from the first quadrant, physical training, care for metal state and the quality of interpersonal relations, searching for scholarships, scientific work, learning the entertainment repertoire (this response was given by a musician who predominantly plays classical works, i.e. Respondent E), playing in chamber music assemblies, searching for new accompanists, preparing for remote competitions, concerts and tasks, and attending teaching and artistic courses.

Tasks presented in the third quadrant are the following: additional, voluntary classes and consultations with students, applying for scholarships, administrative, maintenance and logistics duties, settling formalities related to the organization of concerts, documenting the scientific activity, placing publications in open repositories, advertisement, reading, health and personal hygiene, scientific work, formalities related to teaching and classes conducted for gainful purposes, without any satisfaction or opportunities for professional advancement. What

is noteworthy, one of the respondents did not place any tasks in this quadrant (perhaps they were not able to name or identify them. However, in the next question, they noticed that they spent 10% of their time on tasks from this quadrant).

The last, fourth quadrant included: creating compositions and musical works, expanding the repertoire, sending out resumes to potential employers, scientific work, searching for scholarships, playing the instrument and listening to music for pleasure, non-direction allocation, searching for new business, artistic and scientific partners, spending time on watching online content, reading "snobbish" literature (i.e. popular literature, which does not contribute with any new knowledge), learning to maintain and tune the instrument, and observing the market of spare parts for instruments, copying and printing new notes, home-schooling students when the teaching schedule is overfilled, additional classes for students, conducted for the respondents' own satisfaction.

Asked about the amount of time spent on completing tasks from individual quadrants, the respondents replied:

- Quadrant I – from 30 to 80%.
- Quadrant II – from 10 to 40%.
- Quadrant III – from 5 to 40%.
- Quadrant IV – from 5 to 20%.

Asked about the ideal distribution of the time management matrix, the respondents assigned similar tasks in quadrant 1 to those which they specified for the current state. In some cases, the list of duties from this quadrant was shortened (one of the respondents did not include any tasks in this quadrant). New tasks were added, such as stabilization of own duties. Tasks from other quadrants were also shifted there, such as reading or playing in chamber music assemblies. A similar approach was adopted for the second quadrant – what is noticeable, one of the respondents included searching for new gainful opportunities here, and another shifted playing the instrument and listening to music as a way to relax from quadrant four. The instrumentalist running a business, i.e. respondent B, reserved this quadrant for financial and accounting issues (he noted, however, that he was a realist and that this state was not possible). The person who did not list any tasks in quadrant 1 shifted the issues diagnosed for the current state from quadrant 1 to quadrant 2. Another instrumentalist would like to see practicing the instrument in the second quadrant instead of the first quadrant. The vocalist perceives practicing the piano similarly.

Three respondents would see no tasks assigned in the third quadrant. Among the remaining responses were: as is (three responses), searching for scholarships, entertainment and reading "snobbish" literature. In turn, as regarding the fourth quadrant, the first of the respondents shifted their professional work from quadrant 1, three respondents shifted their tasks here from quadrant 3, and another respondent added building a human relations capital here (this issue was not included in the factual state presented by the respondent). One of the respondents did

not place any tasks here, and another one limited them to one, compared with the three tasks specified before.

An ideal distribution of tasks among the four quadrants would be the following:

- Quadrant I – from 5 to 100%.
- Quadrant II – from 0 to 70%.
- Quadrant III – from 0 to 20%.
- Quadrant IV – from 0 to 20%.

Asked why the factual state differed from the ideal state, as presented by them, the respondent provided the following answers: employer's requirements (e.g. in terms of reporting), the need to perform certain activities in person (in an ideal situation, it would be possible to delegate them), out-of-work responsibilities (e.g. private duties, such as child or pet care), lack of funds or time, proneness to engage in activities which generate fast and measurable results instead of activities generating uncertain and deferred outcomes (stressing that they should keep working on that), the inability to manage time or bad organization, excessive attention paid to useless activities (often performed *pro public bono*), a large number of responsibilities, an education system, or even the "fragility of human nature".

A half of the respondents claimed that they did not delegate their professional responsibilities. Those respondents who delegated a part of their works onto others listed such tasks as employing an accountant to handle their financial statements, the intention to order paid interview transcriptions, looking for substitutes for complete works, or engaging family members in completing household chores in order not to lose potential commissions, handing over students who fail to develop the desired results to other teachers, skipping tasks which are not strictly related to the respondents' musical activity (e.g. guarding students on school trips), and refusing to play non-profitable concerts (in return for recommending people, for whom these projects may be potentially interesting).

In the end of the questionnaire, the respondents formulated their own comments. These concerned, among others, the need for better pay for their work, small possibility of delegating their tasks related to the university organization system, the need to take a time management training as part of university studies or when working at university. One of the respondents provided an elaborate answer, in which he claimed that he would have discussed this questionnaire differently a year earlier. However, having acquired significant experience, the noticed that he paid more attention to what could entail more benefits, not only material, but also those pertaining to skills, image or scientific accomplishment. He noticed that some musicians tended to engage in works and commissions which would bring financial benefits, through which they are "pigeonholed" and stop at a certain level of artistic development, blocking themselves from pursuing better work opportunities. What is also noteworthy is the statement which could be perceived as pathetic, but which reflects the emotions shared by many artists, and namely that "Musicians deserve a good life", which can be interpreted both in the sphere of the need for material and financial resources, and the need to secure a stable social

and employment situation, one that does not require them to take multiple, diverse commissions to ensure a sufficient financial inflow for them and their families.

The question of forced diversification of sources of income was one of the main topics raised in research interviews. A mere glance at the brief descriptions of the respondents indicates that none of them limits themselves to one activity only. Furthermore, all respondents take additional concert commissions, write texts, do small music composition jobs, play in bands and perform any other activities which, although are not completed as part of permanent cooperation, are often work- and time-consuming and require extensive preparations, rehearsals. These works often have short completion dates (e.g. substitution for another artist who went on a sick leave), and which have to be completed in a specific time and place. Musicians, particularly those who have private responsibilities, are not eager to engage in such projects, but are often forced to due to their financial situation. There are also opposite situations – for certain musicians, didactic work and artistic performances are the sources of satisfaction. They do not want to resign from any of them and are driven by other premises than profit.

In their research interviews, the respondents also signaled social security issues. Not all musicians are able to find stable, full-time employment, and artistic projects are often completed in the form of commissions or mandates. In extreme cases, with their music education, they are forced to take up occupations which are not related to their studies to obtain social security coverage when they are unable to find work that would satisfy their needs in their educated profession. Musicians with stable social security backgrounds in the form of full-time jobs, preferably in public institutions, are much more prone to engage in projects with high artistic values, ones that may not be as profitable.

Musicians point to the need for better education in self-management in time. They are open to technological novelties, a part of them read specialist literature or would like to read it, but have insufficient knowledge of specific, available titles (Stępniak, Stasiak-Betlejewska, 2016).

4. Interpretation of results

A synthesis of the research material accumulated and an analysis of the respondents' responses in the questionnaire and to research questions indicate that there are distinguishable similarities and differences among the respondents.

Self-management in time depends on several factors, and education is of key importance here (i.e. a music theorist focuses on different tasks to an instrumentalist), along with the place and form of employment (a business owner is forced to pay more attention to administrative and fiscal issues, compared to people employed full-time), the type of work performed (e.g. teaching, musicians focus on other priorities than research or artistic work), as well as personal situation – in their research interviews, respondents indicated that those who took care

of small children were less flexible in accepting new commissions or modifying their plans, compared to those who have no such responsibilities (at the same time, for the same reason, they tend to be much more organized and plan their actions in advance).

According to Stephen R. Covey's theory presented in the third habit from *The 7 Habits of Highly Effective People*, the most attention should be paid to important, but not urgent tasks, i.e. those situated in the second quadrant. A part of the respondents were also prone to interpreting the time management matrix in this manner, striving to limit the number of important and urgent tasks, striving to shift them to important, but not urgent categories. The second group would like to devote their attention to important and urgent tasks, or to maintain balance between quadrant 1 and quadrant 2. This can result from the specific character of their profession (e.g. instrument practice should be regular, and longer interruptions can cause the long-developed effects to be squandered) or the understanding of the very idea of urgency and importance of tasks. For quarters 3 and 4, the majority of respondents attempted at limiting both the urgent and the non-urgent activities, which are classified as not important. Insofar as the distribution of time devoted to tasks from each quadrant is similar for factual state diagnosis, the distribution of time for an ideal distribution is more diverse.

Analyzing the questionnaires and interviews carried out with a part of the respondents, we can conclude that important and urgent tasks include those tasks which produce measurable material effects, e.g. financial gain. Due to the dynamic character of the music environment, the uncertainty of employment and difficult in finding profitable commissions or jobs, artists praise projects which create a financial gain for them, which they prioritize over tasks which are more stimulating from the artistic or scientific point of view. However, the financial gain is not certain or is deferred for these tasks, and may never translated into material profit.

Respondents also pointed to the need to adapt their responsibilities to the plans of the institutions they work for, or the projects they participate in. Situations when they are not able to learn their schedules ahead of time is a serious problem for them. Participating in many activities, they often face a clash of event dates and incompatibilities not only for them, but also for other interested parties – students, contract parties, superiors, etc., and for commissions performed away from the place of residents, these are also measurable financial losses related to the purchase of railway or airplane tickets.

5. Summary

The factual data collected indicates that the issues related to musicians' time management are extremely important. The multitude of activities taken forces artists to permanently prioritize their objectives and projects, to maintain flexibility in accepting and completing orders, and to maintain a balance between personal life with professional responsibilities, which

are not always stable. What is also important is that musicians are rarely able to delegate the tasks the respondents indicated, and suffer from uncertainty in the social and financial sphere. Social security is also one of the factors which convince musicians to engage in ambitious artistic and social projects which do not guarantee a material profit.

What was noteworthy, the respondents said that they spent most of their time completing tasks from the group of important and urgent or important and not urgent activities, and that they performed not important tasks usually for formal reasons or because their employer requested it. At the same time, they remarked that they would like to limit the number of such activities. What is interesting, some musicians wanted to focus solely on important and urgent tasks, which contradicts Stephen R. Covey's claims. This can however stem from the specific character of their profession, which involves constant practice and skill set development. On the other hand, for people, for whom playing the instrument is not the main source of income, important, but not urgent activities are the basis of their profession.

A part of the respondents pointed to the need to stay fit, maintain a good mental condition, good interpersonal relations, and to stay motivated. This way, despite many activities, they are able to achieve multiple goals without damaging their health and their quality of life, which can be construed as a reference to Stephen Covey's seventh habit from *The 7 Habits of Highly Effective People* – "sharpen the saw" (Covey, 2016). What is also noticeable is their pursuit of increased productivity of their activities (Keplinger, 2011), their high professional mobility (Godlewska-Werner, 2011) and their involvement in interesting projects with a high artistic level, or their pursuit of social objectives (Chirkowska-Smolak, 2011). A part of the respondents are also able to effectively identify and eliminate the "time wasters" and some time management errors listed in literature (Sierpińska, 2013).

An interesting conclusion is that a part of the respondents admitted that completing the questionnaire and conducting the research interview inspired them to rethink their time management routine, consider what is important and urgent for them, and what activities they could limit without damaging their personal and professional growth. This proves that musicians strive for self-development and for the development of their skills in self-management, and are open to any initiatives which could help them increase their competences in this respect, and the matrix proposed by Stephen R. Covey in *The 7 Habits of Highly Effective People* (Covey, 2016) can be a useful tool for all artists who want to improve their self-management in time.

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BYOD – A NEW TREND IN TELEWORK

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Abstract: BYOD – Bring Your Own Device – refers to the policy of permitting employees to bring personally owned devices (laptops, tablets, and smartphones) to their workplace, and to use those devices not only for private but also for business purposes. The study presents the analysis of the BYOD trend, the analysis of previous studies, and constitutes an attempt to determine advantages and disadvantages of adopting BYOD in a company. The paper ends with a short summary.

Keywords: byod, telework, byod trend, remote work.

1. Introduction

BYOD, which is the abbreviation for Bring Your Own Device, refers to permitting employees to bring personally owned devices and to connect them to the company network in order to perform professional duties. This phenomenon is developing dynamically and has its advantages and disadvantages as every new trend (Pentacomp, 2017).

The trend emerges in companies regardless of their size or type of business. The development of BYOD is promoted by an increasing prevalence of telework. In future, therefore, it will be favoured by teleworkers or employees who travel very frequently, e.g. salespeople. A stimulus to the growing importance of BYOD is also an increasing popularity and possibilities of using various mobile devices. These devices not only include computers, but also tablets or smartphones, which nowadays are almost equal to computers even though they were still the most common devices in companies several years ago. It may be argued that BYOD refers not only to a significant technological change, but also a change in the data management model in a company and another way of determining the boundaries of the IT environment of a company (Chmielarz, 2017). BYOD is making significant inroads into workplaces. However, device security is still a central issue. Independent studies confirm that one of the main trends and challenges for companies is consumerisation. By adopting BYOD,

companies are able to gain an advantage over competitors, but they cannot forget to implement appropriate security measures.

2. Description of BYOD use

It is worth analysing the benefits and threats associated with adopting the BYOD strategy in a company. The benefits include significant cost savings for a company. If employees use their personal devices, employers do not have to purchase them. Another benefit includes employee satisfaction and productivity. Employees use their own favourite devices – selected by themselves rather than assigned by the IT department. The BYOD trend also features mobility, which is of significant importance to Generation Y (also known as Millennials). It is Millennials that the BYOD phenomenon primarily concerns. Representatives of the digital generation are used to working in a coworking style, at favourite cafes, or at home – in other words, they are teleworkers. For them, being mobile is natural (Kołtonik, 2017).

Apart from savings on labour costs, competition on a global scale forces employers to be flexible. Demanding customers are seeking new products and services, primarily personalised – that is increasingly advanced and complex. The business cycles already known, which can be taken into account in business plans, saw the addition of a phenomenon of sudden and short-term changes in demand, which requires quick adjustment decisions to be made. These decisions may concern both the number of employed workers (numerical flexibility), including, therefore, all solutions aimed at minimising the protection of the employment relationship durability, and the adjustment of working time – its shortening and extension depending on the employer's demand (working time flexibility, work sharing) (Lach, 2006).

Progress in the field of new technologies, especially computer and telecommunications, ICT technology, and popularisation of the Internet means that sophisticated products and services are launched on the market more quickly, and they become obsolete and are replaced with newer ones more quickly as well. More and more capital-intensive technologies are simultaneously labour-saving. Not only does the demand for labour decrease, but also the nature of labour changes as more and more tasks involve creativity in the first place. Adapting to the market requirements, employers seek flexible and independent workers; however, an active and enterprising subcontractor organises their work on their own, thus not expecting managerial orders (Wiśniewski, 2010).

Work efficiency increases in the long run. It is influenced by a change in the staff management, higher productivity, and a lower staff fluctuation, while at the same time the flexibility of action of a company increases. Telework reduces bureaucracy, ensures a better circulation of information, while the use of new technologies and an enhanced work organisation policy result in a shorter response time of a company to market evolutions.

BYOD brings an advantage to companies by reinforcing innovation and creativity in the workplace while at the same time reducing the general costs of the entire organisation. An important link that should suppress the impetus of the new trend is the implementation of appropriate BYOD policies and procedures, which will ensure that all devices are protected. By cooperating with a partner responsible for security and competent to protect devices in a network, companies may derive benefits from the new trend and may not be overwhelmed by a large amount of information.

The analysis of the BYOD trend by technology companies and research agencies is still in progress. Over the last years, these organisations have carried out a number of studies concerning the functioning of this strategy in the work environment. The results presented by them demonstrate both advantages and disadvantages of the BYOD phenomenon.

The results of independent reports and observations focused on the use of mobile devices show that 83% of companies adopting the BYOD policy have relevant regulations concerning the installation of independent software in order to ensure protection against data leakage. 86% of IT managers from the USA, UK and Germany claim that the main issue concerning data security results from smartphones connected to the company network – 47% of companies allow their employees to connect their personally owned devices to the company network.

If a data leak is detected, many companies immediately change their security procedures to involve actions such as limiting access to data (45%) or installation of data-protecting software (43%). A small number of companies decide to stop adopting the BYOD policy after an incident has occurred (12%) (Gajewski, 28 November 2017).

The results of the "Modern IT in SMEs" study conducted for Microsoft by Ipsos MORI reveal that personally owned IT devices in the workplace are used in nearly half of Polish small and medium-sized enterprises. The most common personally owned devices used for business purposes include laptops (57%), followed by smartphones and tablets (48%) – they usually come with Android (73%), followed by Windows (13%) and iOS (10%). In case of tablets, which are used in the BYOD model by 20% of employees, Android is the most popular operating system, Windows came second (16%), whereas iOS came third (13%). More importantly, 54% of the respondents claim that they take a look at business documents after work with the use of company devices (51%) or their own (45%) (Gajewski, 2017).

Many people believe that BYOD is a natural stage of company development. In a world where increasingly more people use social media and tools available on the Internet, employees expect their company to allow them to use the devices that suit them best at work (Makowiec, 2016).

3. BYOD safety

In such sectors as defence or finance, where data security is of particular importance, companies tend not to allow their employees to use their own tablet or smartphone, but at the same time try to increase employees' productivity by using appropriate applications for selected devices. Multi-level protection and device management mechanisms should correspond to the needs of a company and user (Serafin, 2013).

A company should also consider legal issues related to the BYOD policy. Can the employer legally monitor devices owned by employees to control whether data integrity or terms of use have been violated, or whether time and resources have been misused? This model is based on the assumption that devices belong to employees. However, the rules should be adopted to the requirements of this new trend so that devices can be monitored to a limited extent at least (Serafin, 2013).

It is vital to consider costs and legal issues. Still, companies specialising in infrastructure, such as Alcatel-Lucent, develop solutions that facilitate the implementation of the BYOD model. It is already technologically possible to manage the BYOD environment and ensure users have secure access to data in an economically efficient way. In such network infrastructure, applications that make communication and cooperation easier may be safely used on devices selected by employees. In addition, it is possible to integrate platforms responsible for voice, data, and video transmission. Being already on the market, the Open Touch Conversation solution ensures easy communication between different devices such as iPads.

The task of a service provider is to adapt applications to strategies employed by IT managers. The application to be implemented should make it possible to communicate using different devices safely, and with economically effective infrastructure supporting such applications regardless of whether the company uses the BYOD model or not. Companies should not perceive the BYOD trend from the point of view of costs only, which are not always so important, but they should rather aim at increasing productivity and benefits reaped by individual employees. They may choose a pragmatic strategy based on due diligence investigation and 360-degree feedback, which makes it possible to determine the best speed of BYOD model implementation – adapted to the company requirements and users' roles. If they decide to introduce BYOD, they should make sure that employees are aware of their rights and limitations. To that end, comprehensive procedures and rules should be introduced (Anonim, 2017).

BYOD also entails some challenges associated with company data security. If devices are lost, stolen or hacked, there is a risk of a confidential information leak. IT support constitutes another issue. In an environment involving many devices with different operating systems, it becomes impossible to ensure the right technical support for all users of such devices.

Endless possibilities make it difficult to manage the entire IT structure effectively. The issues mentioned above are only one of the disadvantages of implementing the BYOD policy in a company.

Some of the risks related to this policy may be minimised by developing a security policy within a company. The policy should be known and followed by all employees. The security policy has to contain clearly defined rules in relation to rights, obligations and the scope of responsibility. For example: in order to avoid a confidential information leak, it is important for the security policy to specify, in particular, the requirements concerning password control, an ability to restrict access if security is endangered, or ability to delete sensitive information remotely in different situations. It is also important for the security policy to define the minimum requirements in terms of personally owned devices and software used on them. If these requirements are met, access to the company network and its resources will be made available. The issues mentioned above are only some that should be specified in the security policy. Once the policy is formulated, another step should involve the selection of appropriate tools with which the implementation of the BYOD strategy in a company will be possible. For example, Mobile Device Management (MDM) serves as a solution in this case. It involves software that makes it possible to remote control the entire group of mobile devices in a company (Kołtonik, 2017).

Companies that decide to introduce the BYOD model should keep the following three issues in mind:

- ensuring an appropriate system for the management of devices that connect to the company network,
- ensuring appropriate security solutions and policies in relation to access to company resources,
- in cooperation with employees, determining acceptable good practices and a range of activities that they may perform in relation to company resources with the use of their own devices; for example, these practices should include how to protect passwords, what applications are considered secure etc. (Microsoft, 2017).

4. BYOD in companies

Comprehensive preparation is required to enjoy BYOD benefits safely. The first step to be taken to protect company data is to conduct an internal audit and determine where important information is, who has access to it, how it is protected, and whether all scenarios concerning security threats have been considered. Another step involves determination of which applications may be installed on employees' personally owned devices. Then the appropriate security policy may be specified and IT solutions to introduce it may be developed. A good

solution makes it possible to manage and protect all end devices from a single control panel and supports all common operating systems used in mobile devices. It should also be convenient for the IT department by ensuring that the software installed on mobile devices is standardised. Both encryption and data leak protection are of particular importance. Mobile devices are particularly prone to theft or loss. Therefore, mobile solutions should enable IT departments and users to restrict and delete information on devices or in selected applications remotely (Chmielarz, 27 November 2017).

These days, there is a wide range of services provided by technology companies on the market. These services seek to support and facilitate the implementation of the BYOD policy in a company, for example Windows Inture available on the market may help to manage groups of both personally owned and private devices. The implementation carried out by Supremo in Grecos Holiday with a simultaneous launch of Office 365 serves as an example of introducing this service in Polish SMEs (Microsoft, 2017).

In 2017, the Nudge Rewards report was presented, which is entirely devoted to the approach to new technologies presented by employees and their employers (NudgeRewards, 27 November 2017). It shows that as many as 51% of employees are convinced that new technologies and mobile solutions can facilitate their work. At the same time, only 23% think that this is the case, and their employers use the potential of mobility in their business. The majority (58%) of employees use private devices while working for at least an hour a day. Only 43% of employers allow the use of private devices for business purposes. From the research, we can conclude that the BYOD trend is mainly in companies that have employees in the office than those working behind the company's unit. Only 1 in 10 employees, even though they have the employer's permission to use their own equipment, are encouraged to do so. The last problem is also cultural barriers, which is indicated by as much as 62% of employees. 42% of them are afraid that their supervisor does not accept the use of private equipment for business purposes and decides that they do not perform their duties properly.

5. Conclusions

The idea for BYOD is one of the innovative solutions that is meeting with approval of both employers and employees. It may bring about a considerable number of beneficial changes including higher employee's flexibility, employee's availability, and enjoyment derived from working using favoured tools as well. However, similarly to any change, it requires appropriate preparation on the part of an organisation, which will ensure that company data are protected. The methods for increasing employees' satisfaction and productivity include an office tailored to individual needs or possibility of using employees' own devices in the workplace. This positively translates to the quality of professional

performance. The employee is the most valuable asset in a company, so it is beneficial for the company in the long run to ensure that the employee has the right working conditions (Kołtonik, 2017). However, risks associated with BYOD should be kept in mind. In order to protect a company network and company data against threats posed by mobile devices, companies have to deal with security at the network level rather than at the end point level only. The only effective solution is to implement comprehensive actions, i.e. those that protect the core of the network and control the incoming and outgoing traffic generated by external devices. It is obvious that companies will have to put in a great deal of effort to support their employees in a new way.

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