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# IDENTIFICATION OF DISRUPTIONS IN TRANSPORT PROCESSES

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**Introduction/background:** The article presents an analysis of risk factors that may cause disruptions affecting the shipping of parts and components for the automotive industry. In this regard, based on literature research, the meaning of a disruption risk and its management in transport processes are discussed. Furthermore, the role of the transport and logistics companies in the provision of services for the automotive sector is presented. In the next section, the methodology of risk factor analysis and assessment is determined and the results of studies conducted on disruptions that may have a key impact on the transport process of the analysed company are presented.

**Aim of the paper:** The aim of the article is to determine the influence of disruptions in the transport processes of parts and components for the automotive industry through the analysis and assessment of disruption risk factors.

**Materials and methods:** The tools and methods proposed to assess the risk of disruptions affecting the order execution for the transport service of parts and components for the automotive industry by the company under examination were as follows: an indicative analysis, a disruption risk assessment form, an expert judges method, PHA method and a risk matrix.

**Results and conclusions:** The analysis has allowed for the identification of risk factors, which, due to the potential consequences estimated by a group of experts as well as the probability of occurrence, may have a key impact on the transport process in the investigated company. Indicative analysis has shown that the timeliness of transport, which is associated with delivery time, is a major issue in a company. This formed the basis for the further analysis of process disruptions.

**Keywords:** transport process, disruptions, risk, indicators, disruption risk assessment form, automotive industry.

## 1. Introduction

Risks are present when running any type of business, but as transport businesses are responsible for both their own and others' property, they are particularly vulnerable to disruptions. The majority of companies in the logistics service provider (LSP) sector in Poland

provide their services by road transport, which is highly dependent on the actions of third parties and random events; as such, risk management in this sector is of great importance.

A major challenge for transport companies regards the services provided to businesses in the automotive industry. These services are mainly characterised by precise deliveries, the lowest possible transport costs, and short delivery times because any delay in the delivery of transported goods may disrupt the recipient's production process. Ensuring the best possible quality of transport services has an impact on customer satisfaction, which, together with the company's experience, shapes its position in the LSPs (logistics service providers) market, increasing its competitive advantage. Therefore, the proper identification of events that may disrupt the realisation of transport services and the assessment of their risk level is vital from the perspective of companies that provide transport services as it allows for planning and the implementation of preventive measures that help maintain continuity and the timeliness of transport processes.

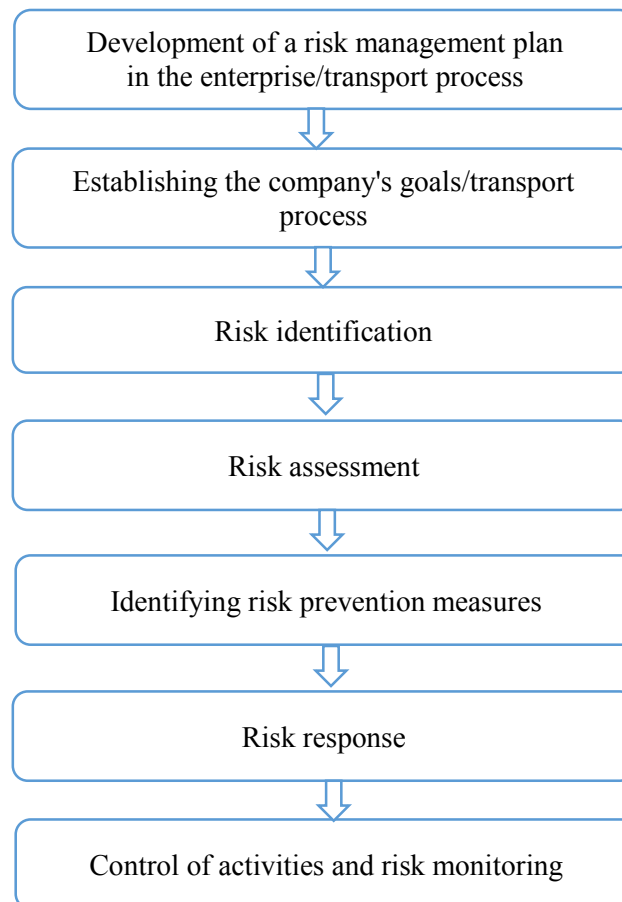
## **2. The nature of the risk of disruptions in transport processes**

Long-term research on risk has resulted in the emergence of a number of different concepts and theories that allow us to understand the essence of risk. In the literature, we can find many definitions of risk, ranging from the etymology of the concept itself, through the first economic theory of risk formulated in 1901 by A. Willet (Willet, 2002) – which made an attempt to distinguish risk from uncertainty – all the way to modern inquiries related to risk in the context of the process approach. The second economic approach to risk is the concept of measurable uncertainty and immeasurable uncertainty proposed by F. Knight (Knight, 2014). The definitions of risk and uncertainty he developed continue to be relevant and used in research in this field. At this point, however, it should be emphasised that the notions of risk and uncertainty are often used interchangeably, both in theory and in practice. However, they are not synonyms and therefore cannot be used to identify the same phenomena. Thus, risk can be defined as a measurable uncertainty as to whether the planned objective of the action will be achieved (Dohn, Gaschi-Uciecha, Wodarski, 2017).

Present-day supply chains are exposed to a variety of risks. The fundamental reason for this is usually a very long distance that the cargo has to cover from the manufacturer through middlemen to the final buyer. The responsibility of companies that provide transport services for both their own and others' property makes them particularly vulnerable to any kind of disruption (Cyganik, 2014). In transport processes, disruptions can be defined as unplanned events, the occurrence of which can cause undesirable delays to the delivery of goods to their destination (Kramarz, Kmieciak, 2017). They are also defined as the likelihood of the occurrence

of an undesirable event that may cause the loss of or damage to the transported cargo (Cyganik, 2014).

Risk management is often regarded as taking actions aimed at identifying, assessing, and controlling risks, as well as controlling the undertaken activities. The purpose of risk management in each company is to take action to limit and protect itself against adverse consequences (Rudzińska, Piekarski, Dudziak, 2011). Risk management is a logically arranged plan, system, or process in which successive stages can be distinguished. An example of a plan of steps in the risk management process of a company is presented in Figure 1.



**Figure 1.** Stages of the risk management process in a transport company. Adapted from: Cieśla M., Turoń K., Risk management in container transport processes based on risk map and mathematical method, [in:] Jadczyk R., Ledzian P. (ed.), Risk management in Logistics and Finance, Łódź 2016, p. 79-91.

The primary and key element of risk management is risk identification. An appropriate and proper identification process is crucial to properly and effectively managing risk in a company (Romanow, Stajniak, Konecka, 2017; Rudzińska, Piekarski, Dudziak, 2011). Risk identification involves activities related to the identification of occurring and probable disruptions as well as the determination, categorisation, and description of various types of risks that may jeopardise the proper implementation of the company's objectives, both during the organisation and the implementation of the defined objectives, or cause damage to or tarnish the company's reputation. The identified risks should be subjected to further analysis in order

to determine the probability with which a given risk may occur and what its consequences may be (Cieśla, Turoń, 2016).

Risk factors that occur in a company or transport process may be related to particular categories (Romanow, Stajniak, Konecka, 2017; Dohn, Gaschi-Uciecha, Wodarski, 2017), such as:

- decision errors made, for instance due to false or unreliable information,
- ignorance, carelessness, or disregard for regulations and procedures,
- human factors related to the qualification, nature, honesty, and approach to assigned professional duties,
- a technical factor,
- a random factor.

### **3. The role of logistics service providers (LSPs) in the automotive industry**

The automotive industry is well-known for requiring a perfectly functioning organisational system, as well as a fast flow of information along the supply chain. For this reason, the industry is considered to be particularly demanding. Due to the high level of production complexity, it is important that the execution of orders is fast as well as precise. Moreover, the automotive sector is also associated with high dynamics and a diversity of orders (Trans.info, 2019).

The provision of transport and logistics services for the automotive industry is governed by its own laws. This is mainly due to the fact that the automotive sector is an international network whose customers expect a final product that will be as personalised as possible in terms of their needs and requirements. This results in the necessity to produce finished products in a large number of variants. It is also of vital importance to understand that cars consist of several thousand parts that can come from various industries, such as machinery, chemical, and electrical industries (Scandinavian Express, 2019; Trans.info, 2019). The carrier also bears a very high responsibility because any delay in the delivery of transported raw materials or semi-finished goods may disrupt the recipient's production process (Scandinavian Express, 2019).

Transport and logistics for the automotive industry demand close cooperation between the carrier, the shipper, and the logistics operator. In the case of automotive logistics, the decisive factor for cooperation with a specific carrier is the precision of transport. The transport company is obliged to take into account its system capabilities in the area of process integration with the customer as well as its readiness to report cooperation indicators based on the model adopted in the contractor's industry (Raben, 2019).

The greatest challenges in the process of servicing automotive companies are short delivery times, large fluctuations in the volume of products, keeping transport costs as low as possible,



and the need for the precise synchronisation of a number of sub-suppliers. This approach often necessitates the use of appropriate solutions, and therefore it is crucial to understand the principles of 'just-in-time' and 'just-in-sequence' when delivering components. Timely delivery dominates the workflow of production lines, especially in the automotive industry. This method means the delivery of goods and components at a precisely defined point in time when they are needed. Cooperation in such a case must be based primarily on synchronised activities and communication between the manufacturer, supplier, and logistics operator or carrier, both in the short and long term (Haber, 2017; Trans.info, 2019).

Just-in-time does not tolerate any delays as they can cause the production line to stop and result in losses. To avoid such problems, it is crucial to analyse transport and/or storage processes (Scandinavian Express, 2019).

#### 4. Methodology for analysing and assessing disruptions

A disruption assessment analysis requires a combination of tools and methods to identify, analyse, and assess the impact level of disruptions to the transport process. The tools and methods proposed to assess the risk of disruptions affecting the order execution for the transport service of parts and components for the automotive industry by the company under examination were as follows: an indicative analysis, a disruption risk assessment form, an expert judge method, a PHA (process hazard analysis) method, and a risk matrix.

Indicators are a set of analytical tools for measuring and evaluating transport processes, and their core task is to present the actual state of the situation in an adequate and reliable way. Indicative analysis allows one to obtain information regarding the realisation of the studied transport processes, which enables the assessment of their effectiveness. Additionally, it is the basis for further analysis of disruptions affecting the activity of the analysed company (Gaschi-Uciecha, 2018). The indicators selected to assess the transport process of the analysed company are presented in Table 1.

**Table 1.**

*Selected indicators for the assessment of the transport process*

No.	Indicator	Pattern
1	Timeliness of transport	$\frac{\text{number of shipments carried out in a timely manner}}{\text{total number of shipments}} \cdot 100\%$
2	Amount of damage during transport	$\frac{\text{number of damaged transport units}}{\text{total number of units transported}} \cdot 100\%$
3	Failure of transport means	$\frac{\text{number of failures}}{\text{total number of shipments}} \cdot 100\%$

Cont. table 1.

4	Number of kilometres per transport unit	$\frac{\text{total number of kilometres}}{\text{number of transport units}}$
5	Delivery readiness	$\frac{\text{number of orders immediately carried out}}{\text{number of transports}} \cdot 100\%$

Adapted from: Gaschi-Uciecha A., Analysis and assessment of the transport process..., op.cit.

The Disruption Risk Assessment Form shown in Table 2 allows for the identification of risk factors at different stages of the transport process that may cause disruptions. Additionally, the examination form used together with the expert judge method and the PHA method makes it possible to assess the probability of risk occurrence and the potential effects of the identified factors.

**Table 2.**  
*Disruption Risk Assessment Form*

Stage of the transport process	No.	Risk factor	Consequence of the risk	Likelihood of the risk occurring	Severity of the risk
–	–	–	–	–	–
–	–	–	–	–	–

The expert judge method is used to solve all kinds of organisational problems and is especially useful for analysing management processes. This method is based on a survey that includes questions and issues formulated in such a way that the expert can unequivocally determine the factor in question using a numeric scale. It is extremely important in this method that experts assess factors independently. In addition to the assessment of risk factors by the experts, it is also crucial to determine the relative validity of the assessments made by each expert. For this purpose, the expert's competence degree indicator is used, which is based on his or her self-evaluation; this in turn is based on the average of the coefficient of the expert's knowledge of the given subject and the coefficient of the argumentation's impact on his or her opinion. These coefficients range from 0 to 1, where 0 indicates that the expert does not know the problem and 1 indicates he or she has very good knowledge of the problem (Grabowska, 2015).

The PHA method is a method of initial hazard analysis that allows for qualitative risk assessment. Risk assessment using this method is about determining the probability that a specific risk may occur and the potential consequences associated with it. In order to carry out a thorough risk assessment using the PHA method, it is essential to determine the different types of probability and effects of disruptions (Cieśla, Turoń, 2016).

The effects are all the possible consequences of the disruption for the organisation. These include vehicle downtime losses, time losses, and financial losses, among other negative events. The assessment of the impact of individual risk factors is based on a five-point scale of how each affects the functioning of the surveyed organisation. On this scale, 1 indicates that

the effect of the risk is insignificant and 5 indicates it is severe. The likelihood that a risk will occur must be assessed on the basis of the occurrence frequency of the individual factors. The likelihood is assessed using a five-step scale, where 1 indicates that the likelihood of the risk occurrence is very rare or impossible and 5 indicates that it is almost certain (Cieśla, Turoń, 2016).

Once the key parameters have been estimated using the PHA method, all factors that may occur in the transport process should be summarised, taking their severity into account. The severity of a risk is the product of the probability and the potential consequences of its occurrence. Then each risk category is classified by the following risk levels (Cieśla, Turoń, 2016):

- low risk — acceptable risk — severity range from 1 to 6,
- medium risk — acceptable risk, but requiring the planning and implementation of activities mitigating this level — severity range from 8 to 12,
- high risk — unacceptable risk requiring an urgent mitigation — severity range from 15 to 25.

By determining the risk severity of particular disruption factors, it is possible to allocate them to the appropriate fields in the risk matrix presented in Table 3.

**Table 3.**  
*Risk matrix*

Consequences of the risk	Likelihood of the risk occurring				
	Rare	Unlikely	Possible	Likely	Almost certain
Insignificant	1	2	3	4	5
Minor	2	4	6	8	10
Moderate	3	6	9	12	15
Major	4	8	12	16	20
Severe	5	10	15	20	25

Adopted from: Cieśla M., op.cit.

Assessing the risk level makes it possible to take appropriate decisions and preventive measures aimed at minimising the impact and occurrence of identified factors that cause disruptions in the examined process.

## 5. Analysis of disruptions in the transport processes

The indicator assessment was made for the transport process carried out by the selected company, which provides transport services for parts and elements supplied for the automotive industry. To verify the results of the indicator analysis of the transport process, the obtained

values are summarised in Table 4 together with the model indicators, established on the basis of the adopted standards in the enterprise.

**Table 4.**

*Comparison of the indicators obtained with the benchmarks*

No.	Indicator	2017		2018		Unit of Measurement
		Obtained	Benchmark	Obtained	Benchmark	
1	Timeliness of transport	94.69	min. 95	94.84	min. 95	%
2	Amount of damage in transit	0.058	max. 0.06	0.05	max. 0.05	%
3	Failure frequency of means of transport	0.162	max. 0.15	0.134	max. 0.14	%
4	Number of kilometres per means of transport	154	max. 155	158	max. 160	thousand km
5	Readiness of delivery	94.91	min. 95	95.15	min. 95	%

The conducted indicative assessment enabled us to determine the effectiveness of the transport process executed in the examined company. On the basis of the compiled results, it can be stated that process efficiency is getting better but the timeliness of transport in 2018 does not come close to meeting the requirements set by the company. However, as the studied business provides services for automotive industry companies, which expect the carriers to deliver goods exactly on time because of the planned cycle of production processes, it is necessary to determine the benchmark value of the indicator at a very high level.

Timeliness of deliveries is a key factor in ensuring that customers will continue to want to use the services of the examined company in the future. Irregularities detected in the analysed process are the basis for further research on the identification, assessment, and analysis of factors that may cause disruptions during the execution of the transport service in a given company.

On the basis of literature research, 31 potential disruption risk factors, which relate to particular stages of the transport processes, were identified. The next step was to select experts to assess the disruption risk factors. Based on a self-evaluation of experts by means of an expert's competence assessment form with respect to disruptions in the transport service process, ten expert judges with extensive knowledge on our subject (extensive experience in the logistics industry) were selected.

The selected group of expert judges assessed individual risk factors by using the PHA method with regard to a risk's potential consequences and likelihood of occurrence. Using the determined values, the severity of the risk of particular factors was calculated and is presented in Table 5.

**Table 5.**  
*Disruption Risk Assessment Form*

Stage of the transport process	No.	Risk factor	Severity of the risk
Preparation of the transport offer	1	Lack of communication	6.50
	2	Non-acceptance of the offer by the customer	7.00
	3	Incorrect preparation of the offer	7.68
Acceptance and confirmation of the order	4	Information flow problems	8.00
	5	Excessive waiting time for the order to be sent	7.00
Selection of the means of transport and driver	6	Selection of the wrong means of transport and driver	7.77
	7	Lack of available means of transport and driver	8.28
Preparation of the means of transport and driver	8	Route information provided to the driver incorrectly	15.99
	9	Uneconomical route planning	6.40
	10	Mistakes connected with the preparation and handing over of the transportation documents to a driver	16.38
	11	Wrong planning of the order execution time	13.12
Loading	12	Accidents during loading	10.80
	13	Damage to the cargo	11.04
	14	Insufficient cargo securing	11.52
	15	Un-adapted cargo area	5.04
Transport	16	Accidents involving a vehicle used in transportation	15.04
	17	Breakdowns of the means of transport	8.82
	18	Adverse weather conditions	12.76
	19	Problems in communication between the forwarder and the driver	9.00
	20	Delay in the delivery of goods	21.12
	21	Necessity of detours	10.66
	22	Wrong route selection by the driver	8.41
	23	Theft of transported cargo	8.46
	24	No driving capability of the driver	6.86
	25	Infrastructure problems	7.82
Unloading	26	Accidents during unloading	10.80
	27	Damage to the cargo	11.28
	28	Un-adapted cargo area	5.04
Settlement	29	Failure to deliver an invoice	6.15
	30	Issuing of an incorrect invoice	6.60
	31	Late payment of the invoice	10.08

Based on specific values of individual risk factors' effects and their likelihood of occurrence, risk factor positions were determined using the assigned numbers in the risk matrix presented in Table 6.

**Table 6.**  
*Risk matrix of the analysed factors*

Consequences of the risk	Likelihood of the risk occurring				
	Rare	Unlikely	Possible	Likely	Almost certain
Insignificant					1, 2, 5
Minor		15, 28	9		3, 4, 19
Moderate		25, 30	22	11, 18, 21	
Major	29	6, 17	31	8, 10	20
Severe	24	7, 12, 13, 14, 23, 26, 27	16		

Ten factors are assigned to the low risk category; such risks are acceptable and usually have little or no impact on the realisation of freight operations.

Another group consists of medium severity risk factors, which include 17 identified factors. The most important risk factors in this group are: poorly planned lead time, adverse weather conditions, and insufficient cargo securing during loading. The factors assigned to this group are considered acceptable; however, they require constant control as well as the systematic planning and implementation of actions that reduce their severity.

In the transport process, unacceptable risk group factors can result in major disruptions. Based on the assessed severity of the risk, four factors were categorised to this group, including: delays in the delivery of goods, mistakes connected with the preparation and handing over of the transportation documents to a driver, errors in the provision of route information to the driver, and accidents involving a vehicle used in transportation.

The factor severity analysis for particular stages of the examined transport process allows us to observe that the activities connected with transport as well as the preparation of the means of transport and the driver are exposed to the highest risks. Moreover, due to the susceptibility to tolerable risk, attention should be paid to activities related to loading, unloading, and the settlement of transport services with the customer.

The most essential risk factors include four unacceptable factors and three key acceptable factors, which are: incorrect planning of the order execution time, adverse weather conditions, and insufficient cargo securing; the potential causes and consequences of their occurrences were identified. As such, we are able to state that the analysed risk factors are mainly related to human errors, errors resulting from insufficient information, the carelessness or ignorance of employees, and random events. The consequences include, first and foremost, delays in order execution and financial losses; the latter may be caused by damage to the transported cargo or contractual penalties imposed by automotive industry customers to minimise losses resulting from production line downtime.

The identified causes for the key factors allowed us to come up with preventive measures to better detect emerging disruptions and help avoid them. The proposed actions include, among others: additional manager supervision over the transport process; training in safe driving and the optimisation of transport processes; more accurate analysis of the transport route and more frequent contact with the driver; language courses; changing the mobile network operator or replacing communication equipment with newer models; obeying road traffic rules and regulations; and increasing the frequency of rolling stock inspections.

## **Conclusion**

This article presents literature and empirical research related to the impact of disruptions on the transport processes of parts and components supplied to automotive companies. The conducted research has allowed us to state that disruptions have a significant influence on the transportation process. Their proper identification, analysis, and evaluation has allowed us to determine actions aimed at limiting the impact of risk on the realisation of the examined process.

Indicative analysis has shown that the timeliness of transport, which is associated with delivery time, is a major issue in a company. This formed the basis for the further analysis of process disruptions. The assessment of identified potential risk factors by expert judges allowed us to determine their severity, and thus determine which factors may have a key impact on the transport process under examination. Based on the identified causes of the most critical factors, precautionary actions were determined to increase the detectability of disruptions occurring in the process and, thus, reduce their negative impact on the process.

The measures identified may contribute to improving the efficiency of the transport service execution process and therefore the quality of the services offered by the company. It is especially relevant in the case of transport services rendered for the automotive industry because any delay in the delivery of transported semi-finished goods may disrupt a customer's production process and result in losses.

However, periodic audits of risk management principles should be carried out, and the compliance of this process with accepted standards should be established. It is worth remembering that the functioning of an enterprise is dynamic. Therefore, it is necessary to identify changes that take place within the enterprise and its environment and make appropriate adjustments to the overall risk management system.

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# PSYCHOLOGICAL EMPOWERMENT IN HEALTHCARE UNITS: AN EMPIRICAL ANALYSIS OF PUBLIC HOSPITALS

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**Introduction/background:** Employees of health care units, like in other organisations, should be considered as key resources. Their individual and group abilities condition the possibility of achieving the organisation's goals. In this context, we can point to the concept of employee empowerment, which emphasises the importance of delegating authority to make certain decisions down the organisational hierarchy.

**Aim of the paper:** The aim of the article is to verify, within empirical research, whether the psychological employee empowerment in terms of attitude towards work, access to information and decision-making can be identified in public health care units in Poland at various levels of the organisational hierarchy. Additional aim is to verify to what extent the Spreitzer's Empowerment Scale can be applied to health care organisations.

**Materials and methods:** The level of psychological employee empowerment was measured by the application of the Spritzer's Empowerment Scale (SES) modified by the authors. The research was conducted at the Rehabilitation and Cardiology Hospital in Kowanówko in April 2017. The questionnaires were distributed to all 233 employees of the hospital. 106 completed questionnaires were received from respondents, which represents 45.5% of employees.

**Results and conclusions:** Conducted research suggests that employees of the analysed hospital feel empowered what is reflected by their attitude towards work, access to information and decision-making, but these feelings decrease with the level of organisational hierarchy. At the same time, the lowest level of empowerment was declared for the decision-making dimension, which is the most important indicator of the actual state of empowerment. Keywords: employee empowerment, psychological empowerment, Spreitzer's Empowerment Scale.

## 1. Introduction

In recent years, healthcare in Poland has undergone a number of transformations. One such change is viewing patients as clients of healthcare units. The emergence of a market for medical services, among other things, has contributed to this. Growing competition between private healthcare providers and public entities, combined with the rules of contracting health services from public funds, have made attracting patients a new determinant of the functioning of medical entities. Changes in financing rules in the scope of primary healthcare has facilitated restructuring processes and resulted in the increasing independence of public healthcare units. Some units have implemented actions aimed at improving and strengthening their image, as well as increasing the effectiveness of patient care, in order to attract more patients (Dobska & Dobski, 2012, p. 7).

In healthcare units, as in other organisations, employees play a key role in building a positive image, in particular medical staff who have the most frequent contact with patients and their relatives. A positive opinion in the external environment depends on employees' behaviour, professionalism, and actions consistent with social expectations. Research shows that a hospital's positive reputation is determined by the relationships between patients and medical staff that are created during the treatment process as well as the implementation of treatment standards at the highest possible quality level (Littwin, 2013, p. 212).

Therefore, employees of healthcare units, like in other organisations, should be considered key resources. Their individual and group abilities condition the possibility of achieving the organisation's goals. In this context, we can point to the concept of employee empowerment, which emphasises the importance of delegating the authority to make certain decisions down the organisational hierarchy. As a result, it becomes possible to service customers, patients in the healthcare case, at a higher level by tailoring to individual needs and expectations. This may contribute to increasing patient satisfaction with the healthcare services they receive and improving the image of the healthcare unit. The literature indicates the importance and impact of employee feelings in terms of whether or not they feel empowered in relation to their work; this is referred to as 'psychological empowerment' (Spreitzer, 1996; 2007), which is the subject of analysis of this article.

The aim of this article is to verify, using empirical research, whether psychological employee empowerment in terms of attitude towards work, access to information, and decision-making can be identified in public healthcare units in Poland at various levels of organisational hierarchy. Research was conducted at one public hospital. An additional aim is to verify to what extent the Spreitzer's Empowerment Scale can be applied to healthcare organisations.

This paper is organized as follows: First, we present a literature review on empowerment; second, we present our research methods; finally, we show the results of the research and conclude with a short discussion on the implications of our findings.

## 2. Employee empowerment and its dimensions

### 2.1. The nature of employee empowerment

Building teams of satisfied, motivated, and self-fulfilling employees is associated with the need to move away from the traditional *command and control* organisational culture. An alternative is flexible work organisation systems, in which the norm is the voluntary commitment of each employee to significantly exceeding standard levels (Amann & Stachowicz-Stanusch, 2013; Deszczyński, 2007; Stankiewicz & Moczulska, 2011). Effective organisational culture, sometimes called the culture of sharing (Ying-Yung, Sun-Quae & Chin-Tsang, 2006), manifests itself in the pursuit of building a common system of positive values, such as respect for others and care for the interests of customers, employees, owners, and business partners. It is also characterised by: the delegation of powers to areas most conducive to making decisions; openness to new challenges and a higher tolerance for errors; creating plans for employee competence development; and enabling employees to exert a real influence on the organisation's development processes (Deszczyński, 2016; Kotter & Heskett, 1992; Potoczek, 2007).

In the *Oxford English Dictionary*, the term 'empowerment' is described as: "authority or power given to someone to do something" and "the process of becoming stronger and more confident, especially in controlling one's life and claiming one's rights". These definitions refer to a certain process of transferring power, or 'legitimation', which strengthens the position of a given individual or entity and introduces, both factually and emotionally, a sense within the individual that s/he has an influence on the organisation. The key issues here are therefore the transition from a passive to an active attitude and participation in shaping how things are run.

Empowerment is primarily a transfer of power downwards in the hierarchy in an organisation. However, not all employees are ready to take up this challenge, especially if it happens suddenly. The ability to act independently and responsibly depends on the individual traits of each person. Both professional skills and psychographic profiles (which include, for example, the willingness to take risks) are of crucial importance. The issue of setting clear competence limits, e.g. in terms of budget management, is an equally important aspect in the implementation of employee empowerment. Empowerment does not mean the introduction of anarchy. Employees are allowed the room to make mistakes that an organisation can draw lessons from for the future, but intentional abuse is not tolerated (Maynard, Gilson & Mathieu, 2012).

Empowerment is the next step, a developed form of human resource management techniques based on the delegation of power. Empowerment means not only handing certain routine decision-making powers (and associated responsibilities) down the organisational hierarchy (Szumowski, 2011), but also giving employees the freedom to choose methods for achieving the set goals or even the possibility of defining such goals. The introduction of

employee empowerment should not be equated with making a single, specific decision, for example establishing a new organisational structure. It is rather an organisational process (creating conditions for delegating decision-making powers) and an individual process (acquiring and motivating employees with appropriate psychographic characteristics who want to play a more active role in the organisation). Hence, the basic principles of employee empowerment are (Smith, 2006; Johnson & Redmond, 1998):

- guaranteeing access to information that employees need to make decisions within their areas of responsibility;
- authorization to independently make most major decisions based on the outlined goals, the time allowed for their implementation, and budget constraints;
- encouraging employees to take responsibility not only for the operational sphere of activities, but also for improving the methods of their execution;
- taking the role of change leaders by managers at various organizational levels.

Employee empowerment dovetails perfectly with building skills such as: initiative, making independent decisions, innovation, creativity, and commitment to the tasks performed. The cultivation of employee empowerment can provide potentially significant benefits. Such measures recognize an employee's individuality and facilitate the recruitment and retention of particularly valuable employees. It improves the speed and accuracy of decision-making because decisions are made by people who have the most complete information on a given topic. It also supports learning processes by promoting openness to other colleagues and changes, as well as reduces the costs of control in quality management (Szczzerba, 2014).

The implementation of empowerment principles may face major difficulties, in particular for large and inflexible organisations. Small, dynamically developing organisations are often characterised by enthusiasm and a vision of development shared by all employees. However, with time and as the organisation grows, advanced control systems and detailed procedures appear (Bolesta-Kukułka, 1996). Intended to ensure security and order (e.g. regarding the use of financial resources), such developments hinder the initiative of employees who either adapt to the system or leave. Similarly, the recruitment of new employees is based on them entering into a work system designed to mitigate their possible incompetence and lack of discipline. In large and successful organisations, however, there is a visible return to building trust between employees and management by developing clear organisational rules that guarantee freedom, transparency, and, at the same time, personal responsibility for decisions. Thanks to this, it is possible to not so much 'manage' people, but to integrate disciplined and cooperating employees (Collins, 2007).

The introduction of employee empowerment requires a lot of effort on the part of managers to unlearn old habits. By making fewer operational decisions, they are able to focus on motivating the team, developing individual employee talents, and strategic thinking. Nevertheless, filling the void arising from the rejection of a command-and-control organisational culture is not easy and may prove unsustainable, e.g. due to the perception of

employees as competitors, etc. (Maynard, Gilson & Mathieu, 2012). Just as employees may abuse their freedom, managers can fall into the traps of old-school leadership, such as micro-management, sensitivity to flattery, and nepotism (Michalik & Mruk, 2008).

The implementation of empowerment in organisations in which negative moods prevail would be premature. In addition, a contemporary, educated individualist will be loyal above all to his or her professional career (Tokar, 2016). This is particularly evident in bureaucratic organisations, which sometimes create façade organisational cultures that ineptly conceal the real, contractual nature of the employee's relationship with the organisation (Biernacka, 2009). On the other hand, in better functioning teams, the enterprise may try to influence employees in a broader context given the overall complexity of a human being, helping them achieve a balance between work, family life, and functioning in society (Kelleher, 2016).

## **2.2. Dimensions of employee empowerment**

In practice, employee empowerment in the workplace can be analysed in terms of attitudes towards work, access to information, and decision-making.

Having a relatively large impact on the functioning of their workplace, empowered employees are characterised by a more positive attitude towards work, their company, and their tasks compared to other colleagues. All possible manifestations of such behaviour are too numerous to be listed; however, it can be said that they translate into a real increase in the quality of processes performed for many groups of stakeholders (Niedzielski, 2016). This can be, for example, openness to sharing information and knowledge, diligent execution of all tasks (even those that are difficult to control), innovation, etc. (Groscurth, 2014; Kumar et al., 2010). This in turn may impact the overall performance of the organisation.

Guaranteeing employees access to the information they need to make decisions within their areas of responsibility is a basic requirement for efficient empowerment. An efficient vertical communication system allows employees to acquaint themselves with the strategic goals of an organisation and its structure and make full use of their own specialist knowledge acquired from direct experience. Horizontal communication allows employees to overcome the barriers created by the functional divisions of an organisation and benefit from synergies across units and the knowledge of employees from other units.

Shifting the majority of decision-making to the operational level meets the expectations of modern employees. It also leads to the improved speed and accuracy of decision-making and behaviour (even in large organisations), flexibility, and the entrepreneurial spirit associated with young enterprises. The relationship of employee empowerment with the lean management concept is clearly visible. One source of waste in an enterprise (minimisation is a priority of lean management) is excessively oversized, slender management structures (Maciąg, 2016). They usually appear as the organisation grows and ownership and management functions separate (Bolesta-Kukułka, 1996). However, these management structures become unnecessary when there is no need to constantly report, control, and authorise decisions. All this requires

clear competence limits, for example in terms of budget management, transparency, and good informal communication. Empowerment does not mean the introduction of anarchy or the atomisation of the company. In small, task-oriented or problem-oriented temporary designed structures, the effectiveness of control can be even greater than in non-transparent hierarchical systems because it is based on a genuine sense of shared responsibility and self-control (Kastelle, 2013). At the same time, flexible work organisation is a prerequisite for the emergence of an organisation with a highly efficient amorphous structures, also known as *holocisions*. They are characterised by the high autonomy of employees, decentralization, a dynamic structure composed of many teams, and dispersed power based on competences rather than formal authority (Biłyk, 2017). Often, such teams are virtual, which – especially in the case of large, geographically dispersed organisation – gives the possibility of a more effective use of human resources and contributes to increasing the innovativeness of solutions found. Dynamisation of the organisational structure also helps motivate employees by diversifying their jobs (Stachowicz-Stanusch & Sworowska, 2009).

A separate issue is the matter of determining the actual state of employee empowerment and how they feel about it. In this context, psychological empowerment, which focuses on the feelings of employees in terms of whether or not they feel empowered in relation to their work, is suggested (Spreitzer, 1996). "Psychological empowerment refers to a set of psychological states that are necessary for individuals to feel a sense of control in relation to their work" Spreitzer (2007). It is believed that psychological empowerment is of similar importance to actual empowerment, as it reflects employees' perception about their role in the organisation.

### **3. Research methodology**

#### **3.1. The Spritzer's Empowerment Scale and its modification**

In order to examine the level of psychological employee empowerment in the analysed organisation, a version of the Spritzer's Empowerment Scale (SES), modified by the authors, was used. The SES uses a questionnaire, which may be applied to any employees of the organisation regardless of their position, level in the organisational hierarchy, or department (Spreitzer, 2007).

The original version of the SES questionnaire contains 12 statements. Respondents are asked to mark on a seven-point Liker scale to what extent they agree or disagree with each statement. Answers higher than 4 indicate that employees feel empowered in the organisation. The SES examines how employees feel about empowerment. The concept used therein is described as psychological empowerment and focuses on the feelings of employees, in terms

of whether or not they feel empowered in relation to their work, and about their role in the organisation.

Of the 12 statements in the original SES questionnaire, one was excluded from the presented research. The statement was: “I have a great deal of control over what happens in my department”. It was excluded as we believe that empowerment should not be linked to control but rather influence (which is mentioned in the following question in the original SES questionnaire). The remaining statements can be divided into three groups: attitude towards work, access to information, and decision-making (see Table 1).

**Table 1.**

*Statements regarding employee empowerment used in this research*

Empowerment in terms of attitude towards work: <i>The work I do is very important to me.</i> <i>My job activities are personally meaningful to me.</i> <i>The work I do is meaningful to me.</i>
Empowerment in terms of access to information: <i>I am confident about my ability to do my job.</i> <i>I am self-assured about my capabilities to perform my work activities.</i> <i>I have mastered the skills necessary for my job.</i>
Empowerment in terms of decision-making: <i>I have significant autonomy in determining how I do my job.</i> <i>I can decide on my own how to go about doing my work.</i> <i>I have considerable opportunity for independence and freedom in how I do my job.</i> <i>My impact on what happens in my department is large.</i> <i>I have significant influence over what happens in my department.</i>

Source: own work based on Spreitzer 1996; 2007.

The original statements were translated into Polish for the purpose of conducting this research.

### **3.2. Respondent characteristics**

The research was conducted at the Rehabilitation and Cardiology Hospital in Kowanówko in April 2017. The research entity was selected because of an informal relationship a member of the research team had with a representative of the hospital authorities, who conducted the research on behalf of the research team. The questionnaires were distributed to all 233 employees of the hospital; 106 completed questionnaires were received from respondents, which represents 45.5% of employees.

Hospital employees are divided into five professional groups: doctors, nursing staff, other medical staff, administrative staff, and auxiliary staff. However, the traditional division into professional groups was not significant from the perspective of the presented research. According to the research plan, employees should belong to different sectors of the organisation and should be diverse, as much as possible, in terms of demographic characteristics and categories within the organisation. For this reason, we divided employees into three groups: hospital authorities, heads of units or teams, and individual positions. A head of unit or a team was defined in the research as an employee with subordinates, while an individual position was

defined as an employee without subordinates. Table 2 presents information on the number of questionnaires received from each of these groups.

**Table 2.**

*Number of respondents from the groups identified in the study*

<b>Group</b>	<b>Number of questionnaires received</b>
Hospital authorities	6
Head of unit or team	25
Individual position	75

Source: own study.

The constraint of the presented research is the limited possibility of comparing these results to other healthcare units as the research was only carried out in one entity. However, the results may indicate areas that require special attention and help direct further research.

## 4. Results and discussion

Table 3 presents the mean results of the assessment of the three dimensions of employee empowerment obtained from the groups of hospital employees identified in the study. As indicated by the data presented in the table, employees of the researched hospital feel empowered in all three analysed dimensions: All values exceeded 4.

**Table 3.**

*Mean assessment of dimensions of psychological empowerment in the specified groups of employees*

<b>Empowerment in terms of:</b>	<b>Hospital authorities</b>	<b>Head of unit or team</b>	<b>Individual position</b>
attitude towards work	6.67	6.51	5.65
access to information	6.00	6.39	6.11
decision-making	5.87	5.71	4.74

Source: own study.

In terms of attitude towards work and decision-making, employee feelings regarding empowerment decrease with their level in the organisational hierarchy. This may mean that, in fact, empowerment is not sufficiently implemented at the lowest organisational levels, which may have a decisive impact on the quality of treatment provided to the hospital's customers, i.e. patients. In this context, particular attention should be paid to the lowest result in the table - 4.74 - when assessing employee empowerment in terms of decision-making by employees belonging to the individual position group. Although the result remains above 4, it may be distorted due to a tendency of some respondents to mark higher values in the survey.

In terms of access to information, the lowest level of feelings regarding the existence of employee empowerment was identified in the group of hospital authorities, which is a seemingly surprising result. It is assumed that an organisation's authorities have the greatest



access to information and may affect its flow (or lack thereof) down the organisational hierarchy. One explanation for this result may lie in the individual statements assigned to this dimension and the corresponding results presented in Table 4. This issue will be discussed in more detail later in this article.

Within the groups of employees defined as hospital authorities and heads of units or teams, the highest assessment regarding feelings of employee empowerment was obtained for attitudes towards the work dimension, then for access to information, and the lowest for decision-making. Particularly puzzling are the lowest results attributed to the decision-making dimension, which most closely relates to the actual existence of employee empowerment. High indications in other dimensions may also result from reasons other than the existence of empowerment in the workplace (e.g. psychographic characteristics or employee competencies). It should also be emphasised here that hospital authorities are not completely independent when making decisions. They are influenced not only by legal conditions, but also by supervising and financing units (including voivodship authorities).

Among employees included in the individual position group, the highest scores were given for the access to information dimension. As in the case of hospital authorities, the explanation of this result may lie in the individual statements assigned to this dimension (see Table 4).

Table 4 presents the mean assessment assigned by employee groups identified in the study to the individual statements in the SES. In addition to the specific interpretation of the results, they also allow us to evaluate of the usefulness of the SES in verifying psychological employee empowerment in healthcare units.

**Table 4.**

*Mean assessment of specific statements related to psychological empowerment in the specified groups of employees*

	Hospital authorities	Head of unit or team	Individual position
Empowerment in terms of attitude towards work:			
<i>The work I do is very important to me.</i>	6.83	6.80	5.91
<i>My job activities are personally meaningful to me.</i>	6.50	6.32	5.27
<i>The work I do is meaningful to me.</i>	6.67	6.40	5.79
Empowerment in terms of access to information:			
<i>I am confident about my ability to do my job.</i>	6.00	6.28	6.13
<i>I am self-assured about my capabilities to perform my work activities.</i>	5.83	6.44	6.15
<i>I have mastered the skills necessary for my job.</i>	6.17	6.44	6.04
Empowerment in terms of decision-making:			
<i>I have significant autonomy in determining how I do my job.</i>	5.50	5.64	5.21
<i>I can decide on my own how to go about doing my work.</i>	5.83	5.52	5.03
<i>I have considerable opportunity for independence and freedom in how I do my job.</i>	5.50	5.84	4.87
<i>My impact on what happens in my department is large.</i>	6.17	5.84	4.33
<i>I have significant influence over what happens in my department.</i>	6.33	5.72	4.28

Source: own study.

Empowerment in terms of access to information was assessed lower among hospital authorities than in other employee groups. The reason for this result may be the nature of the information that respondents took into account when answering. In the case of heads of units or teams and individual positions, which mainly consists of medical staff, the statements in the survey may have suggested an assessment of their own professional preparation and skills in medicine. Thus, respondents did not *de facto* assess their feelings in regard to empowerment in terms of access to information, but conducted a self-assessment of his or her professional skills. Despite the apparent similarity in the case of hospital authorities, it is necessary to take into account differences in the tasks they perform, the effectiveness of which is more determined by the availability of external sources of information. Therefore, it seems that the lower assessment of this empowerment dimension in the authority group results from the greater information-related uncertainties of the tasks members of that group perform.

Similarly, statements that were assessed as part of empowerment in terms of access to information could have influenced the fact that this dimension of empowerment in the individual position group of employees was rated higher than the attitude towards work dimension. In essence, this means that employees from the individual position group assess their professional skills higher than their attitude towards work and the tasks they perform.

When evaluating the SES questionnaire regarding the possibility of its application in healthcare units, some reservations should be pointed out. First of all, its usefulness appears to be limited in relation to the assessment of psychological employee empowerment in terms of access to information among medical staff. The statements in the questionnaire seem to be more appropriate for examining this dimension in professional groups traditionally associated with business areas for which the flow of information within the organisation can be crucial. Among medical staff, information in terms of the SES can be understood as the employee's own knowledge and experience.

Secondly, the usefulness of the SES questionnaire in healthcare units also appears to be limited in relation to the assessment of psychological employee empowerment in terms of attitude towards work. The nature and importance of work can affect employee attitude towards it, regardless of whether or not there is empowerment in the workplace.

However, the SES questionnaire seems to properly reflect the employees' feelings about empowerment in terms of decision-making, which is the quintessence of employee empowerment.

## 5. Conclusions

Our research indicates that the greatest attention in public healthcare units in the area of empowerment should be focused on the decision-making dimension, which is the essence of

actual empowerment. In all the analysed employee groups, feelings regarding the existence of empowerment in this dimension were positive – i.e. mean assessments exceeded the value of 4. However, they were lower compared to the remaining analysed empowerment dimensions. In addition, the lowest feelings in this dimension were declared by employees belonging to the individual position group, who may be of decisive importance for the quality of patient care. This group constituted nearly 71% of all respondents.

It should be emphasised, however, that the lowest assessments in the decision-making dimension were from employees belonging to the individual position group regarding statements concerning their impact and influence within their department. Slightly higher were assessments of statements regarding their influence over their work performance (see Table 4). This may mean, in fact, that employee empowerment in this group is at a sufficient level. Verification may only require, taking the specificity and nature of the work performed into account, assessing whether or not the level of decision-making empowerment in this group can and should be raised at all.

Conclusions about employees' feelings regarding the remaining analysed dimensions of empowerment – attitude towards work and access to information – seem difficult to draw due to the limited adaption of the SES to the realities of healthcare. The statements contained in the survey in the access to information area can be interpreted by medical staff as an assessment of their own professional competences, and not the transfer of necessary information down the organisational hierarchy. In turn, due to the nature of the work, the attitude of employees in the studied professional group regarding access to information can remain high regardless of the existence of empowerment in the workplace.

Thus, it seems that in order to correctly diagnose the feelings of healthcare unit employees regarding empowerment in terms of attitude towards work and access to information, the SES questionnaire should be subjected to further modifications preceded by appropriate qualitative research. It has to be highlighted that the evaluation of the SES questionnaire was not supported by any advanced statistical analysis. However, our results may direct further research in the analysed area.

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# POST-ACCESSION STRUCTURAL TRANSFORMATIONS IN AGRICULTURE IN ŚWIĘTOKRZYSKIE PROVINCE – SELECTED ASPECTS

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**Introduction/background:** The paper has considerable cognitive value for the increase of knowledge in one of the areas of structural transformations in agriculture and rural regions, namely in tendencies regarding the varying number of farms and the size of utilised agricultural areas.

**Aim of the paper:** The purpose of this paper is a synthetic evaluation of selected aspects of structural transformations observed in agriculture in Świętokrzyskie Province in the period 2005-2018.

**Materials and methods:** The study was conducted in a number of poviats, for which original data were presented as regards agriculture and farming in Świętokrzyskie Province, in the dynamic perspective, for the period 2005-2018. The actual data were obtained from the the Agency for Restructuring and Modernisation of Agriculture in Poland. The paper uses the basic measurements applicable in statistical analysis, dynamic analysis and cause-and-effect analysis.

**Results and conclusions:** Based on the conducted study, it was found that the area of farms was reduced by 2.53% in 2005-2018 in Świętokrzyskie Province; the largest reduction was observed in the following poviats: Skarżysko (15.93%) and Kielce (13.3%); However, much more serious changes were noted in the number of farms. These changes were observed in all poviats, and the reduction in the number of farms was 56.1% across the whole region. In 2005-2018, there was a marked increase in the average size of an individual farm, from 2.8 ha to 6.1 ha, which may be seen as a major change as compared to previous tendencies in the agrarian structure of farms in Poland.

**Keywords:** Świętokrzyskie province, farms, agrarian fragmentation, structural transformations.

## 1. Introduction

Polish agriculture differs considerably as compared to neighbouring countries. When compared to the Czech Republic, Slovakia, or Germany, there are considerable differences in agrarian structure. These differences have their source in history: They are related to the process and scope of the abolition of serfdom, which took place in most European countries in the 19th century (including Polish land under occupation). Furthermore, there were organised actions that led to the subdivision of land property in the 20th century. These actions were organised with different levels of intensity in various European countries and resulted in land fragmentation and a greater number of peasant farms. These farms were often passed along from generation to generation, when the law allowed it, and frequently divided up among heirs. Such farms were thus becoming smaller and smaller, less productive, technologically backwards, and outdated. This in turn generated economic, social, and political problems (Van Dijk, 2003; Demetriou, 2014; Harvigsen, 2014; Zegar, 2018).

According to traditional analysis, the dynamics of structural transformations in agriculture (if we assume the main reference is agricultural land) over long periods of time (even over centuries) was usually sinusoidal-shaped. After a period when land was concentrated in communities, feudal properties, or landowner's farms, there was a change in tendencies forced by economic, political, and social factors. Community land was gradually subdivided among families. Feudal lords also gave some land to be farmed by peasants, which created new peasant farms and reduced the area of large land properties (Musiał, 2019); as such, farms were fragmented in order to be enfranchised or parcelled (especially in the interwar period). Historically speaking, the current agrarian structure in Poland (as well as in Świętokrzyskie Province) is the product of enfranchisement reforms that came into effect after 1863, the large land subdivisions that occurred in the period 1923-1928, and the fragmentation of landowner estates after World War II (Zegar, 2018). Other phenomena that considerably affected the agrarian structure in Poland include the intense privatisation processes in the 1990s that were conducted on the land previously administered by the former State-Owned Farms and the Cooperative Society of Farming Circles (Dzun, 2016).

Economic collapse in Poland after 1989, resulting from the shift to the market economy, strengthened the role of agriculture and the food economy for a brief period of time and made them key elements in the food production chain. Amid soaring unemployment rates, some of the young people who lost their jobs returned to the countryside, often having no other choice, and turned to traditional agricultural production on their parents' farms. Owning land was an important social shield at that time, but, on the other hand, it was often used as a pretext to lay off farmers who also had another occupation. This tendency was accompanied by a dynamic economic depreciation of small farms, which was mainly due to the reduced profitability of agricultural production. There was also another phenomenon, unknown since World War II,



namely fallowing of the land; this was mainly done on the privatised areas that previously belonged to the State-Owned Farms, where considerable economic and organisational problems occurred. It also occurred on land abandoned by individual farmers – this was usually land of the poorest quality (Musiał, W., Musiał, K., 2016; Janus, Markuszewska, 2017).

The abovementioned phenomena observed in the 1990s, as well as social and economic transformations after 2004 when Poland joined the European Union, expressly affected the type and dynamics of changes to the agrarian structure of farms in Poland. The region that particularly stands out is Świętokrzyskie Province.

## 2. Goals, scope, and methodology

The purpose of this paper is a synthetic evaluation of selected aspects of structural transformations observed in agriculture in Świętokrzyskie Province in the period 2005-2018, i.e. after Poland joined the European Union.

The study was conducted in a number of poviats, for which original data were presented as regards agriculture and farming in Świętokrzyskie Province, using a dynamic approach, for the period 2005-2018. The data was obtained from the Ministry of Agriculture and Rural Affairs, whose statistical database was prepared by the Agency for Restructuring and Modernisation of Agriculture and the National Centre for Supporting Agriculture. These data concerns farms that receive direct payments and is related to an important area of structural transformations related to the observable tendency in the change of the number of farms and the size of agricultural land.

The studied farms, as per the data provided by the Statistical Office in Kielce, constitute 98.4% of all farms in Świętokrzyskie Province (Statystyczne Vademecum, 2018). The purpose of the analysis conducted for the paper is to define the tendencies related to the changes observed in the size of agricultural land that has benefited from direct payments from the European Union, as well as the size of farms in Świętokrzyskie Province more generally. The status of the farms, as well as changes in the number of farms, that receive area payments are also identified in this paper. This analysis is a fragmentary description of structural transformations with regard to the agriculture of the studied region and the agrarian structure of the farms. The appearance of new tendencies in this respect is underlined. The paper uses basic measurements applicable in statistical analysis, dynamic analysis, and cause-and-effect analysis, as well as references to the analogy method.

### 3. Research findings

Świętokrzyskie Province occupies a total area of 11,711 km<sup>2</sup>, i.e. 3.7% of the country, which makes it the 15th largest province in Poland (there is actually only one smaller province in Poland: Opolskie). The province has 1,241,500 inhabitants (i.e. the population is slightly higher than those of Podlaskie, Lubuskie, and Opolskie provinces), whereas the average population density is 106 people per square kilometre. As regards multiple indicators related to the regional characteristics of the country, Świętokrzyskie Province is below average, which is direct or indirect proof of its relatively poor development. This is reflected, for example, in the gross domestic product per inhabitant: Świętokrzyskie Province ranks 13th in the country overall, 14th as regards value-added production per inhabitant, 12th as regards the number of national economic entities per 10,000 inhabitants, and 14th as regards average monthly salary. Świętokrzyskie Province does have some better national standings, such as the condition of its road infrastructure per 100 km<sup>2</sup> – the province comes in third – and the effectiveness in obtaining funds for the financing and co-financing of projects co-funded by the European Union – where it ranks fourth (Statystyczne Vademecum, 2018). Nearly all the farmland in Świętokrzyskie Province belongs to individual farms (99%). Cultivated land belonging to the farms comprises 486,200 ha, which constitutes 86.1% of the total area of farms, while 98.9% of the cultivated land is regarded as being ‘in good agricultural condition’. The area of agricultural land in good agricultural condition, but lying fallow, is 8500 ha, i.e. 2.5% of the total area of arable land.

In 2017, the number of farms was 83,500, of which 70,600 (i.e. 84.6%) had cultivated and sown agricultural land. This proves that the area of farms where agricultural land is abandoned, lying fallow, and/or subject to forest succession is relatively large. This is true of ca. 13,000 farms with areas above 1 ha each. Out of the total number of farms, 61% were those sized 1-5 ha, 31.5% had 5-15 ha of agricultural land, 4.3% had 15-30 ha, and nearly 1.5% had an area of more than 30 ha. As per the data provided by the Statistical Office in Kielce, the average area of agricultural land per farm in 2017 was 5.9 ha, with the national average being 10.55 ha (Statystyczne Vademecum, 2018).

Proceeding to the analysis and evaluation of agricultural structural transformations in Świętokrzyskie Province, analysed with regard to individual poviats, one should first refer to a few variables describing the initial condition (Table 1). The areas of Świętokrzyskie Province that were analysed in this way display a series of considerable differences as regards the quality of agricultural production space (measured with the agricultural production space valuation ratio). Three poviats have very high values of ‘natural environment’ as regards agricultural production (as well as gardening, orchard production, and vegetable cultivation). These poviats are: Kazimierza Wielka, Sandomierz, and Opatów. The summary valuation ratios for these poviats are respectively 96.4 pts., 94.1 pts, and 86.6 pts. (Witek, 1993). This is why agriculture

in these poviats should be specially monitored, so as to prevent improper land management, including any abandonment and other changes in the use and purpose of the land, especially when it comes to non-agricultural land use.

**Table 1.**

*Selected characteristics of the poviats included in Świętokrzyskie Province as of 2018*

Poviats	General indicator of quality of the agricultural production space	Area of agricultural land in thousands of ha <sup>3)</sup>	Arable land in %*	Average area of a farm (in ha)	Afforestation rate in %	Population in thousands	Birth rate per 1000 inhabitants	Registered unemployment rate	National economic entities per 10,000 inhabitants
Busko-Zdrój	72.5	79.4	74.0	6.02	11.0	72.1	-4.5	3.9	1369
Jędrzejów	65.8	94.1	81.8	7.98	19.6	86.1	-2.9	7.1	1269
Kazimierza Wielka	96.4	39.0	78.5	7.20	2.9	33.8	-4.2	7.5	913
Kielce	54.1	128.8	69.7	5.06	34.4	210.7	0.6	10.7	1315
Końskie	49.4	49.3	59.1	6.41	49.1	80.6	-4.4	11.6	1393
Opatów	86.5	72.3	85.0	8.83	15.6	52.6	-7.5	13.6	1091
Ostrowiec Świętokrzyski	79.3	37.3	82.1	6.59	30.7	110.1	-5.7	11.7	1540
Pińczów	76.1	45.8	74.0	7.28	18.0	39.3	-4.6	6.6	1130
Sandomierz	94.1	55.4	49.0	5.04	7.0	77.8	-4.6	6.9	1381
Skarżysko	49.2	13.0	56.2	3.31	58.8	74.8	-6.0	15.7	1742
Starachowice	64.8	23.4	77.1	3.72	45.1	90.4	-3.7	8.0	1351
Staszów	62.6	60.6	72.1	4.79	27.9	72.2	-2.1	7.2	1196
Włoszczowa	57.1	48.0	68.0	6.90	42.6	45.3	-2.4	6.4	1314

Comments to the table: National Local Database in 2014 (these values do not overlap with the details from the National Agricultural Census from 2010).

Source: own study based on: Witek, T. (ed.), 1993; *Statystyczne Vademecum Samorządowca. Województwo świętokrzyskie*, 2019.

The other extreme of the natural environment are the poviats with the lowest agricultural production space valuation ratio. These are: the very small Skarżysko powiat (49.2 pts.) and the large Końskie powiat (49.4 pts), but also the most diverse and the largest powiat Kielce (54.1 pts). The analysed poviats are diverse as regards their size and their area of agricultural land. The smallest one in this respect is Skarżysko powiat – with 13,000 ha of agricultural land – followed by Starachowice and Ostrowiec powiat with 23,400 and 37,300 ha, respectively. The highest agricultural potential is observed in Kielce powiat, with its 128,800 ha of agricultural land, and in Jędrzejów powiat, which has 94,100 ha. Within nearly all the poviats of this area, we can observe the dominance of arable land, whose proportion varies from 49% in orchard-dominated Sandomierz powiat to more than 80% in Jędrzejów, Opatów, and Ostrowiec. Furthermore, the average size of farms varies in the analysed province from 3.31 ha in Skarżysko powiat and 3.72 in Starachowice powiat to 8.83 and 7.98 in Opatów and Jędrzejów, respectively.

In all the analysed poviats, i.e. the NUTS-4 subregions with high-quality agricultural land and favourable climate conditions, there is orchard production in addition to the typical agricultural production that focuses mainly on plant species. In Kielce powiat, orchards constitute a total of ca. 2,300 ha (1.8%), in Busko 2,000 ha (2.5%), and in Staszów ca. 1,200 ha (2.0%). Orchard production is of minor importance in Skarżysko (0.6%), Końskie (0.6%), and Włoszczowa (1.0%). The forestation rate is also important as regards landscape structure and environmental protection, including the protection of biodiversity. The forestation rate varies significantly in this province. In Kazimierza Wielka powiat, which can boast the best soil in the province, the forestation rate is only 2.9%, much lower than the province-wide average of 29.0% and country-wide average of 30.5%. Additionally, the proportion of forests in Sandomierz powiat is rather low (7.0%). The following poviats have forestation rates higher than the local average: Skarżysko (51.8%), Końskie (49.1%), Starachowice (45.1%), and Włoszczowa (42.6%) (Main Statistical Office, 2019).

Structural transformations in agriculture also depend on how easy it is to obtain employment outside of the agricultural sector as well as on the economic potential measured with regard to large and small national non-agricultural economic entities (Zuzek, 2018). The lowest unemployment rate, as well as the lowest potential labour reserves, were observed in Busko (3.9%) and Włoszczowa (6.4%) poviats (Main Statistical Office, 2019). These values are a few percentage points lower than in the poviats with large- or medium-sized cities, such as Kielce, where the unemployment rate is 11.6%, or Skarżysko (15.7%). However, in these two poviats with the lowest unemployment rates there has been a considerable degree of hidden rural unemployment because of the agricultural nature of these regions (this kind of unemployment is not reflected in any statistics). The number of national economic entities in the Świętokrzyskie poviats is relatively high, especially when compared to the national average, which is 1136 entities per 10,000 inhabitants, and to the provincial average of 916 entities. The most entrepreneurial poviats in this respect are: Skarżysko, with 1742 such entities per 10,000 inhabitants, Ostrowiec (1540), and Końskie (1393).

In order to evaluate and discuss changes in the agrarian structure as regards the de-agrarianisation observed in individual poviats, the figures pertaining to the status and changes in land use and in the farm structure have been analysed. The analysis includes figures from the Agency for the Restructuring and Modernisation of Agriculture for 2005-2018. The figures concern the farms that received area payments, i.e. those that have more than 1 ha of land in agricultural use or sustained in agriculture. Farms that pay the agricultural tax, but failed to conform to the abovementioned criteria, were omitted from the analysis. This means that the data do not include ca. 2.3% of agricultural land occupied by small farms (homesteads), agricultural property constituting a part of mixed agricultural, or construction plots, residue land, which used to belong to State Owned Farms and Cooperative Society of Farming Circles (and other institutions). Since they are no longer productive, these parcels of land were not declared for area payments in the year when Poland joined the EU or since. This land also

includes small plots abandoned for various reasons, for example due to being located between forests or being partly overgrown with forest or shrubbery. Such land can be regarded as 'lost for agriculture', especially for the agricultural production of goods (Dzun 2016). It should be stated, though, that this land is important in terms of environmental protection. These areas are and can remain beacons of local biodiversity (Musiał, 2011). The total area of farms that can be regarded as active and productive and that received area payments in 2005 was 520,770 ha. The area varied considerably from poviats to poviats (Table 2).

Over 14 years, i.e. from 2005 to 2018, the area was reduced by 18,292.42 ha, i.e. by 3.53%. It is possible to formulate various conclusions here because a superficial analysis could suggest the change is not very pronounced. The average pace at which land was dropped from agricultural use was only ca. 0.3%. However, more than 18,000 ha of agricultural land is an area corresponding to more than three of the statistically analysed municipalities in this region (the average size of a municipality is 5,105 ha). If this pace of transformation in the structure of land use were to continue, then in 20 years the area excluded from agricultural use would correspond to the size of six to seven municipalities. This statistic also includes municipalities that increased the size of agricultural land used by farms with at least 1 ha of land cultivated for area payments (and having agricultural land plots larger than 0.1 ha). These poviats are: Ostrowiec, with an increase in land receiving area payments of 4.07%, Opatów (2.93%), Kazimierza Wielka (0.82%), and Pińczów (0.52%).

**Table 2.**

*Land assigned to area payments and related changes in 2005 and 2018*

Powiat	2005	2018	Change in area (in ha)	Change in % (in 2018 as compared to 2005)
Busko-Zdrój	59590.51	56583.36	- 3007.15	-5.05
Jędrzejów	76322.44	75132.71	- 1189.73	-1.56
Kazimierza Wielka	32620.06	32888.35	268.29	0.82
Kielce	79114.31	68588.18	- 10526.13	-13.30
Końskie	23268.28	21496.30	1771.98	-7.62
Opatów	57043.70	58716.97	1673.27	2.93
Ostrowiec Świętokrzyski	24381.59	25372.73	991.14	4.07
Pińczów	36086.83	36274.02	187.19	0.52
Sandomierz	42958.54	42893.61	64.93	-0.15
Skarżysko	3182.33	2675.29	507.04	-15.93
Starachowice	13186.92	13514.89	327.97	2.49
Staszów	37413.26	34481.70	- 2931.56	-7.84
Włoszczowa	34762.40	33003.72	- 1758.68	-5.06
The city of Kielce	840.89	757.81	83.08	-9.88
<b>Total</b>	520772.06	502379.64	18392.42	-3.53

Source: own study based on: databases for 2005-2018, shared by the Agency for Restructuring and Modernisation of Agriculture in Warsaw, 2019.

This situation may be the result of the following: First of all, fragmented agricultural land plots not included in farms were leased or sold and attached to farms that receive area payments. Secondly, the land that used to be fallow is now qualified for area payments, and the size of agricultural land plots was amended through formal or informal consolidation of neighbouring

land plots. However, in the majority of the poviats, the area of agricultural land qualified for area payments was reduced. The leading poviat in this respect is Skarżysko, with a reduction of 15.93%. Kielce poviat comes second, with its less agrarian municipalities in the buffer zone of the Świętokrzyski National Park, as well as municipalities with low agricultural value situated to the south and east of Kielce.

The size of the land that qualified for area payments was reduced by 13.2% over a period of 13 years. For the city of Kielce (which is also a poviat), this ratio is also rather high: 9.88%. Końskie is another poviat that saw a considerable reduction in the size of agricultural land (by 7.62%). Maintaining agricultural land use in this poviat is important not only for the production and economics of the region, but also with regard to the high proportion of agricultural land covered with various forms of environmental protection (landscape parks, Natura 2000 areas, and areas of landscape protection). In Sandomierz poviat, with the highest agricultural value (in the province) as per the agricultural production space valuation ratio, the reduction in the size of the land qualified for area payments is relatively small – only 0.15%. More pronounced structural changes, including agrarian transformations, were noticed with regard to the number of farms (Table 3).

**Table 3.**

*Number of farms receiving area payments in 2005 and in 2018*

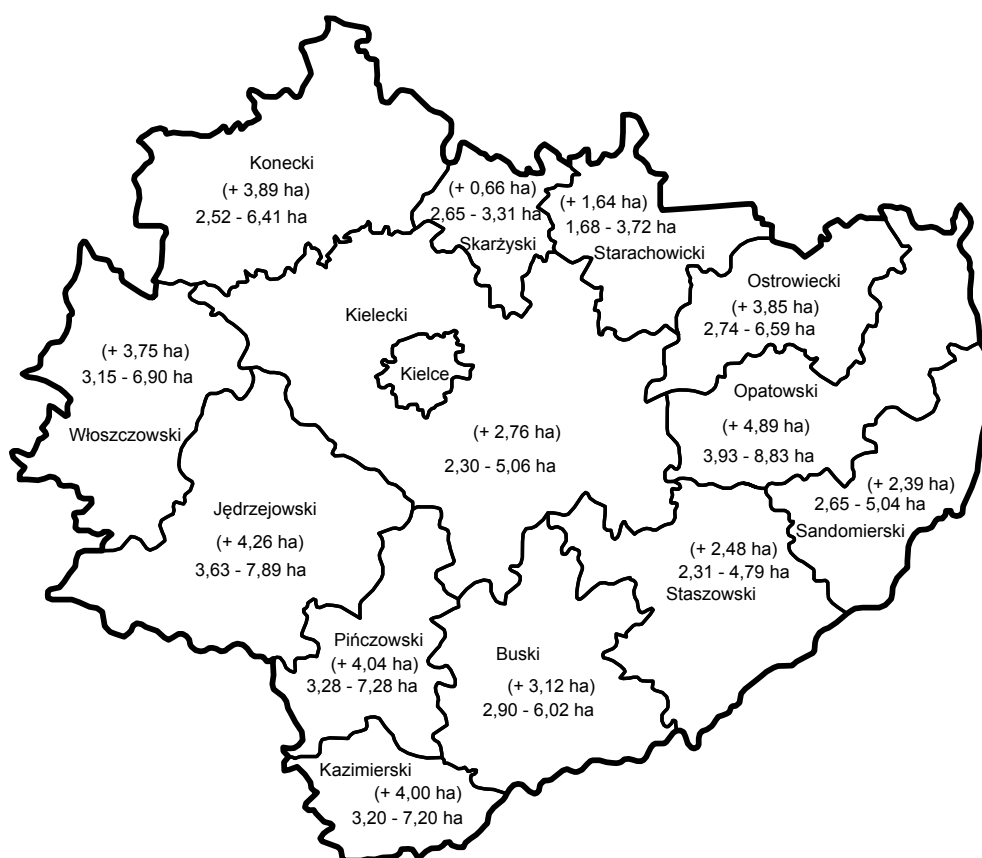
Poviat	2005	2018	Change in the number of farms	Change in % (in 2018 as compared to 2005)
Busko-Zdrój	20542	9406	-11136	-54.2
Jędrzejów	21020	9410	-11610	-55.2
Kazimierza Wielka	10167	4569	5598	-55.1
Kielce	34328	13550	-20778	-60.5
Końskie	9250	3356	-5894	-63.7
Opatów	14487	6650	-7837	-54.1
Ostrowiec Świętokrzyski	8890	3848	-5042	-56.7
Pińczów	10973	4980	-5993	-54.6
Sandomierz	16202	8512	-7690	-47.5
Skarżysko	2649	808	-1841	-69.5
Starachowice	7848	3630	-4218	-53.7
Staszów	16181	7196	-8985	-55.5
Włoszczowa	11006	4782	-6224	-56.6
The city of Kielce	3841	1616	-2225	-57.9
<b>Total</b>	<b>187384</b>	<b>82313</b>	<b>-105071</b>	<b>-56.1</b>

Source: own study based on: databases for 2005-2018, shared by the Agency for Restructuring and Modernisation of Agriculture in Warsaw, 2019.

In the analysed (and relatively short) 14-year period, as many as 56.1% of farms receiving area payments disappeared (this refers to the farms included in the common agricultural policy of the European Union). This means that past evaluations that pointed to the stagnation of agricultural structures, the lack of trade in land, and the specific agrarian standstill observed in rural areas of Poland after 1990 are no longer valid. We can also observe the express polarisation of farms in the analysed period, including those farms included in the area group (2-5 ha). Some of them have given up agricultural production (this is a one-off or gradual

phenomenon) and will only leave part of the land in agricultural use for their own purposes. Still, the small area of land in agricultural use no longer constitutes a farm and thus no longer qualifies for area payments. Therefore, the number and proportion of farms (homestead plots) is increasing, and agricultural land is transferred to farms interested in leasing it, or less often, purchasing it (Sroka and Paluch, 2014). The pace of such changes is ca. 4% per year, which may be regarded as very high. The highest pace of disappearing farms, which had qualified for area payments in 2005, was observed in Skarżysko powiat (69.5%), in Końskie powiat (63.7%), and in Kielce powiat (60,5%). The lowest (although still high) pace of such transformations in Świętokrzyskie province was observed in the poviats of Sandomierz (47.5%), Starachowice (53.7%), and Pińczów (54.6%).

Reducing the size of land included in area payments and the very high pace of reduction in the number of farms qualified for direct payments result in relatively high changes in the average area of such farms. The farmers who intend to continue agricultural production expect these changes, which are the initial prerequisites for maintaining or increasing profitability levels, as well as for increasing production scales and introducing the economically justified professionalisation and technologisation of farms (Wojewodzic, 2017). The average area of farms province-wide in the analysed period increased from 2.8 ha to 6.1 ha, which can be perceived as a success as regards formal structural transformations. These transformations, however, are not evenly distributed across all poviats (Figure 1).



**Figure 1.** Increase in the average size of farms larger than 1 ha in the poviats in 2005 and in 2018. Source: own work.

The highest absolute increase in the average size of farms was observed in the following poviats: Opatów (4.89 ha), Jędrzejów (4.26 ha), and Kazimierza Wielka (4.0 ha). The least noticeable changes in this respect were observed in the following poviats: Skarżysko (0.66 ha) and Starachowice (1.64 ha), i.e. in the subregions with advanced de-agrarianisation processes. These changes are also relatively less pronounced in the poviats of Sandomierz (2.39 ha) and Starachowice (2.48 ha). When analysed in relative terms, these two phenomena have slightly different progresses. When the poviats are broken down into two groups (i.e. those where the average size of the farms has at least doubled and those where the changes were less pronounced), it was observed that significant shifts in the size of farms took place in a large majority of the poviats. These transformations affected both the poviats that are generally regarded as agricultural (Jędrzejów, Pińczów and Busko) as well as those with relatively poorer natural conditions (especially with regard to soil quality) that are less favourable from the perspective of agricultural production, i.e. Kielce, Końskie, and Ostrowiec. Smaller increases in the average size of farms were observed in the poviats of Skarżysko, Starachowice, and Sandomierz. However, structural transformations related to changes in agrarian structure seem to be accelerating, which may mean that the agricultural structure in Świętokrzyskie Province is about to be gradually improved.

#### **4. Conclusions**

Regarding the key issues affecting structural transformations observed in Świętokrzyskie Province in the period 2005-2018, after Poland joined the European Union, one should first mention that the opinions and scientific evaluations that point to a freeze in agrarian changes are no longer valid. The abovementioned freeze especially affected the fragmented agricultural regions (after 1990), where hardly any land is owned by the State Treasury and intended for privatisation. Structural (as well as agrarian) transformations in such regions – as exemplified by Świętokrzyskie Province – are in a way internal or ‘inbred’, i.e. they take place within a sector of small individual farms. In the first years after Poland joined the European Union, even farmers who had only slightly more than 1 ha of land that qualified for area payments requested such subsidies. With time, and with growing administrative requirements, these farmers often stopped receiving this support, which often entailed ceasing farming activity on some or all of the land, which was subsequently leased or, less often, sold. In the following years, we saw a rapid reduction in the number of farms receiving payments under the Common Agricultural Policy of the European Union. Additionally, structural transformations accelerated: Large farms (comprising a few dozen hectares each), made up of mostly leased land, appeared. These transformations can be summarised as follows:



- In the analysed period, the area of agricultural land on farms in this province decreased by 2.53%; the greatest reduction was observed in Skarżysko powiat (15.93%) and in Kielce powiat (13.3%).
- More pronounced changes were observed in the number of farms: This was observed in all powiats of this province, and the total rate of reduction was 56.1%.
- In this period, there was also a dramatic increase in the average size of farms, from 2.8 ha to 6.1 ha, which may be seen as a serious accomplishment as regards agrarian transformations.

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# THE SIGNIFICANCE OF THE INNOVATION CYCLE FOR BETTER INNOVATION POLICIES FOR SMES AT THE FIRM LEVEL: A CONCEPTUAL PROPOSITION

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**Introduction/background:** This paper's aim is to contribute to overcoming the limitations of existing policies intended to facilitate innovativeness. This article addresses the need for more tailored and targeted innovation support measures for small and medium-sized enterprises (SMEs) to help maximize their economic and societal impact.

**Aim of the paper:** Specifically, the aim is to advance methodological frameworks for segmenting or selecting innovative SMEs by providing a conceptual proposition based on the innovation cycle at the firm level.

**Materials and methods:** This objective is achieved by exploring the literature on the innovation cycle concept, and adapting the model developed by Abernathy and Utterback (the A–U model) for the purpose of innovation policy. Particular phases of the innovation cycle are transformed into variables and values, and based on the research regarding the behaviour of SMEs illustrative weights are assigned; this assignment depends on the preferred policy approach: either supporting innovativeness in and of itself or supporting innovativeness and an SME's standing in the long run.

**Results and conclusions:** As a result, the paper presents a tentative working procedure for assessing enterprises according to operationalized criteria derived from the A–U model. Added to this, collaborative efforts in developing innovations are briefly discussed from the innovation policy perspective. It is believed that the new conceptual proposition outlined in the paper will be instrumental in segmenting companies and selecting innovative projects, and will serve policy-makers and intervention organizations in the implementation phase of the innovation policy process, thus contributing to a more efficient and transparent allocation of support instruments by public institution.

**Keywords:** innovation policy, innovation cycle, decision-making, decision support, SME.

## 1. Introduction

Innovation policies have become a politico-economic paradigm for governments and public agencies all over the world. Innovation policy comprises a set of interventions aimed to influence the behaviour and decisions of various stakeholders (most notably enterprises)

through a variety of instruments designed to facilitate innovativeness in order to achieve certain policy goals (see Cirera et al., 2020; Fagerberg, 2017). These interventions are targeted at both large companies and small and medium-sized enterprises (SMEs); however, focusing on supporting SMEs has become increasingly popular (see e.g. World Bank, 2014, 2019; European Commission, 2017). The significance of SMEs as beneficiaries of innovation support is recognized due to their important economic role on the one hand and the barriers that tend to hamper their propensity to innovate on the other hand. These barriers include, among other things, a lack of access to finance, a lack of resources, a lack of experience with innovative projects, insufficient capabilities to incorporate innovation activities, and an increased risk of collapse in the event of innovation failure (see Hall and Lerner, 2010; Cirera et al., 2020; Rosenbusch et al., 2011; Victório et al., 2016). Public institution instruments oriented towards promoting SME innovation include, for example, grants, subsidies, loans, tax relief, regulations, standards, and public procurement for innovation.

Innovative projects are selected for grant support based on criteria established by intervention organizations (Victório et al., 2016). As in the case of each policy, innovation policymaking involves a policy process that is usually interpreted as encompassing a few stages, or a cycle (Hill, 2005; Birkland, 2010). Angelelli, Luna, and Suaznábar (as quoted in Cirera et al., 2020, p. 42) indicate the following steps thereof: “(1) formulation of innovation strategies (long-term policy aspirations); (2) design of innovation policies; (3) implementation and supervision of innovation policies; and (4) deployment of innovation instruments and innovation activities.” Cirera et al. (2020) suggest that these should be complemented with coordination and planning, which they consider important components.

In recent years, the limitations of existing policies meant to facilitate innovativeness have been noticed, and the need for improvement has been expressed. One of the challenges identified by the European Commission (2017a; cf. Saublens, 2013) concerns targeting existing support instruments to SMEs so as to maximize their economic and societal impact. Viewing this through the lens of innovation policy processes, this issue belongs to the third step, i.e. the implementation and supervision of innovation policy. Furthermore, the challenge in question is directly related to the problem of government failure, which might occur as a consequence of insufficient information regarding the assessed projects and difficulties in analysing that information; it may also be a result of improper implementation, which might stem from the biases of the decision-makers (Victório et al., 2016).

This paper seeks to address the aforementioned weakness and assist policymakers and intervention organizations in advancing innovation policy schemes. I will argue that the innovation cycle is a relevant category that should be integrated into methods of segmenting or selecting SMEs for the purpose of innovation support, and I will propose a tentative working procedure of assessing enterprises according to operationalized criteria derived from the Abernathy–Utterback model (the A–U model). I maintain that the major advantage of taking the A-U model into account is to help public agencies in *ex ante* identification, i.e. deciding

which innovative projects or firms show the most promise for achieving the desired policy goals of an intervention – particularly when it comes to supporting innovativeness per se versus supporting innovativeness *and* an SME's standing in the long run. On the other hand, this refinement could help innovation policymakers avoid misallocating resources, as it would provide a tool for better risk evaluation in the implementation phase. In consequence, this paper is expected to contribute to the improvement of innovation policy processes, and specifically the implementation phase. Having said that, since my proposition is relatively original and conceptual, the aim is to start the discussion rather than provide conclusive findings and fixed solutions.

In the next section, I discuss the conceptual background, i.e. innovation and the innovation cycle. Next, I describe a few phases of the innovation cycle within a firm, most notably the A–U model. Further, I discuss the practical implications and propose a segmenting or ranking approach based on the A–U model. The last section summarizes the paper and outlines research recommendations.

## 2. Innovation and the innovation cycle

It is vital to adopt an explicit definition of 'innovation' in order to avoid conceptual problems. I adopt here a widely accepted definition – and a definition that is widely used among decision-makers – that was developed by the OECD (2005, p. 46) in its *Oslo Manual*: "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations". Hence, two elements of innovation are pivotal: first, that it is something that has already been implemented and as such should be distinguished from an invention that might precede it; and second, that there are four main types of innovation: product, process, marketing, and organizational. Furthermore, innovation is a process (Rosenbusch et al., 2011) that is quite commonly perceived in terms of an innovation (life) cycle.

In turn, the concept of an innovation cycle can be traced back to Schumpeter, who popularized the very term 'innovation' and claimed that product and process innovation plays a crucial role in a capitalist economy (see Mahdjoubi, 1997; Bernard et al., 2014). In fact, particularly since the recession in the 1970s, the attention on his work has increased dramatically (Lemanowicz, 2015; Fagerberg, 2003). Schumpeter emphasizes the dynamic character of capitalism, focusing on the role of intellect and skills in an economy. Hence, he rejects the paradigm of an 'equilibrium economy' as stationary and unrealistic. Added to this, he argues that while radical innovations, underpinned by entrepreneurship and creativity, lead to economic growth, they also cause business cycles that result in inevitable depression,

after which new innovations emerge and drive economic growth again. Schumpeter famously calls this ‘creative destruction’, thereby showing that the consequences of a business cycle are not wholly negative, as they allow us to set up even more effective companies that offer better products and services (Lemanowicz, 2015). He famously finds that innovation cycles are pertinent to long innovation-related waves of growth (Tinguely, 2013).

Importantly, there has been some controversy regarding Schumpeter’s followers. Godin (2006) argues that it is fallacious to claim that Schumpeter supports a processual approach to the innovation model based on a triad of invention–innovation–diffusion, where each component represents respective phases of an innovation process (see Mahdjoubi, 1997). “Innovation is possible without anything we should identify as invention and invention does not necessarily induce innovation,” quotes Godin (2006, p. 655) from Schumpeter’s *Business Cycles*, and asserts that it was Schumpeter’s interpreters, not Schumpeter himself, who proposed a sequential model of innovation.

That said, this seemingly ‘Schumpeterian’ model has been very popular in the literature. According to Kaya (2015), an invention process first occurs that consists in generating new ideas, i.e. new approaches that may be exploited in a business activity. Inventions are conditioned by scientific knowledge and lack any regularities. The subsequent stage is an innovation process, during which the new ideas created in the former phase are transformed into products and services with market potential. The third and final stage is the diffusion or spread of innovation. It manifests in the loss of the innovator’s comparative advantage and leads to the development of the whole economy. This framework can be applied in studies focused on either the firm or macroeconomic level; however, as already stressed, this article deals with the innovation cycle at the firm level.

### **3. Innovation cycle at the firm level**

At the level of a firm, there are two major approaches to the innovation cycle: linear and non-linear. The first corresponds to the cycle derived from the writings of Schumpeter and is based on the reasoning that “innovation starts with basic research, then adds applied research and development, and ends with production and diffusion” (Godin, 2006, p. 639). On the other hand, non-linear models are based on the idea that innovation is not a sequential process (Schoen et al., 2015; Berkhout et al., 2006).

A still very popular (see Udagedara, and Allman, 2019; Bento, and Wilson, 2016; Ozman, 2011; Ian, 2010) example of a linear approach is that of Abernathy and Utterback (1975, 1978), which is critical for the purpose of this paper. Abernathy and Utterback describe an innovation cycle that involves product and process innovations as well as how these relate to each other

throughout the cycle (Ian, 2010). This model comprises three phases of the innovation cycle within a firm (Abernathy, and Utterback, 1978; Malecki, 1981; Ian, 2010):

- Phase I (introduction or fluid phase) – the development of a new line of business (the main innovative effort involves extending the product mix and improving product features).
- Phase II (growth or transitional phase) – process innovations and efforts towards benefiting from economies of scale (main innovative efforts comprise process-oriented R&D aimed at standardization and volume production, where the crucial aspects are the management and organization of production).
- Phase III (mature or specific phase) – ordered and organized management and extensive production based on standardization (efforts are focused on cost reduction, which is achieved by improving management control and standardized production; these are incremental improvements on the products and processes that were created in earlier phases).

Thus, the first phase involves mostly product and/or service innovations, the second phase is dominated by process innovations, and the last involves organizational enhancements and standardized production. The first two phases are the most effort-consuming: the earlier the phase, the more resources a business has to devote to the innovation effort (cf. Malecki, 1981). Adhering to the A–U model, Malecki (1981) argues that the innovation cycle perspective outweighs the product cycle framework, since the former allows for the examination of the processes within a firm more broadly. On the other hand, Ian (2010) discusses the model's limitations and outlines some steps towards improving it.

The European Commission (2015) also considers the innovation cycle as consisting of three stages. The SME Instrument of Horizon 2020 programme addresses its support to companies in the following phases of the innovation cycle: feasibility, innovation projects, and commercialization phase. This approach is similar to the Schumpeterian framework described above, but it is tailored to the logic of the SME instrument that provides funds for companies. Thus, the invention phase is replaced by a feasibility phase, which is justified by the fact that the SME Instrument does not finance mere brainstorming that could lead to ideas that could in turn start the innovation cycle. Potential beneficiaries must present a viable idea before they receive support. Having said that, it needs to be noted that the Horizon 2020 also provides support for research-intensive SMEs. Another recent example of the application of the three-stage innovation cycle – which distinguishes between R&D, trial, and market introduction phases – is the work by Dockner and Siyahhan (2015). On the other hand, Eggers and Singh (2009) provide a four-stage model centred around idea generation, idea selection, idea implementation, and idea diffusion. Another example of the four-stage approach is the study by Hong and Zhao (2017).

However, other researchers such as Schoen et al. (2015) and Berkhout et al. (2006) claim that it is wrong to conceive of innovation as a sequential process. In fact, according to Schoen et al. (2015), the innovation cycle is characterized by the following features:

- the time span of an innovation cycle is often measured in decades,
- non-linearity,
- high importance of market feedback,
- lack of a clearly defined outcome,
- lack of a clearly defined process.

Hence, the uncertain and even unpredictable character of a cycle is stressed. Notably, Schoen and colleagues (2015) point out that one of the most difficult steps for engineers developing technology to take is to move from the invention stage to the innovation stage (i.e. start developing a business model for marketable solutions) since overstating the role of R&D could result in innovation failure. As we can observe, the Schumpeterian stage-based approach might still be involved in the non-linear reasoning on a more general level.

The innovation models used nowadays can be divided into three generations. The first generation represents a linear model based on a ‘technology push’, inspired by scientific research that leads to commercialization. As Berkhout et al. (2006) argue, the critical drawback of this model is that it does not pay much attention to the market, which often results in releasing technical inventions instead of innovative marketable solutions. Conversely, the second-generation models, also linear, are based on ‘market pull’, and focus too much “on market-driven improvements of existing products (optimization), resulting in a large variety of short-term projects” (Berkhout et al., 2006, p. 392). Contrary to the first and second generations of innovation models, the third can be characterized by less linear models. These models take into account both technology push and market pull. They focus on product and process innovations, ignoring marketing and organizational motivations. These third-generation models are technology-oriented and do not address institutional barriers or societal needs (Berkhout et al., 2006).

Furthermore, a fourth generation of innovation models has been proposed as more suitable for the new business circumstances created by essential changes in the industry that have resulted in more companies operating jointly across industrial sectors. These models’ characteristics are the following (Berkhout et al., 2006, p. 393):

- “innovation is embedded in partnerships: ‘open innovation’,
- attention is given to an early interaction between science and business,
- hard knowledge of emerging technologies is complemented by soft knowledge of emerging markets,
- the need for new organizational concepts is acknowledged by emphasizing skills for managing networks with specialized suppliers as well as early users,
- entrepreneurship plays a central role”.



Berkhout et al. (2006, 2007) proposed their own dynamic and flexible fourth-generation model called the Cyclic Innovation Model (CIM), which is based on cyclical interactions. The CIM is highly dynamic and is based on four ‘nodes of change’: scientific research, technological change, product development, and market transition. In turn, the ‘cycles of change’, located between the nodes, allow for mutual impact between processes taking place in the different nodes. Notably, ideas can be created within each node and thus underlie the processes in other nodes. New scientific results interact with industry, and technological changes interact with the market (Berkhout, 2006).

#### **4. Practical implications for innovation policy**

Victório et al. (2016) reviewed recent literature on criteria used by intervention organizations for selecting R&D projects. They find that the literature in this field is underdeveloped, especially in regard to public support. Their review reveals a lack of application of the innovation cycle perspective when awarding grants/support; nonetheless, several criteria used by individual agencies can be perceived as corresponding in some way to the criteria that could be derived from innovation cycle analysis. However, as the authors also note, the criteria are sometimes general and thereby not easy to interpret. This is also the case as regards those that could be related to the innovation cycle perspective, i.e.: *maturity of implementation, capabilities of firms and partners, availability of complementary assets, availability of resources, availability of technical resources, development risk, economic viability, creativity, and advanced level*. On the other hand, *A Practitioner’s Guide to Innovation Policy*, recently published by The World Bank (Cirera et al., 2020, p. 76), explicitly refers to the innovation cycle in some variation by pointing out that policy measures should support all phases thereof, that is, “the generation of ideas, their prototyping, and their commercialization”.

That said, the conclusion from this short introduction to the concept of the innovation cycle is that innovation policy could benefit from a more detailed investigation into the innovation cycle as it is approached in the scientific literature. Indeed, as demonstrated in the previous section, there is no agreement among scientists as to whether an innovation cycle at a firm level has a linear or non-linear character. However, those differences seem to be of a rather secondary importance for policy implications. For including findings derived from an innovation cycle analysis in the methods of segmenting or selecting SMEs for the purpose of innovation support might prove to be successful regardless of whether or not specific phases or stages should be distinguished from one another in the cycle.

An attempt to apply the innovation cycle perspective to grant selection criteria for innovating SMEs is presented below. It is driven by the need to increase the effectiveness of

innovation policies via the better targeting of existing support instruments to SMEs, and it comprises a hypothetical framework based on explorative considerations derived from the review of research on the innovation cycle at the enterprise level. Hence, this attempt should be treated as an invitation for further discussion through providing some insights into a possible use of the framework of the innovation cycle in the innovation policy implementation process.

My main point of reference is the A–U model that was developed by Abernathy and Utterback, which is a linear-type model. Abernathy and Utterback argued that product and process innovations are separated but take place within one model of technological change (cf. Abernathy, and Utterback, 1975; 1978; Malecki, 1981; Akiike, 2013). As mentioned, firms' innovative activities that are related to developing a product or service innovation are the most effort-consuming, whereas activities related to process and organizational innovations are less challenging. Regarding innovation policy, this observation would suggest that support measures should follow the same pattern, that is, the highest support should be oriented towards companies engaged mostly in product or service innovation development. Accordingly, one could conclude that process and organizational innovations should not be prioritized. However, effort consumption does not appear to be an automatically decisive criterion for SME segmentation or ranking.

Notably, Malecki (1981) finds that the second phase of the innovation cycle, i.e. the growth or transitional phase (encompassing process innovations and efforts towards achieving economies of scale and involving process-oriented R&D), might be particularly challenging for SMEs since they may not be able to deal with process-oriented R&D activities aimed at standardization and volume production. These findings are supported by Ortt and Smitts (2006), who argue that firms are often not ready to enter the market with innovative solutions since they lack, *inter alia*, new organizational practices and do not offer complementary products or services. SMEs might then seek to solve this issue by selling or licensing an innovative output to another, most probably larger company (Malecki, 1981). In fact, research indicates (Arora, 1997; de Rassenfosse, 2010) that small enterprises use licensing more often than big companies, which is due to small firms lacking the capabilities necessary to bring innovative solutions to market. Furthermore, Prabhu et al. (2005) demonstrate that the acquisition of innovation might positively influence the innovative performance of a firm. Clearly, it creates the incentive for larger companies to obtain innovative outputs from outside the firm. However, selling or licensing patents might be challenging, as SMEs possess even more unused patents than large firms (de Rassenfosse, 2010).

On the basis of the above considerations, two approaches to segmenting or ranking innovating SMEs using the A–U model perspective can be proposed. The first rests upon the assumption that an innovation agency aims to facilitate innovativeness *per se*. The key focus is placed on the process that leads to developing a new solution with market potential, regardless of the level of probability of its commercialization (in terms of an SME's capabilities and resources) and of what kind of companies – SMEs or large firms – may appear to most benefit

from the introduced innovation in the long run. On the other hand, the second approach takes into account both innovativeness and the innovating SME's standing in the long run. The difference is that innovative potential is the only point of reference in the first approach, whereas the second model considers not only the innovative potential of a firm or a project, but also the expected influence that supporting a firm would have on its future behaviour and performance.

Thus, as a consequence of the exploration of the A–U model and its adaptation to the objective of this article, the same variables and values presented for each approach are innovation-type based. Table 1 presents variables, values, and weights differentiated according to a preferred policy approach. For the purpose of illustration, it was assumed that weights can vary from 1 to 3.

**Table 1.**

*A conceptual tool for assessing innovating SMEs based on innovation cycle variables*

Variable	Value	Policy approach	Weight
main innovative activities in a firm	focused mostly on a new product or service design	targeting innovativeness <i>per se</i>	3
		targeting innovativeness and the innovating SME's standing in the long run	1
	mostly processes-oriented; R&D activities aimed at standardization and volume production	targeting innovativeness <i>per se</i>	2
		targeting innovativeness and the innovating SME's standing in the long run	3
	mostly focused on improving management control and standardized production, incremental improvements of the products and processes of a firm	targeting innovativeness <i>per se</i>	1
		targeting innovativeness and the innovating SME's standing in the long run	1
enterprises involved in an innovation cycle	two companies – (an) SME(s) and/or (a) large company(-ies)	targeting innovativeness <i>per se</i>	> <i>x</i>
		targeting innovativeness and the innovating SME's standing in the long run	<i>x</i>
	two SMEs	targeting innovativeness <i>per se</i>	> <i>x</i>
		targeting innovativeness and the innovating SME's standing in the long run	> <i>x</i>

Adapted from: own elaboration based on the cited literature.

Thus, if a firm is engaged mostly in product or service design, which is the most effort-consuming activity, the highest weight (3) is assigned to this value, provided that the target is facilitating innovativeness *per se*. On the other hand, when support is aimed at fostering innovativeness *and* the development of the SME in the long run, the proposed weight is the lowest (1). This might seem controversial, but the lower weight stems from the assumption of

a possible risk that an SME would not be able to deal with in the subsequent process innovations (the next phase). The consequence might be that the output with innovative potential would not be commercialized at all, thus keeping policy intervention from achieving its goal. Another, more optimistic scenario, which has already been mentioned, is that the output could be sold or licensed to a larger company. In that situation, however, it could be argued that the large company acquiring a novel output could in fact benefit from the public intervention more than the innovating SME that was expected to be the actual target. On the other hand, one may then claim that selling or licensing a solution with an innovative potential naturally does benefit the SME that created it. Nonetheless, when considering the complex and comprehensive character of innovation policies aimed at creating a broad societal and economic impact, the practice of selling or licensing out new solutions by SMEs to large companies might easily interfere with the holistic dimension of innovation policies. As an example, licensing out does not appear to ensure an SME's independence and stability, which is highly important given their economic role.

When process innovation activities are involved, the situation is different. Namely, if the target is not only innovativeness but also an SME's standing in the long run, the weight is higher (3) than in the case of promoting innovativeness only (2). Besides the fact that process innovation is very effort-consuming, and that SMEs need support at this level, it might be assumed, based on the A-U model, that once the SME is dealing with a process innovation, it has already handled the main efforts related to product or service innovation and is now seeking a way to overcome the difficulties linked to process innovation rather than to selling or licensing the output. Hence, the risk that the output will not be commercialized or that it will be licensed or sold seems much less likely.

Finally, when it comes to activities that focus mostly on organizational innovation, there is no difference in weights for either approach, since there is no higher risk involved for the SME-oriented support. The reason why the weights are the lowest is the expectation that the activities performed at this stage do not involve as much effort or resources, which means that the need for support is relatively low.

An additional situation considered in the conceptual proposal presented in Table 1 is when innovative activities are performed in collaboration by a few companies. Rosenbusch et al. (2011) point out that there is no agreement in the literature about the effectiveness of collaborative innovating. However, in contradiction to a popular view presented in the field of social capital and networking, they report findings from their empirical research that internal innovations have a relatively high impact on a firm's performance compared to a lower impact in the case of collaboration with other companies. They support their findings with other literature and maintain that collaborative innovation development might be unprofitable for SMEs, particularly when it comes to joint undertakings between a small enterprise and a large company. The expected disadvantages include increased complications, more time needed to finalize the project, increased transaction costs, and the inferior bargaining position of small

businesses involved in such collaborations. Instead, the authors advise SMEs to innovate internally. Added to this, Suh and Kim (2012) find that the positive implications of collaborative activities do not tend to materialize for SMEs in the service sector. Furthermore, their findings show the negative results of networking for an SME's propensity to engage in organizational innovation. Furthermore, a more recent study by Najafi-Tavani et al. (2018) finds that collaborative innovation activities do not necessarily facilitate a firm's innovation capabilities, unless the companies have a significant absorptive capacity.

As can be seen in Table 1, the concrete weights for joint undertakings have not been specified, which is due to the inconsistent results provided by the literature. Nonetheless, bearing in mind all the assumptions and analyses, it seems reasonable for intervention organizations to favour working directly with SMEs over working with SMEs and large companies together, unless supporting innovativeness in and of itself is their main target. In Table 1, this is shown with the  $x$  and  $>x$  distinction.

## 5. Conclusions

The innovation cycle is a relevant category that may help decision-makers better and more transparently allocate support measures to innovative SMEs. It could be highly beneficial to include the innovation cycle framework within the selection criteria for granting support to SMEs, particularly when it comes to improving the efficiency of existing policy schemes. As shown in this article, the innovation cycle is a broad topic that has been approached in a variety of ways. This paper illustrates a possible application of the A–U model to segmenting or ranking innovative SMEs. An obvious limitation of the study is the lack of empirical evidence; therefore, it would be beneficial to empirically examine the proposed conceptual framework in order to advance the discussion and deliver better-established findings that would help innovation stakeholders more efficiently implement innovation-support instruments, thus improving the innovation policy process.

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# THE RIGHT TO BE FORGOTTEN AS AN ELEMENT OF THE PERSONAL DATA PROTECTION SYSTEM IN THE ORGANISATION

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**Introduction/background:** The protection of personal data, as the protection of information on natural persons by entities which hold it, is currently a topic of considerable interest. Proper protection of personal data is closely related to the way the organisation is managed. Lack of management awareness of the dangers of inappropriate procedures in this respect can lead to abuse and even crime, e.g. identity theft. In the light of doubts as to whether to rely on existing solutions or build a system from scratch, there are many research problems in this area.

**Aim of the paper:** The cognitive goal of this article is to analyse the basics of building a system of personal data protection in the scope of creating new internal regulations and to indicate the role of the Data Protection Officer, while the utilitarian goal is to analyse the case of a request to erase the processed data.

**Materials and methods:** A selected organisation was studied, where a process map with a detailed description of actions was drawn up on the basis of participant observation and direct interviews.

**Results and conclusions:** The conclusions indicate that the Data Protection Officer may perform the function of a person responsible for the system. However, their activities must be supported by information obtained from within the organisation. Therefore, it is important to involve the highest management in the development of the personal data protection system. The foundations for creating a procedure to handle the request for erasure of personal data were also indicated.

**Keywords:** personal data security, GDPR, personal data processing, Data Protection Officer, right to be forgotten, erasure of personal data.

## 1. Introduction

Personal data protection is currently a popular topic that generates more and more interest. What is more, social awareness of data protection law is growing, also with regard to data entrusted or shared with other entities. Recently, a closer look has been taken at various

institutions, checking whether the technical and organisational solutions applied by them are sufficient for the data to be secure (<https://uodo.gov.pl/pl/138/1189>).

This was facilitated by the entry into force of Regulation (EU) 2016/679 of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC – hereinafter referred to as the GDPR. The purpose of implementing this Regulation was to establish a uniform level of personal data protection in all Member States of the European Union.

Personal data, according to the definition in Art. 4 of the GDPR, is all information about an identified or identifiable natural person. Pieces of individual information, which when combined may lead to the identification of a person, are also personal data. This is indicated by Opinion 4/2007 on the concept of personal data adopted by the Article 29 Data Protection Working Party on June 20th, 2007. Such data can be e.g. name and surname, or the personal identification number (PESEL) of an individual. In its opinion, the Working Party also points to biometric data, including not only fingerprint, retinal pattern, facial structure, but also the venous system “or even some deeply rooted skills or other behavioral characteristics (such as handwritten signature, keystrokes, special walk or speech pattern etc.)”. (Opinion of the Article 29 Working Party 01248/07/PL WP136 No 4/2007, p. 8).

Personal data, which has been stripped of its identifying elements or encrypted or pseudonymised, but which may lead to reidentification of a natural person, remains personal data within the scope of the GDPR (Article 4(1) and (5) of the GDPR). Pseudonymised data cannot be attributed to a specific person without the use of additional information (Elliot, O'Hara, Raab, O'Keefe, Mackey, Dibben & McCullagh, 2018). Proper pseudonymisation is subject to the condition that such additional information is stored separately and is subject to technical and organisational measures that make it impossible to attribute it to an identified or identifiable natural person. The literature review revealed that university institutions across Europe organised courses, both formal and informal, to prepare staff for the new incoming GDPR legislation. Academic institutions feel the obligation to treat personal data with care and respect, following the provisions of GDPR. (How the General Data Protection Regulation changes..., 2019).

Personal data anonymised in a way that data subjects cannot be identified at all or can no longer be identified shall not be deemed personal data. For data to be genuinely anonymous, the anonymization must be irreversible (Article 29 Working Party Opinion 0829/14/PL WP216 No. 05/2014, p. 6).

Pseudonymisation is thus a process which aims at reducing the risk related to personal data processing; however, this is still personal data, so provisions of Articles 15-20 of the GDPR are applicable (Mourby et al., 2018, p. 223).

The protection of personal data is the protection of information concerning natural persons by entities that manage them, i.e. controllers. The protection applies both to individual information constituting personal data and to entire compilations and sets of data. This obligation results directly from Art. 47 of the Constitution of the Republic of Poland: “Everyone shall have the right to legal protection of their private and family life, their honor and good reputation, and to make decisions about their personal life” and Article 51(1) of the Constitution: “No one may be obliged, except on the basis of legislation, to disclose information concerning themselves.” (The Constitution of the Republic of Poland, Art. 47-51).

The protection of personal data is understood as the protection of data against loss, leakage, or unauthorised access, i.e. preventing the data to be processed by persons not authorised to do so (<https://poradnikprzedsiebiorcy.pl>).

The GDPR ensures personal data protection, regardless of the technology used to process the data. Thus, it is “neutral with respect to technology” and is applicable both to automated and manual processing, if the data is or is to be included in a set of data. That is what recital 15 of the GDPR directly points to. Furthermore, it is irrelevant how the data is stored, whether in an IT system, a video surveillance system or a paper-based system – in all of which cases personal data is subject to the protection requirements of the GDPR (<https://ec.europa.eu/info/law>).

Nowadays, teleinformatic systems support operations in almost all areas of life. They are used in every institution, both in small organisations and small enterprises. They are key determinants of the level of development of the state and, above all, of the quality of operation of its organisational and administrative structures. The intensification of criminal activities aimed at theft and illegal use of information on IT networks is steadily increasing, as is the number of available services and the volume of gathered information resources (Kępa, 2012, p. 60.).

Each organisation has a certain specificity determined by the principles of personal data protection. Uncritical copying of elements from other organisations’ policies is strongly discouraged. However, it is possible to use in an organisation those elements justified by organisation and management theory (Grzelak, 2015, p. 56.).

Proper protection of personal data is closely related to the way the organisation is managed. Lack of awareness of the organisation’s management about the risks and potential losses resulting from the lack of procedures regulating data protection may contribute to abuse and even criminal offenses in the information flow (Bajorek, 2016, pp. 40-50). After more than a year of the GDPR being in force, there are still doubts about the construction of a proper system of personal data protection, which is to ensure that the data will not only be processed correctly, but above all, will be properly protected against unauthorised access.

Many controllers, despite compliance with the requirements of the no longer applicable Act of 1997 on personal data protection (Journal of Laws of 2016, item 922, as amended), still cannot cope with issues arising from compliance with the GDPR. They cannot identify all

of their obligations and have problems with establishing rules, instructions or procedures that will guarantee compliance with formal and legal requirements included in the GDPR, often unconsciously exposing organisations to the risk of a penalty imposed by the Personal Data Protection Office (UODO), which, during the audit, could indicate irregularities and impose financial penalties in the amount of up to EUR 20 million (art. 83 GDPR).

In the light of doubts as to whether it will be correct practice to base the system on existing requirements and implemented solutions, or whether it should be built from scratch, there are many research problems in this area. The cognitive goal of the article is to analyse the basics of building a system of personal data protection in the scope of creating new internal regulations, while the utilitarian goal is to analyse the case of a request to erase the processed data. A selected organisation was studied, where a process map with a detailed description of actions was drawn up on the basis of participant observation and direct interviews.

## **2. The role and tasks of the Data Protection Officer**

Before May 25th, 2018, most data controllers did not pay sufficient attention to personal data processing. On the basis of the authors' experience – some of them did not implement any solutions in their organisations, even those required by law, and some were limited to meet only minimum requirements, including among others the development of safety policy and instruction of IT system management, the appointment of an information safety administrator or, where an information safety administrator was not appointed, the registration of personal data sets.

After the GDPR came into force, controllers first had to consider whether they would appoint a Data Protection Officer (DPO) in the place of an information safety administrator. Some controllers did not have this dilemma, as the obligation to appoint a DPO results directly from Art. 37 of the GDPR, which states that "Data controller and processor shall appoint DPO always when:

- a) the processing is carried out by a public authority or entity, with the exception of courts, as regards the exercise of justice or
- b) the main activity of the controller or processor consists of processing operations, which, by their nature, scope or purpose, require regular and systematic large-scale monitoring of data subjects or
- c) the main activity of the controller or the processor is large-scale processing of special categories of personal data".

The obligation to appoint a DPO applies to public entities, defined in such way regardless of the nature of their activity and the scale of personal data processing, as well as the volume, type or deployment of organisational solutions (Jabłoński et al., 2018, p. 84).

In other situations, appointment of a DPO is not mandatory, but, according to the guidelines of the Article 29 Data Protection Working Party, it is recommended within “good practice” (Guidelines for Data Protection Officers (DPO) WP 243 rev. 01, p. 7).

The responsibilities of the DPO are specified in Article 39 of the GDPR and they include:

- a) information tasks consisting of informing the controller, the processor and persons who process data about their obligations dictated by the GDPR,
- b) monitoring compliance with GDPR and other regulations governing the processing of personal data, e.g. the Personal Data Protection Act of 2018,
- c) carrying out activities aimed at raising the awareness of the controller, the processor and the employees or other persons processing the data,
- d) training personnel,
- e) conducting audits that verify the correctness of personal data processing – the quantity, frequency and scope of audits is established by the DPO themselves; however, it is recommended to discuss the audit schedule with the controller,
- f) co-operation with the Personal Data Protection Office,
- g) make recommendations on request for the data protection impact assessment and monitor its implementation in accordance with Article 35,
- h) acting as a contact point for the supervisory authority on processing issues, including prior consultation. This obligation also results from Art. 38(4) of the GDPR, which points out that “Data subjects may contact the data protection officer with regard to all issues related to processing of their personal data and to the exercise of their rights under this Regulation” (Jabłoński et al., 2018, pp. 103-104).

Article 38 of the GDPR clearly states that “the data protection officer is involved, properly and in a timely manner, in all issues, which relate to the protection of personal data”. At the same time, section 2 orders the controller and the processor to support the activities of the Officer in the fulfilment of their tasks. Unfortunately, it often turns out that, without additional support, the DPO is not able to manage data protection in an organisation on their own; their activities require the establishment of a team of people who will be responsible, together with the DPO, for the management of personal data. The DPO must be supported by information from other people, such as managers of individual departments such as human resources, marketing, finance and accounting and, of course, the IT department.

The biggest problem faced by the Officers is to obtain reliable and comprehensive information on data processing, including not only the manner of data protection, but also the scope, purpose and time of data processing. The DPO often receives information post factum, after commencement of data processing, which in practice prevents them from properly fulfilling their obligations.

The consequence of the lack of knowledge of the DPO may be, for example, a breach of the principles set out in Article 25 of the GDPR, i.e. “Data protection by design and by default” – the principle called *privacy by design* and *privacy by default*. These are the principles which

state that the controller has to take data protection and privacy issues into account at every stage of data processing, starting from obtaining the data. It is therefore reasonable to involve the DPO in processes within the organisation that are directly related to the protection of personal data. The essence of the role of the data protection officer in the organisation is not the subject of research in this article, therefore it was not given much attention. The focus was on the right to be forgotten.

### **3. Basis for building a personal data protection system**

Due to the complexity of the processes related to the appropriate protection of personal data, it seems that in each company it will be justified to establish a team responsible for the implementation, construction and maintenance of a personal data protection system.

The first stage of team's work should be to determine which personal data the organisation processes. The Processing Activity Register maintained in accordance with Article 30 of the GDPR is a document helpful in establishing the factual situation. This document was not required before the entry into force of the GDPR, but the controller was obliged to keep the Register of Personal Data Sets. These two documents have the same purpose – determining what data is actually processed by the controller. The Processing Activity Register is kept in order to ensure compliance with the GDPR and enable the Supervisory Body, i.e. DPO, to monitor the correctness of personal data processing (recital 82 of the GDPR). In practice, it is a very important element of the personal data protection system – this document allows the systemisation of activities carried out within the framework of data processing (Guidelines and explanations on the obligation to register processing activities and categories of activities stipulated in Art. 30(1) and (2) of the GDPR, GIODO Information materials, p. 5). It is a kind of inventory of activities, manners of data processing, and the safeguards used.

The register should contain such information as:

- the precise identification of the controller – including the contact details of the controller,
- details of DPO – if one was appointed,
- purpose of data processing,
- description of data subject categories and personal data categories,
- categories of recipients,
- and other elements, pursuant to Art. 30 of the GDPR.

The register can contain additional elements, e.g. legal basis for processing, source of data, used software and information on the need to carry out a data protection impact assessment (DPIA).

The team should then carry out a risk analysis based on the information collected in the course of its work. This obligation results from recital 83, which obliges the controller to “assess the risk” and implement measures that minimise it. The GDPR does not stipulate these measures; however, it states that these measures “should ensure an appropriate level of security, including confidentiality, taking into account the state of the art and the costs of implementation in relation to the risks and the nature of the personal data to be protected” (recital 83).

An important material that should be used in the work of the team are recorded incidents, i.e. adverse events that could have an impact on the integrity, availability and confidentiality of the processed data, e.g. by making them available to unauthorised persons. Therefore, such an important element of the system of personal data protection is the recording of incidents and drawing conclusions from them for the future, which is a legal requirement mandated by Article 35(5) of the GDPR. In the case of Officers who outsource their services, the input to risk analysis may also be incidents with other controllers, where this person also performs the functions of DPO.

As in other situations, for risk analysis, the GDPR gives controllers the freedom to choose their own risk assessment method. Controllers can use recital 75 of the GDPR for their risk analysis, which lists examples of risks, e.g.:

- discrimination and/or identity theft
- financial loss,
- damage to the reputation,
- loss of confidentiality of personal data,
- unauthorised reversal of pseudonymisation, or any other significant economic or social disadvantage,
- deprivation of rights and freedoms or of the possibility to exercise control over one’s personal data and other.

Only a detailed risk analysis of personal data processing can provide the basis for the development of a dedicated personal data protection system and the definition of appropriate technical and organisational measures to secure the processed data.

#### **4. Procedure of exercising the right to be forgotten**

The right to erasure, also known as “the right to be forgotten” is one of the rights of data subjects. Data subjects also have the right to information, the right of access, the right of rectification, the right to limit data processing, the right to object to data processing, the right to data portability and the right not to be subject to decisions based solely on automated processing.

The right to erasure applies only in selected cases. One of them is achieving the purpose for which the data were collected (Art. 17(1)(a) of the GDPR). This obligation of the controller is closely linked to the rules of data processing stipulated in Art. 5 of the GDPR – the personal data shall be “collected for specified, explicit and legitimate purposes and not processed further in a manner that is incompatible with those purposes”. Furthermore, such data may be stored no longer than is necessary for the purposes for which they were collected and processed (Art. 5(1)(e) of the GDPR). As a rule, it is the controllers themselves who, without waiting for the request of the data subject, should observe the principle of limiting the processing of personal data (Litwiński et al., 2017, p. 402).

Another, yet not the last case, may be the withdrawal of consent. Art. 17(1)(b) explicitly stipulates the data subject’s right to withdraw their consent, if the processing took place based on Art. 6(1)(a) (ordinary data) or Art. 9(2)(a) (special categories of data, e.g. concerning health, sexuality, religious beliefs, etc.).

This article will discuss the procedure to be followed when a request for erasure of data is sent to the controller in relation to the withdrawal of consent to the processing.

When there is a request to erase processed data, organisations often do not know what to do. If the data subject:

- claims that the data is no longer necessary for the purposes for which it was collected or processed otherwise,
- withdraws the consent which is a basis for processing and there is no other legal basis for the processing,
- objects to the processing of their data,
- claims that personal data were processed unlawfully,
- claims that the data has to be erased in order to fulfil the controller’s legal obligation,
- claims that personal data was collected in connection with the provision of information society services

then the data subject (pursuant to Art. 17(1) of the GDPR) can request the controller to erase the data.

Due to the lack of an agreed procedure in the event of a request to erase data, the authors decided to carry out the research in the form of participant observation and direct interview. The information obtained in this way will constitute the basis for the development of detailed procedures, dedicated to a specific company, for handling a request for data erasure, and the creation of a graphical process map.

Participant observation consists primarily in the researcher entering a given social environment and observing a specific group from the inside as one of its members. At the same time, it is a direct observation, whereby the researchers themselves collect data, as well as hidden and uncontrolled observation (Cybulska, 2013, p. 21).



The use of the research method based on participant observation is justified by the fact that the co-author of this article processed the request to be forgotten in one of the organisations. Thus, the below procedure was developed based on a specific event which concerned a particular organisation.

The interview, as one of research techniques, helped in collecting and organising data. In the present situation, these research techniques seem to be the most appropriate to the specificity of the request to be forgotten. Lack of experience in handling this type of request has led the authors of the article to use a non-directive unstructured interview, conducted on the basis of a general plan of issues. The questions asked were open and induced the respondent to provide multi-layered, longer statements (Przybyłowska, 1978, p. 63).

The applied methods are used for analyses in industry, but also in services, administration and project management.

Based on the collected information, a process map for data erasure in the organisation was developed. The manner of implementing the data erasure process, including also particular activities performed by specific persons, were presented in a graphic form. Developed in such way, the process map presents its structure and the sequence of actions that are performed during the process (Keller, 1999, pp. 62-64).

On the basis of the information collected, it was established that a company dealing with the sale of equipment and providing services in the field of maintenance and repair of such equipment received, by electronic means, a request to erase data.

The Company, which was the addressee of the request, despite the absence of a legal obligation, appointed a Data Protection Officer. The Officer provides their services under a civil contract, not as an employee of the Company. After receiving an e-mail from the data subject with a request to erase data, the DPO was informed about the fact of receiving such request.

The request has to be processed, regardless of its form of submission (e.g. by e-mail, phone, mail). In justified cases, e.g. when submitting the request by phone, an organisation has the right to additionally verify the identity of the person submitting the request (e.g. contacting the person by e-mail to an e-mail address stored in the database). The condition for starting the erasure procedure is the correct verification of the identity of the applicant. In this particular case, there was no need to additionally verify the person's identity – the received e-mail clearly defined who made the request.

The controller should, without undue delay – and in any event within one month of receipt of the request – provide the data subject with information on the actions taken in relation to the request. If necessary, this period may be extended further by two months, due to the complexity of the request or the number of requests. Within one month of receiving the request, the controller informs the data subject of such an extension, stating the reasons for the delay.

Where the data subject has transmitted their request electronically, the information is, as far as possible, also transmitted electronically, unless the data subject requests otherwise.

After receiving a request to erase data, the controller should verify whether one of the prerequisites entitling the data subject to request erasure specified in Article 17(1) of the GDPR is met.

After receiving the request, the following should be verified:

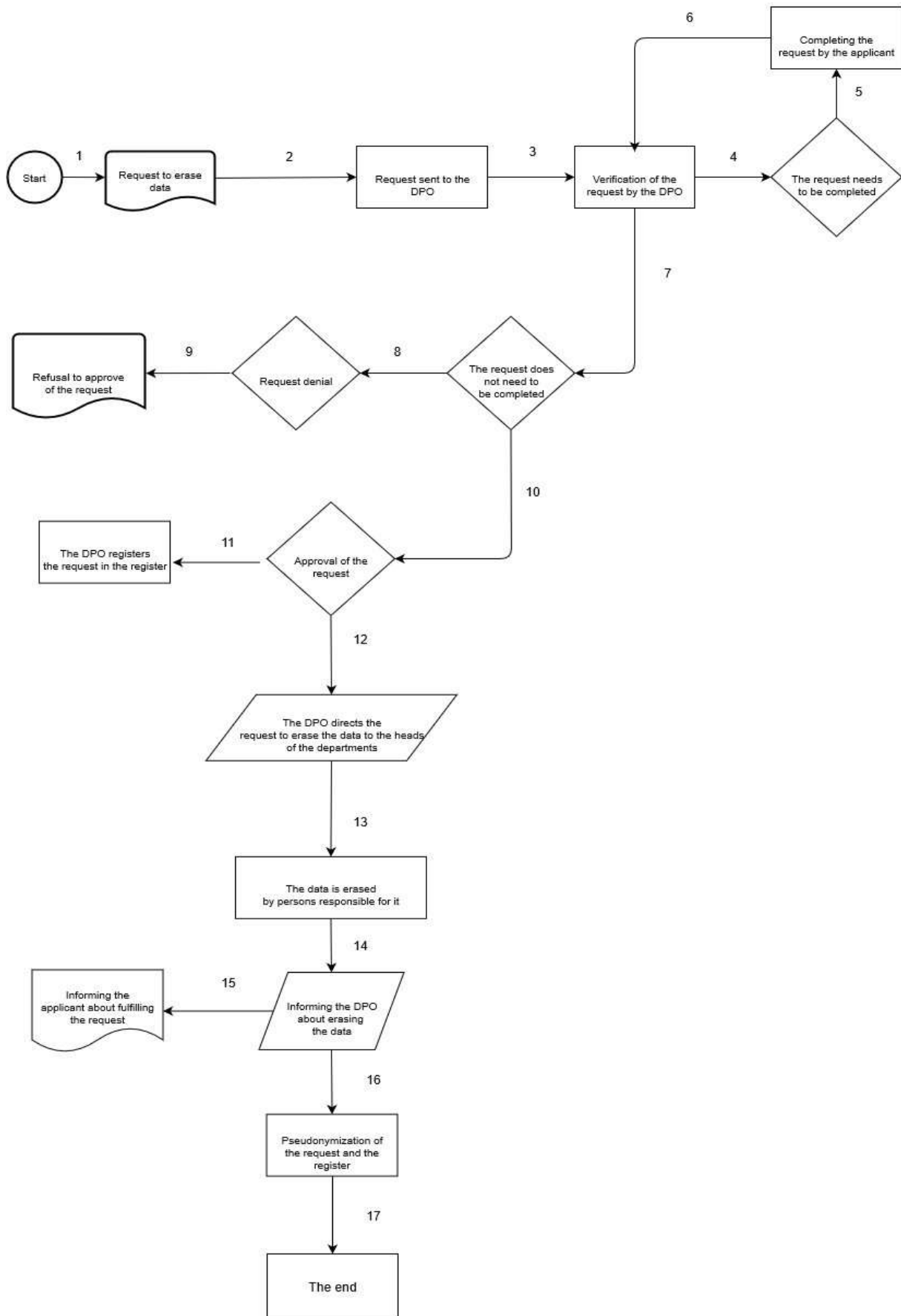
- in which computer system the data was processed,
- if the data has been archived,
- if the data was processed in a traditional, paper manner,
- to whom the data was transmitted,
- if processors also have access to the data,
- which of the employees in the organisation is responsible for managing the applicant's data.

The organisation has the right to reject a request to erase data when processing is necessary:

- to exercise the right to freedom of expression and information (e.g. in the case of the press, media, electronic forums or comments on websites),
- to comply with a legal obligation requiring processing under EU law or under the law of the Member State, to which the controller is subject, or to carry out a task performed in the public interest or to exercise official authority vested in the controller,
- for reasons of public interest in the field of public health, pursuant to Art. 9(2)(h) and (i), as well as Art. 9(3) of the GDPR,
- for archival purposes in the public interest, for scientific or historical research purposes or for statistical purposes in accordance with Article 89(1) of the GDPR, if the right to erasure is likely to render impossible or seriously impair the achievement of the objectives of that processing,
- for the establishment, exercise or defense of claims.

A simplified procedure chart for dealing with requests for erasure is presented on figure 1.

The diagram presented by the authors of the study is of a general nature. On its basis, each organisation creates its own instructions that are tailored to its specific conditions.



**Figure 1.** A map of processes implemented in the analysed company, divided into identified activities. Source: own study.

#### Situation description:

The company received an e-mail with a request to erase data [1]. The applicant requested data erasure by sending an e-mail from a business address consisting of the name, surname and domain of the company. The e-mail was sent to a dedicated e-mail address `gdpr@abc.pl`. Due to the fact that the company uses the services of a DPO specialist outside the company, the request email was sent directly to the DPO [2]. The request was verified by the DPO – it was complete and clearly stated the person it concerned [7]. Therefore, there were no grounds for requesting data to be completed [step 5 and 6]. The next step was to analyse whether the person's request was justified. The application, which was received by the company, concerned the withdrawal of consent to the processing of personal data with the simultaneous request to erase it. The DPO registered the request in an electronic register kept by them [11]. Then, the DPO, in consultation with the representative of the department responsible for processing the data of that particular person, verified whether any of the prerequisites set out in Article 17(3) of the GDPR are met. This verification has shown that the request of the person is justified and that the data should be erased. Therefore, the DPO ordered the head of the department by e-mail to erase the data [12]. The data was erased according to the DPO's instruction [13] and the DPO [14] and the applicant [15] were informed of this fact. The next step was to pseudonymise the register and the request received by the DPO – the contact details in the e-mail were pseudonymised and the e-mail was deleted. The DPO stores only the pseudonymised copy of the e-mail (request) and register [16]. The case is closed [17].

Data erasure includes the deletion of all the applicant's data processed by the organisation (e.g. financial and accounting IT system, e-mail elements, security copies, CMR, CMS, office software files, paper documents etc.). In the example presented above, the request concerned erasure of data of a person subscribed to a newsletter. The data has been deleted from the current, valid database; it has not been deleted from the backups (Politou, Michota, Alepis, Pocs & Patsakis, 2018). Deleting data from backups raises a lot of questions – not only because of an absent or limited technical possibility to carry out such an operation, but also because of the correct reproduction of the altered backup (erasure of data of a particular person). The performed pseudonymisation of the request will allow for the possible repeated erasure of the data if there is a need to restore the data from the backup, which seems reasonable in order to guarantee the rights of the applicant while ensuring the integrity and availability of the database (Gawroński et al., 2018 pp. 252-254).

However, the position of the Ministry of Digital Affairs is different, with clear instructions to erase data from back-up copies as well: “Personal data must also be erased from all backups and logs. If erasing single records from backup threatens to infringe the integrity of other collected data, the controller can manually restore the copies to the main database, and then erase single records from them and create backups of the database without this record, although it is a quite time-consuming process” (Ministry of Digital Affairs, p. 6).

Once the controller has decided to erase the data, no further processing can be permitted.

## 5. Summary

The cognitive purpose of the article was to analyse the basics of building a system of personal data protection with respect to creating new internal regulations. Due to the complexity of the issue, only some elements were analysed. The article focuses only on the basics of building a system of personal data protection. Only issues related to the functioning of DPO in the organisation and problems with identification of a team of persons responsible for its implementation were discussed.

The utilitarian goal was to analyse a case of a request to erase processed data. Based on the developed process map with a detailed description of actions, the basis for the preparation of the procedure has been laid down, which may become an essential element of the data protection system. The procedure outlined above once again indicates that the protection of personal data requires the involvement of more than just the DPO. Of course, the DPO's duty is to coordinate the whole process, but it also requires the involvement of other people, such as those responsible for processing the data and implementing the physical erasure of the data in the IT system. The DPO also keeps required records and is responsible for correspondence with an applicant. The presented scheme is one of the possible options of the procedure of executing a request for data erasure. The solutions proposed in this article may provide guidelines for other organisations, but should be modified depending on the size and specificity of the organisation and whether the DPO is an employee of the organisation or provides services on an outsourcing basis.

The authors' experience clearly shows that the controllers' approach of shifting the full responsibility for the system to the DPO is inappropriate and may lead to the risk that the organisation might fail to comply with the obligations resulting from the GDPR. DPO may be the person responsible for the system, but their activities must be supported by information from within the organisation. It often happens, especially in the case of outsourcing DPO functions, that the DPO is not informed about the conducted processes and discovers them by accident. That is why it is so important to involve the senior management in building a system of personal data protection, at least at the beginning, and to involve the DPO in the process of managing the organisation. At a later stage, the position of the DPO in the organisation may prove so strong that they will be able to fulfill their duties independently, with only little internal support. Until then, however, the DPO needs to be supported by an internal team.

Further research in this area will therefore include other elements that should form the basis for building a well-functioning system of personal data protection in an organisation.

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# CAUSES AND EFFECTS OF ENTERPRISE RISK MANAGEMENT IMPLEMENTATION

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**Introduction/background:** This paper presents a detailed review of causes and effects of the Enterprise risk management (ERM) implementation, including results of the author's own survey research.

**Aim of the paper:** The purpose of the paper is to analyse the benefits of ERM implementation while taking into account the importance of the incentives that motivate the decision to implement ERM within enterprises.

**Materials and methods:** On the basis of a detailed literature review and taking the results of author's own survey research into account, an analysis of the causes and effects of ERM implementation is presented. Particular attention is paid to cases where enterprises implement ERM mainly due to stakeholder expectations.

**Results and conclusions:** The described benefits related to the use of ERM are an important reason for the implementation of these systems in enterprises; the benefits exceed the financial costs related to the implementation and use of a risk management system. However, in many cases, the decision to implement ERM is also influenced by external factors. The influence of the organisation's environment on the decision to implement ERM is a positive phenomenon, but the willingness to meet stakeholder requirements should not be the only motivation for implementing ERM. In order to implement an effective risk management system, enterprises should implement such systems deliberately with the primary aim of achieving actual benefits, not just meeting the expectations of those within its environment.

**Keywords:** Enterprise Risk Management, corporate governance, risk management, causes and effects of ERM.

## 1. Introduction

Enterprise risk management (ERM) is a relatively new approach to risk management and is gaining popularity all over the world. Unlike traditional risk management, ERM emphasises the need for the consistent and comprehensive management of all risks and takes into account dependencies that may exist between different risks (Bromiley et al., 2015). According to ERM, risk management should be integrated with all processes in an organisation, including strategic

and business planning (Fraser and Simkins, 2016; Sprčić, Kožul and Pecina, 2015). It is a continuous and repeatable process that is implemented throughout the enterprise (Cormican, 2014). It requires a well-developed infrastructure, an appropriate risk culture, and a proper division of duties and responsibilities (Boulton and Dominus, 2014; ISO 2018).

The implementation of enterprise risk management requires taking additional measures aimed at changing the presented approach to risk, creating an appropriate risk management infrastructure, employing additional employees, and/or adapting the organisational structure and culture. Knowledge and experience regarding the implementation and application of risk management are also necessary. This implies the need to invest additional time and resources in order to successfully implement ERM in an organisation. What is more, it is not possible to create one universal ERM system suitable for every enterprise. This means that it is necessary to always adapt existing standards, frameworks, and concepts to the given organisation and situation, which additionally hinders the process of implementing risk management. So, it begs the question of why organisations decide to implement such systems and what the benefits of implementing them are.

It is worth emphasising that, despite the fact that implementing a risk management system necessarily involves incurring additional financial costs as well as devoting a certain amount of time and resources, the use of ERM brings many benefits to enterprises, positively influencing their bottom line. Potential measurable benefits undoubtedly encourage the implementation of ERM, but, in many cases, organisations also implement ERM for other reasons.

In the remainder of this paper, the author will attempt to analyse the benefits of ERM implementation, taking into account the incentives that motivate the decision to implement ERM within enterprises.

## **2. Impact of ERM on company performance**

According to ISO 31000:2018, an objective of risk management is to create and protect the value of a company. Risk management is aimed at improving results, strengthening innovation, and making a company better able to accomplish its goals (ISO, 2018). Among economists, opinions regarding the impact of ERM on the results and value of an enterprise are divided. Many believe that, from an investor's point of view, a cheaper way to eliminate a specific risk is portfolio diversification. What is more, the expenses associated with reducing risk in an enterprise are a negative cash flow for an investor (Mikes, Oyon and Jeitziner, 2016). Additionally, some researchers involved in the analysis of the impact of ERM on a company's results were not able to confirm a positive correlation between the implementation of a risk management system and the results of the enterprise (Pagach and Warr, 2010; Quon, Zeghal and Maingot, 2012). Despite this, the vast majority of key research and publications

demonstrate that the benefits of using ERM systems outweigh the costs associated with their implementation and maintenance, and that they have a positive impact on organisations (Choi et al., 2016).

A well-designed risk management system increases risk awareness in the organisation, enables better anticipation and assessment of opportunities and threats, and allows for more rational managerial decisions. This provides the opportunity to better control the impact of potential risks on business by reducing the likelihood of occurrence, by decreasing the consequences of negative risks that may occur, and by strengthening the impact of positive risks. Such an action limits the volatility of financial results and has a positive effect on their growth. Moreover, reducing business risk and increasing financial results should have a positive impact on the value of the organisation.

The impact of implementing a risk management system on a company's performance has been analysed by many researchers. A company's performance is understood as a set of financial and non-financial indicators that offer information regarding the level of objective and result accomplishment (Lebans and Euske, 2006). Therefore, the impact of risk management on a company's performance can be measured by its impact on the value of the company, the company's financial results, the return on shares, etc. The most important studies on this subject include the following:

- R.E. Hoyt, D.L. Moore, and A.P. Liebenberg (2008), by analysing American companies in the insurance industry, proved a positive, statistically and economically significant relation (ERM premium of around 17% of the company value) between the use of ERM and the value of the surveyed companies.
- L.A. Gordon, M.P. Loeb, and C. Tseng (2009), by examining a sample of 112 American companies that included information on ERM implementation in their financial statements, proved the thesis that the relationship between ERM and results depends on how well a risk management system is matched to five selected factors affecting the organisation.
- R.E. Hoyt and A.P. Liebenberg (2011), by analysing American companies in the insurance industry, proved a positive relation between the implementation of ERM and the value of the company (they used the Tobin Q index). They considered the calculated bonus related to the ERM implementation of around 20% to be statistically and economically significant.
- R. Baxter, J.C. Bedard, R. Hoitash, and A. Yezegel (2013) showed that both the results of enterprises measured with the return on investment and the market value of the surveyed enterprises are higher for companies that have invested in higher quality ERM systems. The authors conclude that higher quality risk management improves results by reducing losses and by making more effective use of opportunities. The research was conducted on a group of enterprises from the financial sector.

- The impact of ERM implementation on the value of European companies was studied by G.S. Bertinetti, E. Cavezzali, and G. Gardenal (2013). Based on research on a group of 200 companies from financial and non-financial industries, they proved a positive, statistically significant relation between the implementation of ERM and the value of the surveyed enterprises.
- N. Waweru and E. Kisaka (2013), analysing 22 companies listed on the Nairobi Stock Exchange, showed a positive relationship between the level of ERM implementation and the value of the companies.
- AON (2013), based on the research conducted on a group of over 100 companies listed under the S&P 500 stock index, proved a positive correlation between the return on shares and an increase in the quality of risk management. At the same time, a negative relationship between the volatility of share prices and an increase in the quality of risk management was demonstrated. Furthermore, it was proved that enterprises with a high ERM maturity were more resistant to market declines.
- A. Nair, E. Rustambekov, M. McShane, and S. Fainshmidt (2014), examining the impact of the 2008 crisis on enterprises, showed that organisations with well-functioning ERM systems were characterised by a smaller fall in share prices during the crisis (during declines) and above average gains during increases.
- D.L. Eckles, R.E. Hoyt, and S.M. Miller (2014), based on data obtained from the insurance industry, proved that organisations that implemented ERM experienced a decrease in the variability of the return on shares, which deepened over time following ERM implementation. Moreover, an increase in the value of operating profit per risk unit was observed (ROA/rate of return variability). On this basis, the authors concluded that enterprises generate greater risk reduction as calculated by dollars spent on managing said risk thanks to the ERM approach, according to which risks are analysed and managed jointly in the form of a risk portfolio.
- M. Farrell and R. Gallagher (2014) showed that enterprises exhibiting mature ERM are characterised by higher values (measured with Tobin Q). On the basis of the conducted research, the authors also identified the most important elements of ERM from the perspective of enterprise value, which are the commitment of managers and a general embrace of risk culture throughout the organisation.
- S. Soltanizadeh, S.Z.A. Rasid, N.M. Golshan, and W.K.W. Ismail (2016), by analysing data from 174 companies listed on the Malaysian Stock Exchange, proved that implementing ERM has a positive, significant impact on operating profit.
- C. Florio and G. Leoni (2017), researching Italian listed companies, showed that organisations that implemented ERM at an advanced level presented better financial results and were characterised by higher market valuation.

- T.R. Berry-Stölzle and J. Xu (2018), based on research conducted on American companies from the insurance industry, proved that the implementation of ERM has a significant impact on the decrease in the cost of equity in enterprises.
- E.M. Kerraous (2018), based on a sample of 37 Moroccan companies, proved that ERM integration generates an increase in turnover of 36.54%, an increase in operating profits of 72.16%, an increase in net income of 97.99%, and an increase in return on assets of 37.86%.
- A. Bohnert, N. Gatzert, R.E. Hoyt, and P. Lechner (2018) demonstrated a significantly positive impact of ERM on firm value in the case of European insurers. They found that insurers with a high-quality risk management system exhibit on average about 6.5% higher Tobin's  $Q$  than insurers with lower quality risk management.
- G. Girangwa Kakiya, J. Mose, and L. Rono (2019), researching Kenyan state corporations, found that ERM governance practices influence organisational performance in a significantly positive manner. They also stated that intellectual capital had an enhancing and significant moderation effect on the relationship between ERM governance practices and organisational performance.
- J.R. Silva, A.F. da Silva, and B.L. Chan (2019) investigated the association between ERM and firm value based on Brazilian listed companies in 2004-2013. The results indicated a positive association between firm value and the use of an ERM approach.
- X. Zou, C.R. Isa, and M. Rahman (2019) found that an effective ERM programme adds value to manufacturing firms by mitigating firm cost and enhancing firm efficiency. Their results showed significant evidence of a value premium attached to effective ERM programmes.

The above studies confirm the opinion expressed by the majority of researchers dealing with risk management regarding the impact of ERM systems on the results of enterprises. They indicate a positive correlation between the use of ERM systems and the amount and stability of financial results, the market value of the analysed companies, and the effectiveness of their functioning. ERM implementation also helps lower the cost of equity in the enterprise.

The author's own research also confirms the positive impact of using risk management systems on company results. The author conducted individual, anonymous surveys on 27 specialists dealing with risk management (managers, risk specialists, etc.) in organisations operating in Poland that have implemented mature risk management systems (presenting a proactive approach towards risk). The respondents were asked to assess the overall impact of implementing a risk management system on the performance of their company (impact on financial results, company's value, etc.) by selecting one of the following answers: (1) *largely positive*, (2) *somewhat positive*, (3) *slightly positive*, (4) *no impact*, (5) *negative impact*. The assessment determined by the respondents was subjective and was not parameterised, but it was based on their knowledge regarding the company's performance and the professional

experience of the respondents. In most cases, the respondents assessed the overall impact of implementing a risk management system on the enterprise where they work as *somewhat positive* (12 responses) or *largely positive* (ten responses). Only two people assessed the impact as *slightly positive*, and two people replied that the ERM implementation *did not affect their organisation* in any way.

### 3. Other benefits of enterprise risk management

As regards publications on the benefits of ERM, it is also worth mentioning the survey conducted by AON (2013) on a group of 230 Polish enterprises. Among the basic benefits of investing in risk management, the respondents mentioned: more informed decisions regarding risk retention/acceptance (61%), improved internal control (54%), improved management standards (54%), increased shareholder value (38%), improved business continuity planning/crisis management (29%), lower total costs of insurable risks (16%), higher return on investment (13%), reduced compliance costs (12%), and improved strategy (10 %) (AON, 2013). In turn, research conducted by A. Korombel, M. Nowicka-Skowron, and S. Brzezinski (2016) shows that some of the most significant benefits of risk management in small- and medium-sized enterprises in Poland are: increasing the likelihood of achieving business goals; improving decision-making processes and setting strategies; increasing company results; improving the company's image among stakeholders; allocating resources more efficiently; and increasing awareness and cultivating risk culture.

As follows from the above-mentioned research, in addition to the positive impact on financial results, the use of ERM systems can also provide other benefits to enterprises. Among the most important described in the literature, it is worth mentioning:

- Being able to take better advantage of opportunities, reducing unnecessary losses and the number of unexpected events, and increasing the stability of the organisation (COSO, 2017).
- Easier adaptation of the enterprise to the changing business environment – Increasingly rapid changes in the environment force organisations to better identify, evaluate, and plan responses to new emerging risks. ERM pushes managers to attempt to anticipate possible future scenarios and prepare organisations to improve their ability to deal with new risks to which they may be exposed (Protiviti, 2006).
- The ability to identify and manage entity-wide risks that can impact many parts of the entity, including those risks which originate in one part of the entity but affect a different part (COSO, 2017).
- A more optimal structure and a better allocation of capital within an enterprise (Marchetti, 2012).

- Improving corporate governance principles – Risk management and corporate governance are inextricably linked (Protiviti, 2006).
- Better compliance with legal and regulatory requirements and international standards (Polski Komitet Normalizacyjny, 2012).
- Reducing the number and cost of complaints, reducing the number of lawsuits, lowering insurance costs, and avoiding financial penalties (Decker, Galler, 2013, p. 41).
- Increasing risk awareness and cultivating risk culture (Korombel, Nowicka-Skowron, Brzeziński, 2016).
- The possibility of coordinating various functions in the enterprise more proficiently, allowing the company to better manage not only individual risks, but also interdependencies between different risks, which results in the improved efficiency of an organisation (Lam, 2014).
- Improving the organisation's learning process and increasing its resistance to external factors (Polski Komitet Normalizacyjny, 2012).

In addition to the benefits of risk management for the organisation managing it, the use of ERM systems brings considerable benefits to an individual entity's stakeholders, which improves the image of the enterprise in their eyes:

- It leads to an increase in share value, a decrease in investment risk, and an increase in and greater stabilisation of earnings for shareholders (Segal, 2011). The research conducted by J. Górnik showed that the way investors perceive the quality of risk management in an enterprise has, in most cases, a significant impact on their investment decisions (when investors believe that the company does not manage risk well, 61% of them do not get involved in further investments, 48% withdraw from the company, 35% attempt to change risk management procedures in this company, and 30% attempt to change the management). In addition, most investors believe that companies that manage risk effectively can expect higher share prices (Górnik, 2006).
- Thanks to risk management, a company becomes a more stable and timely supplier and a more reliable recipient in the eyes of contractors (Przetacznik, 2016).
- Managers are able to make better, more conscious decisions, allocate capital more efficiently, and achieve better results with less risk associated with decision making.
- From the employees' point of view, ERM improves health and safety at the workplace. In addition, the company becomes a more stable employer.
- For banks, enterprises using ERM are more reliable and stable customers, and, for insurance companies, they are safer entities that are less exposed to risk.
- From the point of view of the region where a company is located and its residents, ERM leads to improvements in occupational health and safety as well as environmental protection. The company is seen to be becoming a more stable economic entity.

#### 4. Causes for ERM implementation

Undoubtedly, the implementation of ERM brings many benefits to enterprises, has a positive effect on financial results, and improves the quality of management. However, one may ask the question of whether the potential positive impact of ERM implementation on organisations constitutes the main motivation for implementing such systems. One may also wonder what factors have the greatest influence on the decision to implement ERM, as well as what the main goals of implementing risk management systems in organisations are.

According to research conducted by the FERMA organisation (FERMA, 2012) on a group of 809 enterprises, the main factors influencing the decision to develop ERM in enterprises include: legal requirements, regulations, and compliance (61%), shareholder requirements (33%), corporate social responsibility (31%), catastrophic events (26%), major insurance issues (19%), market pressure (17%), and pressure from analysts/rating agencies (14%).

On the other hand, in the research conducted by AON (AON, 2016), the most important premises for strengthening risk management in Polish and global enterprises include: economic instability (Poland: 60%, world: 37%), investors' requirements for greater transparency and responsibility (Poland: 24%, world: 20%), pressure from customers (Poland: 35%, world: 26%), increased interest from regulators (Poland: 33%, world: 38%), extreme natural events (Poland: 3%, world: 17%), political instability (Poland: 9%, world: 15%), competitive pressure (Poland: 28%, world: 21%), exposure from suppliers or contractors (Poland: 8%, world: 15%), employee issues (Poland: 10%, world: 15%), cyber threats (Poland: 12%, world: 22%), civil liability losses (Poland: 8%, world: 18%), unforeseeable events (Poland: 13%, world: 18%), and globalisation (Poland: 6%, world: 11%).

Research on factors influencing the decision to implement ERM in organisations was also carried out by M.J. Khan, D. Hussain, and W. Mehmood (Khan, Hussain, and Mehmood, 2016). Based on information on 315 French companies, the authors showed that the most important factors are: pressure from local and international regulators; the likelihood of financial difficulties and their potential costs; poor financial performance of the company; the presence of development opportunities; and applied corporate governance practices.

The author's own research also showed a large variety of implementation goals and, hence, motivations to implement ERM. The survey conducted with 27 risk management specialists dealing with organisations operating in Poland that have implemented mature risk management systems (the survey described in Chapter 2) asked about the goals of ERM implementation in the respondents' organisations. The respondents could select any number of answers from a list of 12 responses. Based on a survey, it can be concluded that the two main reasons for implementing risk management in the group under examination were the improvement of management quality (this was the goal for 20 out of 27 surveyed enterprises) and meeting the requirements of stakeholders (owners, contractors, etc.) (selected by 18 respondents).



Third place was shared by: better adaptation to the changing environment and the improvement and stabilisation of financial results (each marked by 14 respondents), and the fifth was the protection of the company's resources and reputation (12 respondents). Other important factors included: wishing to meet legal requirements (nine respondents), limiting the number of complaints and financial penalties (six respondents), and lowering the impact of crises and catastrophic events on the organisation (six respondents), as well as improving the company's image (five respondents) and increasing the value of the company (five respondents). The least frequently selected goal was the reduction of insurance costs (selected by only two respondents) and 'other' (selected by three respondents).

## **5. Impact of the ERM implementation goals on outcomes**

The reasons why organisations decide to implement ERM directly influence their determination of risk management implementation goals. The analysis of the objectives of implementing a risk management system is extremely important in the context of achieving the expected effects (benefits) from the implementation of these systems. Both the specific problem and the formulation thereof influence the priorities that are defined and the actions that are taken (Bonnardel and Sumner, 1996; Hodgkinson et al., 1999). Thus, an organisation's reasons for implementing such a system have a direct impact on how the implementation process is carried out and what measures, as a result, will be implemented (Smith et al., 2008). Motivations to implement the system influence the actions taken and not taken in connection with its implementation; this affects the outcome, including the design of the system and the way it will be used (Smith et al., 2008; Markus and Tanis, 2000). Depending on the dominant motivation (internal - related to the desire to achieve benefits from ERM implementation, the source of which is the organisation itself - or external - the organisation's environment and expectations from that environment, as well as specific motivations) leading to ERM implementation, organisations may define different implementation goals, and thus they will (or will not) undertake various actions related to the implementation of the new system and its use. This has a direct impact on the way such a system is organised. It can affect the total impact of the implemented system on the organisation, and thus the benefits of implementing such a system.

Motivation to implement ERM may also affect the level of commitment to the process of ERM implementation and application, which also affects the achieved result. For every change initiative, understanding the meaning and the benefits of a change results in greater participation in and engagement with the change initiative (Sonenshein and Dholakia, 2012; Bartunek et al., 2006). Therefore, greater awareness of the potential benefits of ERM implementation and the willingness to achieve these benefits will certainly result in greater motivation to use such a system, and thus in greater involvement in its implementation and application process. Strong

commitment on the part of managers as well as all other employees is crucial for the effective implementation of the ERM system, which will then produce tangible benefits to an even greater extent (ISO, 2018; Sax and Torp, 2015; Althonayan, Keith and Killackey, 2012). In turn, in a situation where the system is implemented mainly due to outside requirements, management and, thus, other employees are unlikely to be fully committed to the process (Williams, 2004; Douglas, et al., 1999), which may negatively affect the outcome of ERM application.

It should be emphasised that the impact of an organisation's stakeholders on the decision to implement ERM is not a negative phenomenon as it motivates a company to take additional, beneficial initiatives. However, it is important that a willingness to meet stakeholder requirements should not be the only motivating factor for implementing a risk management system. Organisations implementing ERM should be fully aware of the benefits that a reliable implementation of an effective risk management system can bring; as such, they will be more likely to be more committed to and educated about ERM implementation, which will have tangible benefits for the organisation.

## **6. Summary**

ERM systems have a positive impact on the functioning of organisations, in particular on: the growth and stabilisation of their financial results, increase in the value of shares, and decrease in the cost of equity. A positive impact of ERM implementation on the organisation was also confirmed by the author's own research. Moreover, risk management helps to protect the company's assets and reputation, reduces insurance costs, and reduces the likelihood of a company taking part in illegal activity. In addition to measurable financial benefits, the implementation of a risk management system also improves the quality of management, enables better adaptation to the changing business environment, and introduces a risk management culture to the organisation. Importantly, the use of ERM provides benefits not only to the enterprise itself, but also to its stakeholders – shareholders, contractors, employees, banks, and insurance companies.

The described benefits related to the use of ERM are an important reason for the implementation of these systems in enterprises, which exceed the financial costs related to the implementation and use of a risk management system. Improving the quality of management, the desire to better adapt to the changing environment, willingness to counteract the negative consequences of unexpected events, limiting the costs associated with the implementation of individual risks, or the wish to take better advantage of potential opportunities are factors that motivate enterprises to implement and develop risk management systems. However, in many

cases, the decision to implement ERM is also influenced by external factors, such as compliance with legal regulations or the expectations of investors and contractors.

The influence of the organisation's environment on the decision to implement ERM is a positive phenomenon, but it should be noted that a willingness to meet the stakeholders' requirements should not be the only motivation for implementing ERM. Enterprises should implement such systems deliberately, with the primary aim of achieving actual benefits, not just to meet the expectations of its environment. Therefore, management awareness regarding the purpose of ERM implementation and its benefits is essential. Incorrect or unclear motivations for implementing a risk management system in an organisation affect the actions taken, and thus also the effect of implementing such a system. The implementation of ERM in a situation where the main motivation to do so revolves around external factors may have a negative impact on the ERM outcome. Goals and motivations leading to ERM implementation, especially when analysed in the context of how such a system is implemented and of the effects achieved, are an important and interesting issue and can be the subject of further research.

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# THE SOURCES OF KNOWLEDGE AND THEIR IMPACT ON CONSUMERS' DECISIONS CONCERNING PROPER NUTRITION

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**Introduction/background:** As a result of ICT development a growing number of consumers use the Internet as a principal source of information on the relationship between good nutrition and health. This in turn provides a basis for taking purchase decisions. The research presented in this paper focuses on the act of selecting sources of consumer information to facilitate the process of purchase decision-making. The literature on this subject consists of extensive reviews on food items but lacks research on proper nutrition.

**Aim of the paper:** This paper is aimed at analyzing the sources of consumer information on proper nutrition. The research involved identifying the most frequently used sources of consumer knowledge on healthy foods and examining the correlation between the sources selected by respondents and their level of knowledge.

**Materials and methods:** The research data were obtained by means of online questionnaires sent out to 240 respondents selected using purposive sampling. The study was carried out in the last quarter of 2019. The following statistical methods for data analysis were applied in this study: contingency tables, multiple response tables, the Chi-square test of independence and the Spearman's rank correlation coefficient.

**Results and conclusions:** The results of the analysis revealed that websites run by experts represent the most popular channel for communicating with consumers, and as invaluable sources of knowledge on healthy eating. The conclusions derived from applied research provide guidelines on marketing communications strategy for healthy food producers.

**Keywords:** knowledge sharing, consumer information, knowledge management, communication channels, proper nutrition.

## 1. Introduction

The decision-taking process represents an indispensable element of consumer behavior. The dynamic development of information and communication technologies has led to far-reaching changes in the sources, as well as means of satisfying purchase needs. Consumers have

become more demanding and their needs undergo constant changes. They search for product information using traditional means such as own experiences and commercial messaging, as well as utilizing online resources. The evolution of the Internet had a profound impact on establishing new information sources. Businesses are eager to utilize online marketing communications channels and to apply diverse promotional tools. The process of exchanging opinions among consumers has also been affected by significant changes. Many websites, internet forums and shops provide users with the opportunity to share their opinions with others. The research results indicate that *e-word of mouth* (eWOM) exerts an extremely strong impact on taking purchase decisions, and the opinions expressed by other website users are treated as a reliable source of information (Barlas, Stamboulis, Vleioras, 2020; Budzanowska-Drzewiecka, 2015). Internet users add informal, spontaneous or more structured opinions, however, it should be noted that some persuasive online recommendations are commissioned by commercial enterprises. Neutral blogs and affiliate websites run by experts in a given field, who share their knowledge as well as publish reviews and opinions, represent a special case. This trend is especially noticeable in cosmetic, fitness, dietetic and medical branches. It is popular to seek for medical advice online – in Poland, over 60% of its citizens use the Internet to search for information on health and illnesses (Szymczyk, Grela et al., 2015).

The purpose of this paper is to analyze the sources of information used by consumers to take purchasing decisions on proper nutrition. The authors formulated the following research questions: What are the main sources of consumer knowledge on good nutrition? What is the relationship between the sources of information on proper nutrition and foods selected by consumers and their level of knowledge within that scope?

## 2. Information sources in the consumer decision-making process

Contemporary consumers take very complicated decisions on a daily basis that concern, among others, the place, time, order and means of making a purchase. The development of the world wide web, internet shopping, price comparison sites and instant messaging marketing targeted at prospective clients has led to changes in the process of taking decisions and factors affecting it. A typical decision-making process consists of the following stages:

1. Identifying/creating a need.
2. Searching for information.
3. Assessing the possibility to satisfy the need.
4. Making a choice (assessing other options).
5. Purchase.
6. Evaluation of the purchase made by using it (Goldsmith, 2005).

In this paper, we draw special attention to the stage involving searching for information. The process of looking for information by consumers has been defined as “the motivated

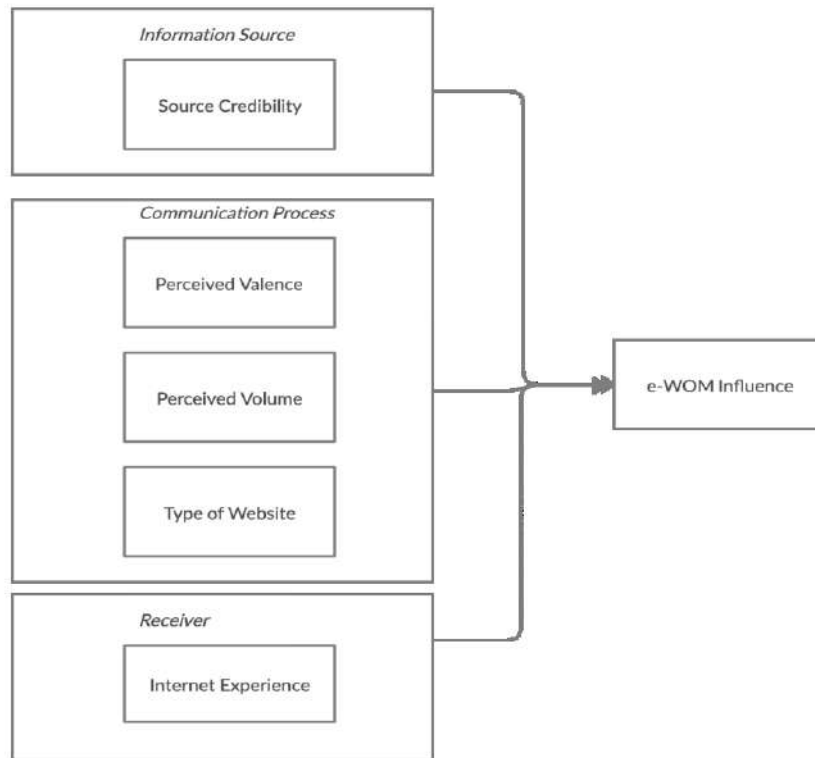
activation of knowledge in memory or acquisition of information from the environment about the potential satisfiers” (Blackwell, Miniard, & Engel, 2006, p. 126). This means that ‘internal’, that is that resulting from previous experiences, as well as ‘external’ sources, can be used to obtain information. The external process motivated by the necessity to take a purchase decision takes place before or during a purchase. External search motivated by an imminent purchase decision, is considered as pre-purchase search (Schmidt, & Spreng, 1996), while ongoing search consists of “search activities that are independent of specific purchase needs or decisions” (Bloch, Sherrell, & Ridgway, 1986, p. 120). The benefits of such search for consumers include saving money by purchasing the product at a lower price, lessening of risk and increasing the likelihood of obtaining a superior product by eliminating inferior alternatives (Klein, & Ford, 2003), as well as generating greater satisfaction with purchase decision (Punj, & Staelin, 1983). The research presented in this paper is focused on pre-purchase external information search behavior.

The literature of the subject provides multiple research into the process of looking for external sources of purchase information offline (e.g. Kim, & Ratchford, 2012; Punj, & Staelin, 1983;). When it comes to online information sources, researchers focus their attention mostly on the ways of searching for purchase occasion, selecting an information source and evaluating its credibility. In most cases, researchers agree that consumers do not limit their choices to online or offline sources, but use both of these alternately (compare Grant, Clarke, & Kyriazis, 2007; Rippé, Weisfeld-Spolter, Yurova, & Sussan, 2015). Another interesting line of research is concerned with information overload and the impact of that phenomenon on the evaluation and selection of the sources of consumer information (Lu, & Gursoy, 2015).

Budzanowska-Drzewiecka (2015) proposed to divide external information sources into the following categories: informal (provided by consumers sharing opinions with other users), neutral (provided by experts) and commercial (provided by salespeople and intermediaries characterized by a clearly defined commercial purpose). This classification becomes extremely important when we take into account the evaluation of the credibility of the source. According to Bailey (2005), consumer opinions can be found on two types of websites. The first type includes websites that are characterized by frequent interactions that are run by consumers who use mostly non-structured written forms. Such websites include Internet communities, blogs and discussion forums. In the subject literature, these sources are often described with the term *Word of Mouth* (WOM or e-WOM in the case of internet sources). The second one covers marketing-oriented websites that are utilized as an online marketing communications channel, such as Internet rankings, price comparison sites and opinions in Internet shops. Bailey’s classification does not include neutral websites, which constitute an exceptional source of information provided by experts in a given field. These websites – in most cases – blogs and affiliate sites on social networks, are run for information purposes by users with appropriate education or professional experience. It is worth highlighting that in some cases, experts publish promotional materials financed by companies. These channels are also used to interact with

consumers who are given an opportunity to question the experts or add their own opinions and posts.

Figure 1 illustrates determinants that contribute to the influence of informal internet sources of consumer information (eWOM).



**Figure 1.** Determinants of eWOM influence. Source: M. López, M. Sicilia, Determinants of E-WOM Influence: The Role of Consumers' Internet Experience, *Journal of Theoretical and Applied Electronic Commerce Research* Vol. 9, Iss. 1, p. 31.

Taking into account the purpose of this research, it is worth treating the evaluation of the information source as a variable that may affect the level of consumers' knowledge. Determination of credibility based on sourcing in the subject literature is called the 'source effect' (Bae, Lee, 2011). This means that the information released by an expert is assessed as being more reliable than the same, but published by the producer.

### 3. Information behavior with regard to proper nutrition

The Medical Library Association (2013) defines health information literacy as "the set of abilities needed to: recognize a health information need; identify likely information sources and use them to retrieve relevant information; assess the quality of the information and its applicability to a specific situation; and analyze, understand, and use the information to make good health decisions." This definition can surely be applied to information regarding healthy foods and proper nutrition. The level of health information literacy has been extensively studied

by experts in healthcare and nutrition, as well as in information science. This type of research usually involves employing self-administered questionnaire (Niedźwiecka, Słońska, Taran, 2012). The other type of studies covers secondary data analysis, in particular, data concerning means and the scope of searching for information on health and good nutrition. That research may refer to consumers' activity in social media (e.g. Sanak-Kosmowska, Śliwińska, 2020; Sharma, De Choudhury, 2015) or analysis of the inquiries made using search engines (Shepherd, 2005).

Health has become a key factor for many contemporary consumers that affects their eating habits (Goetzke, Spiller, 2014). Health condition and illnesses are often perceived as consequences of the individual's behavior – their eating habits, diet and physical activity. Consumers, so as to improve their health, and frequently on their own initiative, look for information and advice on proper nutrition. The search results in following diets, purchasing eco-friendly and functional foods. Thompson and Moughan (2008) identified the most important trends in nutrition almost a decade ago: individualized nutrition, body weight control and foods affecting mental well-being. Currently, this list should be extended with the following positions: eco-friendly foods (from local farmers) and functional foods (with documented impact on human body). This trend has also been observed in Poland. Indeed, forty percent of all Polish consumers admit that they buy healthy food at least once a week (Portal Spożywczy, 2019). The report titled: *Wiemy co jemy. Polacy o potrzebie informacji* (Eng. *We know what we eat. Polish citizens about the information need*) compiled by the research agency 'Inquiry and ITBC Communication' (2019) details the search by Polish citizens for proper nutrition information. The study involved 551 participants and was conducted in May 2019. According to the report, 91% of all respondents pay attention to food product information. The research population were particularly interested in ingredients – 90% of all participants checked whether given food contains any contaminants. Positive effects of foods on health (83%) and nutrient content (82%) were of equal importance for the research participants. Furthermore, the study indicated that consumers obtain food information mostly from labels. Other important sources of food information listed by respondents included cooking TV shows (32%), family/friends (30%) and the Internet – thematic websites, e.g. about cooking (29%). Moreover, the consumers claimed that advice provided by doctors and dieticians (41%), packaging labels (38%) and family's/friends' recommendations (34%) are the most credible sources of knowledge concerning nutrition. The study also noted that Polish citizens trust websites (27%) and cooking TV shows (25%).

#### **4. Research methodology**

The analyses presented in this paper were carried out using the results obtained from own studies conducted in 2019 involving online survey questionnaires distributed among Polish

consumers. We used a purposive sample and took into account respondents' age (two categories: age range 18-34 and 35-65 years) and gender (two categories: female, male). Each subgroup amounted to 60 observations. The sample amounted to 240 respondents. A questionnaire was used as a research tool. Two variables were analyzed to answer research questions: the sources of knowledge used by consumers and their level of knowledge. The successive stage of the analysis involved examining correlations between the two variables.

The respondents were asked about the sources used to obtain information concerning foods and nutrition. Survey participants could select any number of answers from the one given below:

- from scientific literature,
- from classes/courses at school/university,
- from TV/radio,
- from family/friends,
- from experts (e.g. doctor, dietitian),
- from websites run by experts,
- from internet users,
- from other sources/what sources?

The analysis of multiple dichotomies allowed learning about respondents' opinions and presenting the number of observations, percentage of answers and percentage of cases in one table.

Respondents' knowledge with regard to foods and proper nutrition was evaluated based on their own subjective statement. Survey participants could select one of the five following responses determining their level of knowledge:

- very high (I'm an expert in nutrition);
- high (I'm interested in this subject, I read a lot and expand my knowledge);
- average (I expand my knowledge on selected products from time to time);
- low (I'm aware which products are not healthy but I do not look for new information);
- very low (I do not know which products are healthy and I'm not interested in these issues).

The surveyed women and men were divided into five groups based on subjective perception with regard to knowledge in the analyzed field. Due to low number of observations, two marginal categories were merged to enable running the Chi-square test, otherwise basic assumptions of the independence test would not be met. As a result, the number of categories was reduced from five to three:

- category "high level of knowledge" was obtained by merging "very high" and "high" categories,
- category "average level of knowledge" was created from the one with the same name,
- category "low level of knowledge" was obtained by merging "very low" and "low" categories.

The level of knowledge (3 categories) was compared with the information sources selected by survey participants using contingency tables to identify the sources that are the most effective in terms of expanding respondents' knowledge. This paper covers the analysis of results for 3 sources of knowledge that were most frequently selected by survey participants. The data were examined using Chi-square test of independence and the Spearman's rank correlation coefficient. All analyses were carried out using the Statistica software, version 13.1.

## 5. Results

### 5.1. Identification of the most frequently selected sources of information concerning proper nutrition

The analysis revealed that websites run by experts represent the most frequently selected source for obtaining information about the impact of nutrition on health. That response was given by half of all respondents. Family and friends took the second position, as 45% of all respondents use their advice. The next popular source of information is represented by TV and radio (38,75% of all cases). This is followed by Internet users (35,42%). The selection of these sources may depend on many factors, among others, user-friendly means of delivering information, widespread and easy availability. One fourth of the surveyed obtain information directly from experts or scientific literature. This shows that respondents wish to acquire reliable knowledge. As the number of responses was not limited, it can be noticed that consumers consider proper nutrition a crucial issue and look for information on this topic in many sources. Based on the analysis of the responses, it can be seen that Internet sources (websites run by experts and internet users) constitute over 35% of all answers.

**Table 1.**

*Information sources selected by respondents*

Information source	The number of responses	Percentage of responses	Percentage of cases
Website run by experts	120	20,87	50,00
Family, friends	109	18,96	45,42
TV, radio	93	16,17	38,75
Internet user	85	14,78	35,42
Experts (e.g. doctor, dietitian)	62	10,78	25,83
Scientific literature	58	10,09	24,17
Courses, classes at school/university	34	5,91	14,17
Other	14	2,43	5,83
Total	575	100,00	-

Source: own study.

## 5.2. The sources used to obtain information about the impact of nutrition on health versus the level of respondents' knowledge

The majority of respondents assessed their level of knowledge as “average” (68%). Only 4 respondents perceive themselves as experts in nutrition, while 37 claim that their level of knowledge on good nutrition is very high. These two groups were merged into one category “high”, and this accounts for almost 15% of all study participants. The number of people representing low and very low level of knowledge was slightly higher. Five persons described themselves as not having any knowledge and being completely not interested in the topic, while 30 respondents admitted that their knowledge on nutrition is limited. In total, these two groups (low and very low level of knowledge) constituted 17% of all survey participants. Table 2 shows the results after reducing variable “the level of knowledge” to 3 categories.

**Table 2.**

*The level of knowledge perceived by respondents, after reducing the number of categories to 3.*

Perceived level of knowledge	The number of respondents	Percentage of respondents
High	41	14,6
Average	164	68,3
Low	35	17,1
Total	240	100

Source: Own study.

The subsequent stage of data analysis involved studying whether the information sources selected by consumers have impact on their level of knowledge. To that end, extreme values were compared – low and high level of knowledge as assessed by respondents was juxtaposed with the information sources. The analysis covers four most popular information sources selected by the respondents. Table 3 shows comparison of the information sources with subjectively perceived level of knowledge.

**Table 3.**

*Utilizing information sources vs. respondents' level of knowledge*

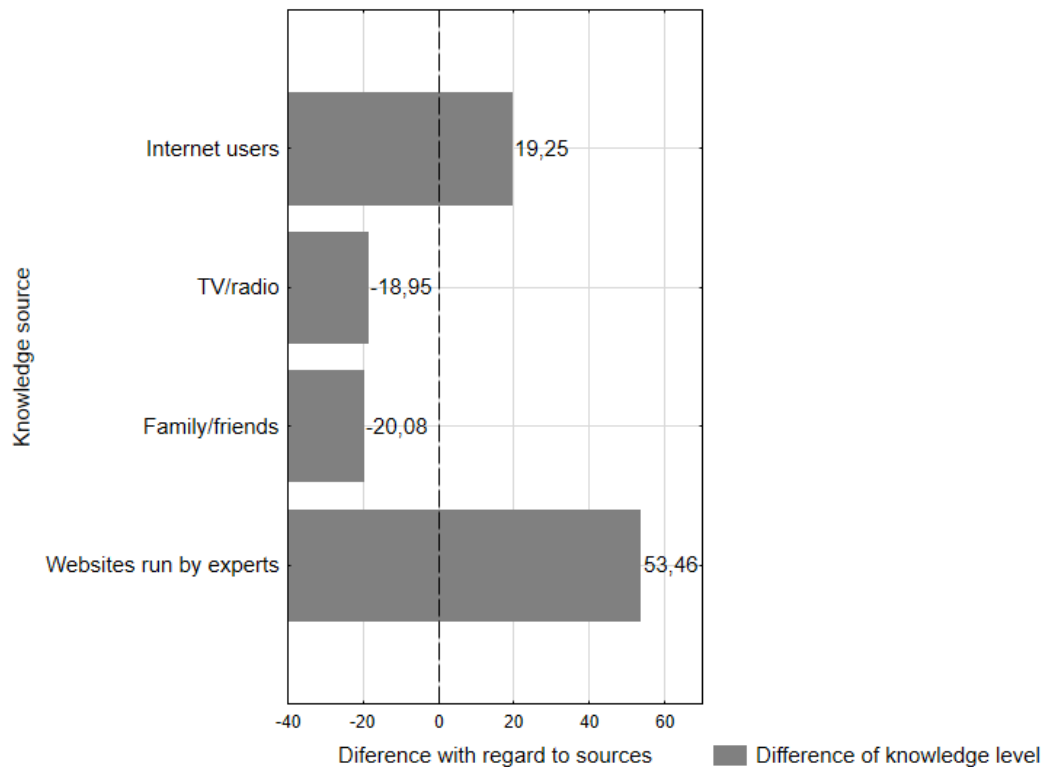
Knowledge source	The level of knowledge (percentage of cases) <sup>1</sup>			Difference of knowledge level: high – low
	low	average	high	
Websites run by experts	22,86	56,46	76,32	53,46
Family/friends	54,29	52,38	34,21	-20,08
TV/radio	40,00	48,30	21,05	-18,95
Internet users	22,86	41,50	42,11	19,25

Source: Own study.

<sup>1</sup> The percentage of cases does not sum up to 100% as participants could provide multiple responses to the question regarding knowledge sources.



The differences in the level of knowledge calculated for individual information sources indicate that the greatest number of respondents with high level of knowledge use websites run by experts. A positive result was also obtained for category “Internet users”. In the case of source “family/friends” and “TV/radio”, it is clearly visible that it is utilized mostly by respondents with the low level of knowledge. The differences in the level of knowledge for particular information sources are presented in Figure 2.



**Figure 2.** The difference in the respondents' level of knowledge depending on the information source. Source: Own study.

Correlation between the subjective level of knowledge and the information source selected by respondents was examined using Chi-square test for independence with Yates' correction<sup>2</sup>. The strength of the relationship was computed by applying the Spearman's rank correlation coefficient. Assumed confidence level was  $\alpha = 0,05$ . The results of the Chi-square test for independence (with Yates' correction) revealed a significant correlation between self-assessed level of knowledge and the sources of information chosen by consumers only in the case of websites run by experts. The Spearman's rank correlation coefficient indicated a moderate positive relationship (0,48, at  $p < 0,001$ ). Based on the test results it can be inferred that the persons visiting the above-mentioned sites show higher level of knowledge on foods and proper nutrition.

<sup>2</sup> Yates' correction is used in the case of small 2x2 contingency tables.

## 6. Conclusions

Empirical studies have allowed answering the research questions presented at the beginning of this paper. The research involved identifying major sources of knowledge utilized by the respondents in searching for information concerning proper nutrition. The most popular source is represented by websites managed by experts, followed by family/friends, TV/radio and Internet users. Based on the investigation of the relationship between subjective level of knowledge and information sources, it can be concluded that websites maintained by experts constitute an effective and valuable tool for spreading knowledge on foods and adequate nutrition. The analyses revealed a significant correlation between the respondents' level of knowledge and use of sites run by experts as a source of information concerning proper nutrition. With regard to other analyzed information sources, further studies with larger sample size should be conducted.

Allowing for the results of empirical research presented here and conclusions drawn based on literature review pointing to the importance of the information search in the consumer decision-making process, it can be deduced that there is a gap in marketing strategies applied by companies operating in the food sector. These companies could benefit from expanding their marketing strategy through involving experts (e.g. food technologists, dieticians and nutritionists) in the process of sharing knowledge on food and nutrition on the Internet. This could translate into positive purchase decisions by consumers searching for food products to improve their diet.

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# MANAGING INSTRUMENTAL COMMUNICATION IN THE CONTEXT OF THE PERCEPTION OF BULLYING AMONG NEW EMPLOYEES

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**Introduction/background:** Researchers have indicated that organizational change may indirectly affect workplace bullying. In the case of employees undergoing organizational change, the same stressors might be experienced only by new employees.

**Aim of the paper:** The aim of the article is to identify whether work experience in the organization intensifies subjective perception of bullying in the process of instrumental communication and receiving negative feedback.

**Materials and methods:** Relational and phenomenological methods were applied. Multi-phase mixed methods research included; shadowing, participant observation, discourse analysis, semi structured interviews, oral history interviews. Qualitative data (n = 67) gathered in the first stage in longitudinal studies was transformed into a questionnaire used in quantitative research (n = 267) in the second research stage.

**Results and conclusions:** The findings indicate that improper conditions for decision realization, inadequate individualization of instructions and poor feedback intensify the subjective experience of bullying. Perceived bullying in the process of instrumental communication decreases with longer work experience within the given organization and not with overall work experience.

**Keywords:** Bullying, mobbing, organizational change, organizational learning, employee socialization.

## Introduction

Companies need to plan and implement organizational change to remain more competitive or to simply survive in the marketplace. The process of planned change is in fact “managed learning” (Schein, 1999). Due to the complexity and volatility of the economic environment, the attainment of long-run equilibrium remains highly unlikely (Simon, 1959, p. 263). Organizations are oriented towards achieving targets (Levitt & March, 1988, p. 320). “Their behavior depends on the relation between the outcomes they observe and the aspirations they have for those outcomes” (Levitt & March, 1988, p. 320). People are faced with similar

choices when they wish to improve their career prospects and decide to change their place of employment. Employees are willing to take action when they expect it will lead to desirable outcomes (Vroom, 1964). Although, job description and employment contract outline the expectations of both the employer and the new employee, it is impossible to predict all the possible outcomes of the decision due to both the inability to imagine all of them, as well as limited information (Simon, 1957). Thus, the new place of employment is a change in professional life that might result both in positive and negative outcomes. However, the process of experiencing negative aspects of change is significantly stronger than in case of positive (Kahneman & Tversky, 2013). Researchers have indicated that organizational change increases the risk of the occurrence of workplace bullying (McCarthy, 1996; McCarthy, 2001; Hutchinson et al., 2005; Skogstad et al., 2007; Baillien & De Witte, 2009; D’Cruz et al., 2014). Newly employed staff might experience similar negative outcomes as that of employees working in companies going through organizational change because they both undergo a process of change in their professional careers.

Workplace bullying is “the systemic persecution of a colleague, a subordinate or a superior which, if continued, can cause severe social, psychological and psychosomatic problems for the victim” (Einarsen, 1999, p. 17). Over the past few years, the word “bullying”, along with other related concepts, have started to appear in the public sphere more frequently. The terms: “harassment” (Brodsky, 1976), “mobbing” (Leymann, 1990), “bullying” (Adams & Bray, 1992), “victimization” (Olweus, 1994), “emotional abuse” (Keashly & Harvey, 2005), and “workplace aggression” (Baron & Neuman, 1996) are no longer solely reserved for scientists. Extensive research has raised public awareness of the phenomenon of workplace bullying (Vartia & Leka, 2011; Hanley & O’Rourke, 2016). Due to its negative connotation, ‘bullying at work’ has become a signifier that gives expression to a variety of anxieties, fears and resentment (McCarthy, 2002). Researchers have, however, identified discrepancies in subjective perception of bullying (Veenstra et al., 2007; Tolsma et al., 2013; Tatum & Grund, 2020). Indeed, the term devised to protect bullying victims can become a tool to bully others. The fact that an employee declares having subjectively experienced bullying does not mean that objectively any bullying has actually occurred (Einarsen, 1999). However, it is the subjective perception that has constituted bullying as an objective phenomenon, as it lies at the core of its definition (Brodsky, 1976; Niedl, 1996). In either case, bullying victims reported subjective perception of lowered work productivity and decreased creativity (Bassman, 1992; Einarsen, Hoel, & Cooper, 2003; Mete & Sökmen, 2016). Moreover, organizations reported financial losses, especially due to absenteeism and prolonged sick leaves of both victims and witnesses of workplace bullying (Hoel, Einarsen, et al., 2002; Pranjić et al., 2006; Beardwell & Claydon, 2010; Hoel et al., 2020).

## Research aims

The purpose of the research is to verify whether work experience within a specific organization influences the subjective perception of respondents in order to identify which functions of communication process that might be associated with bullying by staff with less than 1 year work experience in the organization. Workplace bullying refers to systematic negative acts with intent to harm, that occur over a period of at least six months (Einarsen, 2000). Victims are forced into inferior positions and are unable to defend themselves (Leymann, 1996). However, the 'intent to harm' due to its ambiguity is difficult to prove, and it is frequently not included in definitions (Hoel et al., 1999; Zapf & Einarsen, 2005; Nielsen et al., 2016; Escartin et al., 2017; Rai & Agarwal, 2018; Nielsen & Einarsen, 2018).

C. Brodsky stressed that bullying is a systemic phenomenon that can only exist within a culture wherein it is permitted (Brodsky, 1976). Several authors point out that there might be structural and systemic aspects to certain behaviors and Employees who bully might simply conform to norms without intending to harm anyone (Bassman, 1992; Keashly, 2001; Keashly & Jagatic, 2002).

Organizations learn through the experience of individuals, however, organizational learning is not simply the sum of each member's learning (Mitroff & Kilmann, 1976; Hedberg, 1981). Organizations develop learning systems that not only influence their immediate members, but are also transmitted to new members by way of organization histories, norms, ideologies and routines (Fiol & Lyles, 1985).

Routines are independent of individual employees who execute them and are able to survive considerable turnover in these employees (Levitt & March, 1988). The sense of stability and strong emotional identification with norms and values translates into employee loyalty with the company (Van Maanen & Kunda, 1989). However, certain authors have pointed out that loyalty and sense of stability make organizational change much more difficult, as it intensifies the feeling of uncertainty which was previously decreased by the sense of stability (Jaques, 1957; Stacey, 1995; Huy, 1999, p. 337). Furthermore, rapid technological changes force top, middle and operational managers to redefine their roles, which no longer provides predictability in relational exchanges (Friedman & Podolny, 1992; Huff et al., 1992).

Contested belief structures and tensions associated with the difference in norms and priorities as to which role to enact might result in strategic role conflict (Walsh & Fahey, 1986; Floyd & Lane, 2000). Most common reasons for resistance to change are, among others, negative rumor – mongering, fear of the unknown, disorientation, pace of change, lack of communication, loss of autonomy, threats to power or influence, habits, unpredictability, knowledge and skill obsolescence, selective perception, economic implications (Coch & French Jr, 1948; Lawrence, 1968; Powell & Posner, 1978; Kotter & Schlesinger, 1979; Mullins, 2007; Robbins & Judge, 2009; Yilmaz & Kiliçoğlu, 2013; Lewin, 2016; Krügel & Traub, 2018).

Numerous authors indicate that organizational change may indirectly affect workplace bullying through stressors such as increased job insecurity, workload, role conflict, role ambiguity, autocratic leadership style, personal conflict, deterioration of bonds between coworkers, reduction of leader credibility, anticipation of job loss (McCarthy, Sheehan, & Kearns, 1995; McCarthy, 1996; Greenglass & Burke, 2001; Hoel, Cooper, et al., 2002; Hoel & Salin, 2002; Skogstad et al., 2007; Baillien & De Witte, 2009).

Just as in the case of employees undergoing organizational change, the same resistance to change mechanisms and stressors might be experienced by newly employed staff. For instance, the trial period is associated with decreased job security, especially due to the short notice period (Hora et al., 2016). Initial experience of new employees is imperative in adjusting to the new environment (Fogarty, 1992; Saks & Ashforth, 1997; Robinson & O'Leary-Kelly, 1998). However, new employees, either consciously or unconsciously, will inevitably experience either positive or negative conflict (Jehn, 1997). If new employees' roles are not defined in a comprehensible way, newly employed staff might experience role ambiguity and role conflict (Judeh, 2011). As a consequence, employees might not understand why their work is corrected and whether their work will be acceptable to their superior (Rizzo, House, & Lirtzman, 1970, p. 156). In addition, new employees in the process of socialization might experience role conflict and role ambiguity due to change of behavior as a function of the new situation. They might feel they have to perform duties in a different way that they should be performed (Rizzo, House, & Lirtzman, 1970, p. 156). Several authors stress that role ambiguity leads to tensions, feeling of helplessness, cognitive distortions among new employees due to insufficient information necessary to perform tasks (Hamilton, 2003; Onyemah, 2008; Judeh, 2011).

According to some researchers, role conflict, role ambiguity and stress are inevitable in the process of socialization and organizational change (Harvey & Evans, 1994; Jehn, 1995; Jahanzeb, 2010; Singh & Mishra, 2012; Karunanithi & Ponnampalam, 2013; Zhang & Huo, 2015). Others argue that harmful stress, conflicts and bullying are the result of inadequate work organization (Karasek & Theorell, 1990; Gilbreath, 2004, p. 97; Zapf, 1999; Cox & Rial-González, 2002; Leka et al., 2003; Redfern et al., 2008).

Researching workplace bullying gives rise to two propositions:

**H1:** Inadequate individualization of instruction in the process of instrumental communication will be positively correlated with perceived bullying.

**H2:** Creating improper conditions for effective decision realization in the process of instrumental communication will be positively correlated with perceived bullying.

E. Schein puts forward that “all forms of learning and change start with some form of dissatisfaction or frustration generated by data that disconfirm our expectations and hopes” (Schein, 1999, p. 60). The less competent people are, the more they tend to overestimate their performance (Darwin, 1871; Kruger & Dunning, 1999). Moreover, incompetent people suffer a dual burden: “not only do they reach erroneous conclusions and make unfortunate choices, but their incompetence robs them of the ability to realize it” (Kruger & Dunning, 1999).



J. Kruger and D. Dunning found that incompetent people are also unable to recognize competence in others (Kruger & Dunning, 1999). Thus, employees might question their immediate superiors and senior colleagues credibility (Kieżun & Kwiatkowski, 1975; Szymański, 2018).

In order to avoid unnecessary conflict, superiors might implement structural empowerment which provides employees with autonomy and control over their work (Seibert et al., 2011; Ayala Calvo & Garcia, 2018; Amor et al., 2020). Structural empowerment has been positioned as a necessary, but not sufficient, antecedent of psychological empowerment (Mathieu & Taylor, 2006). Several authors stress that empowerment needs to be adjusted not only to employees expectations, but also to the level of their competence, otherwise they will become dissatisfied and overburdened with their work (Nowakowski & Szmidt, 1984; Maynard et al., 2012; Cheong et al., 2016; Lee et al., 2018; Cheong et al., 2019). Even more qualified and experienced staff felt that empowering leaders lacked interest in their work and perceived their leadership style as *laissez faire* (Wong & Giessner, 2018, p. 777). Employees with more autonomy are forced to process additional information, as they are responsible not only for realizing tasks, but also for deciding on the manner and time of their implementation (Rubinstein et al., 2001). They require proportionally more time to complete tasks than do employees who simply follow their supervisor's guidelines (Rubinstein et al., 2001). Consequently, employees who make complex decisions and take responsibility for the obtained results might perceive autonomy as an undesirable factor and associate it only with additional duties (Spector et al., 1988; Langfred & Moye, 2004, p. 936).

Perceived high workload had direct negative relationship with new employees' job satisfaction (Russ-Eft, 2001). Additionally, research indicates increased levels of stress and insecurity in employees who perform tasks independently (Langfred & Moye, 2004). Thus, empowering leadership does not always provide better results than does a more directive style of leadership (Staw & Epstein, 2000). Moreover, bullies can use pseudo transformational and pseudo democratic leadership styles, as they are usually perceived positively by their coworkers as they provide them with the illusions of inspiration and participation in the decision process (Barling et al., 2008, pp. 852-853; Auvinen et al., 2013, p. 25; Niesche & Thomson, 2017, p. 194). Therefore, particular authors indicate that superiors should apply autocratic or paternalistic leadership style when employees are either unfamiliar or lack know-how about their jobs (Wong & Page, 2003; Iqbal et al., 2015). However, while autocratic leadership style can boost productivity, it decreases satisfaction (Lewin et al., 1939; Foels et al., 2000; Appelbaum et al., 2004; Al-Ababneh, 2013).

A further two propositions then arise:

**H3:** Inadequate individualization of feedback in the process of instrumental communication will be positively correlated with perceived bullying.

**H4:** Perceived bullying in the process of instrumental communication will be negatively correlated with longer work experience in the organization.

According to H. Simon, people who have accepted employment in a company and the authority relationship with the employer which the employment contract entails, willingly permitted their behavior to be determined to some extent by their employer (Simon, 1979, p. 502). Additionally, holding an employment contract reduces uncertainty and allows employees to predict how their work will look like – which in turn might reduce their intention to look for other employment alternatives (Simon, 1951; March et al., 1964, pp. 155-172).

Research has indicated that time spent in a particular department or function develops a viewpoint that is consistent with the activities and goals of that department or particular function (Dearborn & Simon, 1958; Walsh, 1988, p. 875). Regular exposure to the same microcosm might foster a readiness in individuals to view their broader organizational worlds in a special light ((Dearborn & Simon, 1958; Walsh, 1988, p. 875). For example, nurses through the linked process of splitting, projection and introjection, lend their individual and collective authority to ritual, which in turn authorizes them to behave in a depersonalized way towards their patients (Hirschhorn, 1988, p. 3). Splitting is a cognitive mechanism based on dichotomous black and white judgments, with inability to see both sides simultaneously (Freud, 1941; Myers & Zeigler-Hill, 2008). According to S. Freud, splitting helps to reduce anxieties associated with ambivalence of more complex and integrated evaluations (Freud, 1941; Myers & Zeigler-Hill, 2008). Nurses, therefore, often allow the practice they had once created to dominate them and followed orders regardless of patients' needs (Hirschhorn, 1988, p. 3).

Behavior in an organization is primarily based on routines, which in turn are based on interpretations of the past more than anticipations of the future (Lindblom, 1959, p. 79; Cyert & March, 1963; Nelson & Winter, 1982). Organizational action is history-dependent, it stems from a logic of appropriateness or legitimacy more than consequentiality or intention (Steinbruner, 1974; Levitt & March, 1988, p. 320). It involves matching procedures to situations more than it does calculating choices (Steinbruner, 1974; Levitt & March, 1988, p. 320). As a result, it might lead to problems of perceptual screens, personal bias, collective blindness, tunnel vision and functional fixedness (Cyert & March, 1963; Stagner, 1969; Turner, 1976; Mason & Mitroff, 1981; Katz, 1982).

Suboptimal information processing among employees might lead to heuristic and cognitive biases such as associative principles, retainment principle, focus principle, attentional bias, attentional tunneling, overconfidence, optimism bias and confirmation bias (Wason, 1968; DeJoy, 1989; Thomson, 2000; Wickens & Alexander, 2009; Dunning & Story, 1991; Furnham & Boo, 2011; Korteling et al., 2018). Moreover, people frequently do not expect regression in many contexts where it is bound to occur (Tversky & Kahneman, 1974).

D. Kahneman and A. Tversky point out that failure to recognize regression can have pernicious consequences (Tversky & Kahneman, 1974). If experienced supervisors notice that praise for good performance is typically followed by poor performance the next day, while punishment after bad performance is typically followed by good performance, they might conclude that praise is detrimental to good performance, while punishment is beneficial to good

performance (Kahneman & Tversky, 1973, pp. 250-251). Consequently, superiors will be rewarded for punishing someone, and punished for rewarding someone (Kahneman & Tversky, 1973, pp. 250-251). Still, a bully or a hypersensitive managers might have gone unnoticed 10 years ago in organizations, nowadays through open criticism and repeated punishments, he/she would easily attract attention (Cameron & Green, 2019, p. 166). Bullies, consequently, are forced to use more sophisticated methods such as knowledge sabotage which involves hiding information needed to perform a task or intentionally misinforming colleagues in order to discredit them and/or prevent them from performing their tasks efficiently (Serenko, 2020, pp. 740-741).

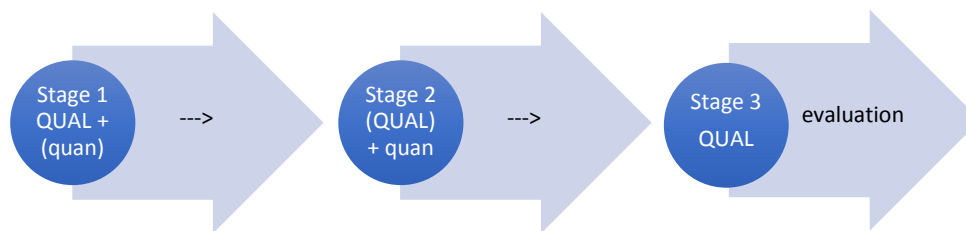
Manipulating information enables workplace bullies not only to harm both colleagues and employers, but also increases the likelihood of avoiding consequences and retaliation (Serenko, 2019, pp. 1270). 'Knowledge hiding' is an intentional action of not disclosing information which can be destructive to the individual trying to obtain it (Connelly et al., 2012, p. 65). 'Knowledge withholding' is an action of not disclosing information which can be destructive to individuals and/or the organization (Lin & Huang, 2010). Researchers emphasize that this does not have to be intentional, because the employee may not be aware of the fact that withholding certain pieces of information may be destructive to individuals and/or the organization (Pan et al., 2018).

Incompetence or the intention to harm may be equally destructive to the individual and the organization within the context of perception of workplace bullying. 'Knowledge hoarding' is a strategic, intentional, destructive action of not disclosing information to colleagues trying to obtain it (Evans et al., 2015). Additionally, the phenomenon of 'knowledge hoarding' involves deliberate hiding of information. This can be destructive to the organization. However, the existence and importance of the expert knowledge is not known to anyone except the person concealing it (Evans et al., 2015). Expert knowledge can be a source of power because it can reduce organizational uncertainty (Crozier et al., 1982, p. 83-85). Additionally, in the absence of support from colleagues and/or superiors, 'knowledge hoarding' seems to be the only way of defense for bullying victims (Serenko, 2019, p. 1270-1271).

Until the organization either begins to incur financial losses or qualified employees decide to resign, the employer might, either knowingly or unknowingly, tolerate bullying acts of tyrannical and disloyal managers (Kelloway et al., 2010, p. 20). Researchers stress that regular possibility of direct contact between managers responsible for making strategic decisions and their employees could partly prevent knowledge hoarding and hiding (Butt, 2020). In the era of new technologies, skillful building of trust becomes of paramount importance, it allows the company not only to develop, but also control incompetent and dishonest employees to prevent 'knowledge spillover' (Klincewicz, 2012, p. 190; Arain et al., 2019, p. 26; Latusek-Jurczak, 2020).

## Methods

Data was gathered in the course of 3 stage multiphase mixed method research sessions (Creswell & Creswell, 2017). During semi-structured interviews, respondents provided their lived experience in the form of idiosyncratic accounts of behaviors and factors that cause discomfort in their workplace (Husserl, 1970; Janowitz, 1972; Sanders, 1982; Van Manen, 2016; Crowther et al., 2017). In addition, they revealed their personal strategies for realizing their professional goals within their organizations (Bourdieu, 2013; Mohr, 2013). The phenomenological approach enabled to obtain a list of behaviors which were qualified as bullying having conducted a literature review of self-report inventories and bullying typologies (Groenewald, 2004; Aspers, 2009; Nielsen, Notelaers, & Einarsen, 2011; Escartin et al., 2019). Bullying measuring scales in the literature review included: The Work Harassment Scale WHS, Leymann Inventory of Psychological Terror LIPT/LIPT II, Negative Acts Questionnaire-Revised NAQ-R, Taxonomy of Workplace Bullying TWB (Björkqvist et al., 1994; Leymann, 1997; Cowie et al., 2002; Salin, 2003; Einarsen, Hoel, & Notelaers, 2009; Escartin et al., 2009). Having analyzed the data, a qualitative questionnaire was compiled (Figure 1).



**Figure 1.** Research Model. Source: Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications. Creswell, J. W., & Creswell, J. D. (2017).

## Findings and discussion

There is a statistical significance between bullying and incomprehensible instructions regarding the manner and time of completing tasks (H1). Newly employed staff complained about being either given unreasonable deadlines or that instructions are misunderstandable (Table 1). During the interviews, the respondents frequently accused their superiors of being incompetent as they used words and phrases they considered unprofessional. The unfamiliar professional jargon created an obstacle that might have impeded cognition. As a consequence of inadequate instructions, respondents felt criticized during the realization of their tasks (H2). Frequently, new employees were convinced that their mistakes were the fault of their superiors failing to provide them with proper instructions. The unawareness of the standardization of process and results frequently intensified subjective perception of being bullied through

constant criticism of their work (H3). Negative feedback after having received inadequate instructions and being constantly micro-managed in the process of decision realization intensified their discomfort and further developed into subjective experience of bullying by less experienced staff. Perceived bullying in the process of instrumental communication correlated negatively with longer work experience in the organization (H4). Time spent in the organization enabled to either learn or improve the required skills for more effective completion of tasks and the manner of their realization. Thus, the initial few months might intensify new employees' negativity towards their superiors and result in subjective experience of bullying.

**Table 1.**  
*Findings*

Parameter	WE < 1	IC1		WE < 2	IC1	
(H1) Makes allusions, without expressing explicitly when dealing with other employees	Y	<b>0,57***</b>	(n = 37)	Y	<b>0,29**</b>	(n = 74)
	N	<b>0,02</b>	(n = 230)	N	<b>0,03</b>	(n = 193)
		<b>IC2</b>			<b>IC2</b>	
(H2) Criticizes the work of other employees	Y	<b>0,45**</b>	(n = 37)	Y	<b>0,05</b>	(n = 74)
	N	<b>0,07</b>	(n = 230)	N	<b>0,05</b>	(n = 193)
		<b>IC3</b>			<b>IC3</b>	
(H3) Criticizes the work of other employees	Y	<b>0,71***</b>	(n = 37)	Y	<b>0,55***</b>	(n = 74)
	N	<b>0,36***</b>	(n = 230)	N	<b>0,36***</b>	(n = 193)
	<b>*p &lt; 0,05</b>	<b>** p &lt; 0,01</b>	<b>***p &lt; 0,001</b>			

Parameter – instrumental communication	Label
(H1) When I receive a task, my superior only provides me with the date of its completion, whereas the manner of its implementation is completely up to me	IC1
(H2) When I realize my tasks, my superior checks the manner of their implementation and/or suggests possible corrections	IC2
(H3) After completing the task, the superior expresses dissatisfaction if the outcome is inconsistent with their expectations and guidelines	IC3
Work experience shorter than 1 year	WE < 1
Work experience shorter than 2 years	WE < 2

## Conclusion

The first year of employment is of paramount importance in the process of confidence building, as well as job performance (McKenna et al., 2003; Laschinger, 2012; Missen et al., 2014). Lack of proper mentoring and training in the process of instrumental communication between superiors and subordinates might result in subjective experience of bullying. Bullying victims may envisage similar symptoms to post-traumatic stress disorder and even react physically in specific circumstances (Björkqvist et al., 1994). Suppressed anger might be vented

online and create a negative company image of the organization (Slonje & Smith, 2008; Bartlett & Bartlett, 2011; Szmidt, 2012; Muhonen et al., 2017; Forssell, 2019). Experts in this field stress that lack of physical contact dehumanizes the victim through online disinhibition effects (Suler, 2004; Dooley et al., 2009; Kowalski et al., 2012). Perceived bullying might also incur financial losses due to legal disputes (Baruch, 2005; Orozco, 2016; Milosevic, 2016; Hoel et al., 2020). Failure to either acknowledge that phenomenon of bullying might be subjectively experienced by employees or simply being unaware of the possibility, does not relieve organizations from potential negative consequences related to its occurrence. Moreover, new employees' initial experience could provide employers with invaluable information about the workplace and prevent potentially harmful consequences to organizations, superiors and subordinates.

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# QUEUE THEORY AND IMPROVING THE CUSTOMER SERVICE PROCESS IN THE CITY HALL – CASE STUDY

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**Introduction/background:** The objective of the article is to present possibilities of using queue theory at the City Hall to improve the service process. In recent years, the demand for high-quality customer service in an industrial city has increased, as it causes the applicant, and in the case of urban logistics – a resident, to become tied to their place of residence. This results in an increase in the number of residents, and thus leads to the development of the city and an increase in its resources (also financial).

**Aim of the paper:** The objective of the article is to present possibilities in City Hall offices of using queue theory to improve the service process.

**Materials and methods:** The article shows the application of mathematical methods in customer service in logistics.

**Results and conclusions:** Queuing systems have particular use in administration. Proper organisation of the work of an office or department enables fast and efficient service and customer satisfaction. The analysis of customer mass service systems is carried out in order to determine the optimal number of stations and to determine the general rules prevailing in the queue. When analysing the City Hall as a customer service system, it can be noticed that the usage of queuing theory to evaluate the system performance allows assessing the ability of the entity's logistics system to meet customer needs in terms of time, reliability and quality in accordance with the level of customer service.

**Keywords:** Queue theory in practice, customer satisfaction survey, optimization of customer service system.

## 1. Introduction

Customer service in logistics is among the latest aspects of logistics recently researched. The above term is increasingly important, not only for entrepreneurs or investors, but primarily for users. Moreover, in recent years, the individual resident has become the most important element of the city system, which makes efficient customer service more and more popular. From year to year, there are more indicators employed for examining customer satisfaction and compliance of the actual state with that expected by the consumer.

The article is an attempt to prove that, thanks to the application of mathematical models of queue theory, it is possible to calculate the optimal number of service points and the optimal service time with maximum mass customer satisfaction. The queue problem described in the article affects everyone, so resolving this issue is likely to save time and improve service quality. The thesis of the article was also formed: *The application of quantitative methods in City Hall offices in the process of servicing residents, increases customer satisfaction.*

## **2. City logistics and city logistics system**

City logistics currently serves as a tool that coordinates the unregulated system of cargo and people flow in the city, and is additionally customer-oriented – in this case, to a resident of a given urbanised region. Application of urban logistics procedures opens agglomerations to innovation and development, and introduces new IT systems supporting management (Szymczak, 2015). The individual is the most important element of the urban system, so the main objective of urban logistics according to B. Tundys is: ‘Providing the city user with the highest level of service at an acceptable cost of the flow of goods, information and people’. In addition, the activities of people managing urban logistics are focused on joining all the elements of the city's logistics system together, coordinating and controlling relations between them (Witkowski, 2015). The city's logistics system is a series of coordinated activities ensuring optimal flow within the system of goods, information and people. The city's logistics system and logistics processes occurring in it are closely related to meeting the diverse needs of users (mobility, manufacturing, learning, development, recreation, acquisition of goods, information) (Tundys, 2013).

## **3. The customer as a city resident**

The modern customer is increasingly aware of their high position in the entire logistics chain. The Polish dictionary defines a customer as follows: ‘An interested party dealing with some matters in an office, department, using the services of an enterprise, facility, bank, etc. (...)’ (Szymczak, 1978). The City Hall (in particular, the City Council Offices), is an institution in the city that deals with residents. The operation of this institution is financed from citizens' taxes, which is why a person who goes to the City Hall to sort a specific matter or acquire information should be treated as a customer who (due to paying taxes) purchased the service. More and more offices are taking on this strategy (Jórczak, 2015). It allows building good relations with the residents, and thus to develop the city and the society functioning in it.

I. Fechner defines customer service as ensuring the usability of space and time in the process of moving goods between the seller and the buyer.

It can be said that customer service logistics, as a process, consists of three basic parts (Fechner, 2007):

- Determination of the demand for a given service,
- data transformation and service implementation,
- assessment of the efficiency and effectiveness of service by comparing the actual state level with the declared.

Customer service in logistics raises the interest of both people related to marketing research and logistics. Customer service occupies a central position among logistics activities (Bendkowski et al., 2010) Due to the growing number of competitors on the market, customer service is increasingly important for the sale of a product or service, hence, we can say that customer service is complementary to marketing activities. Customer service in logistics can be described as a system of solutions that guarantee customer satisfaction. It is the ability to dynamically respond to customer expectations and requirements. Moreover, customer orientation allows long-term relationships (Walasek, 2014).’ Thus, ‘The customer service level (CSL, logistics customer service) is defined as the ability of an enterprise's logistics system to meet customer needs in terms of time, reliability, quality and convenience’.

#### **4. Characteristics of customer mass service systems**

Queue theory is based on probability theory. It examines the behaviour of systems and their basic parameters when queues begin to form. Queue theory is used in various fields of science. Its precursor is A.K. Erlang, a Danish mathematician who in his work examined the load on telephone exchanges. He published his first work in this field in 1909. Another scholar associated with queue theory is D.G. Kendall, who is considered the founder of mass theory (Oniszczyk, 1995). This theory is closely related to the issue of queuing systems and networks. The concept finds its use in modelling various service systems. Referring to the goal of city logistics, which is to provide the city user with a high level of service, the queue theory in the context of this system may have a positive impact on customer service. Important concepts in the case of mass service theory are (Filipowicz, 2008):

- arrival rate – average number of people arriving per unit of time,
- request intensity – average time between incoming requests,
- service rate – average number of people served in a given unit of time,
- traffic intensity parameter – arrival rate and service rate, which shows how many customers approached the service point and were correctly served per unit of time.

Two situations are distinguished (Filipowicz, 2008):

- when the arrival rate is less than the service rate; then the probability that the queue has a certain length per unit of time is constant,
- when the arrival rate is greater than the service rate; then the system is unstable and the probability of the queue lengthening over time increases.

Queuing systems have their particular application in administration. The proper organisation of work of each office or department enables quick and efficient service of the applicant and increases the efficiency of work and customer satisfaction (Filipowicz, 2008). The analysis of mass customer service systems is carried out in order to determine the optimal number of service points or to determine the principle of selecting tickets of those waiting in line for service. The objective of this analysis can be to determine the optimal average waiting time and to calculate the length of the queue. Due to the fact that the time of arrival of those waiting to enter the system and the exact time of service are not known, they are accepted as random variables. In queuing systems, it is important to properly select the number of servers for efficient and effective service. After service, applicants leave the system.

The creation of several queues that are characteristic of multi-channel and multi-phase mass service systems is allowed. These classes differ in the priority of service (priority service systems)' (Obretenow, 1989).

The theory of mass service also deals with the construction of mathematical models that can be used to manage any system.

The simplest model includes (Obretenow, 1989):

- a source of requests, which is characterised by:
  - finite (when the source generates an exact number of tasks) and infinite dimensions (when new requests can come in an unlimited number to the system),
  - the time between individual requests being described using a random variable  $U$  with the cumulative distribution function  $A(x) = P(\bar{u} \leq x)$  where  $\bar{u}$  is the average value of time intervals between requests,
- a queue, described by maximum length and regulations,
- a request service point, characterised by the duration of handling one request,
- traffic intensity (Erlang constant) - the quotient of the average number of requests that flows into the system per unit of time to the average number of requests that can be handled per unit of time.

### **Kendall's notation**

The queue system is described by 3 parameters (Smolarek, 2006):

1. Arrival time.
2. Service time.
3. Number of service points.

Queuing systems in Kendall's notation are described as follows:

parameter1/parameter2/parameter3

where:

**Parameter 1**

M = Poisson arrival time

D = Deterministic arrival time

**Parameter 2**

M = Poisson service time

G = General service time

D = Deterministic service time, this means that the service time must be set from above, e.g. at the production line or automatic car wash (Kotowski, 2009).

**Parameter 3**

Number of service points

**Parameter 4 (does not always occur, in the infinite system this parameter is omitted)**

Number of places in the system (including those at customer service points and in the queues).

Examples of queuing system description using the parameters put forward above are presented in Table 1.

**Table 1.**

*Examples of system description using Kendall's notation*

M/M/s	M/G/1	M/D/1
<ul style="list-style-type: none"> <li>• Input stream with parameter <math>\lambda</math></li> <li>• Exponential service with the <math>\mu</math> parameter</li> <li>• Number of service points <math>s</math></li> <li>• FIFO service discipline</li> <li>• Single queue</li> <li>• An infinite queue</li> </ul>	<ul style="list-style-type: none"> <li>• Poisson input stream with the <math>\lambda</math> parameter</li> <li>• Service time with any <math>\mu</math> distribution and <math>\sigma</math> standard deviation</li> <li>• One service point</li> </ul>	<ul style="list-style-type: none"> <li>• The service time is deterministic, i.e. it has been agreed in advance. It is possible to switch from the M/G/1 system to the M/D/1 system assuming the standard deviation value <math>\sigma = 0</math></li> </ul>

Source: Kotowski R. Elementy Modelowania Matematycznego (Elements of Mathematical Modelling). Lecture 9. Department of Applied Computer Science. PJWSTK 2009.

The mathematical model of mass customer service systems includes the random variables and assumptions given in Table 2, and is also based on the theory of stochastic processes. Thanks to suitable mathematical formulas, the system user or observer can calculate queue-waiting time, probability of queue lengthening, etc. based on various variables. Usually two cases are considered (Kotowski, 2009):

- when the system heads towards a balanced state
- when the system is unstable.

**Table 2.***Essential assumptions and random variables of mass service systems*

Assumptions	Random variables
<ul style="list-style-type: none"> <li>probability distribution type of random variables, deterministic distribution, exponential distribution, Erlang distribution, any distribution,</li> <li>dependence or independence of random variables - waiting time for requests and service time,</li> <li>service discipline in force in the system,</li> <li>it is assumed that R (number of service points) converges to infinity,</li> </ul>	<ul style="list-style-type: none"> <li>time between subsequent requests entering the system,</li> <li>request service time by one service point,</li> <li>number of service points,</li> <li>number of people waiting in the queue (finite, infinite queue),</li> </ul>

Source: [http://pja.mykhi.org/mgr/1sem/EMM/tronczyk/EMM\\_W\\_9.pdf](http://pja.mykhi.org/mgr/1sem/EMM/tronczyk/EMM_W_9.pdf).**Table 3.***Mathematical formulas used in queue theory*

Description	Formula
The probability that there are no customers in the system, i.e. $n = 0$	$P(n = 0) = \frac{1}{\sum_{i=0}^{r-1} \frac{p^i}{i!} + \frac{p^r}{(r-p)(r-1)!}}$
Average number of people waiting in queue	$Q = \frac{p^{r+1}P(n = 0)}{(r-p)^2(r-1)!}$
The probability that the waiting time in the queue is longer than $t_0$	$P(t > t_0) = P(n > r - 1)e^{\mu t_0(r-p)}$
The probability that the customer will have to wait (under the condition that $n_0 \geq r-1$ )	$P(n > n_0) = \frac{r^{r-n_0}p^{n_0+1}P(n = 0)}{(r-p)r!}$

Source: [http://pja.mykhi.org/mgr/1sem/EMM/tronczyk/EMM\\_W\\_9.pdf](http://pja.mykhi.org/mgr/1sem/EMM/tronczyk/EMM_W_9.pdf).

It is important to first determine whether the queue is getting smaller, bigger or remaining unchanged. A favourable situation for the institution servicing the customer is that the work of the servicing person is not interrupted and that that institution is able to take full advantage of its human resources. The customer who wants to be served immediately looks at the queue problem from a different perspective. Knowing the arrival rate  $\lambda$  and the service rate, he/she can determine whether the queue has a certain length in each unit of time and is heading towards a balance or shrinks and then the inequality  $\lambda < \mu$  occurs, or whether the system is unstable and then  $\lambda \geq \mu$ . In the second case, the service channel cannot make up for the lost time in which e.g. the service point was temporarily closed. Hence, by knowing the basic parameters of the queue, the institution can determine whether it needs to improve the work of a given service point or open a new one (Jędrzejczyk et al., 1997).

## 5. Queue theory in practice – case study

In one City Hall, an issue was identified which generated queues for service points responsible for issuing transportation documents. As a solution, an additional service point was



considered. For the purpose of assessing the effectiveness of this proposal, traffic intensity was monitored and a customer satisfaction questionnaire was created and conducted on a group of 100 people. Among other issues, the following were checked:

- time between arrival of next customer,
- individual customer service time,
- waiting time in queue.

Observations took place at the following times: Monday 13:00-16:00, Tuesday 10:00-12:00, Wednesday 11:00-13:00, Thursday 9:00-11:00, Friday 12:00-14:00.

During the research period, 183 applicants visited the City Hall office. In Table 4, the results of observations carried out on Monday from 13:00 to 16:00 are presented. At that time, 51 people visited the city council office, but only 44 people decided to stay and wait in the queue (Głos, 2016).

**Table 4.**

*The result of the observation carried out at the city council office on Monday*

Day of the week	Number of open service points	Observation hours	
Monday	2	13:00-16:00	
Customer number	Arrival time (counted from the time the previous customer arrives until the next one arrives) [min]	Customer waiting time in queue [min]	Service time [min]
1	1	0	6
2	2	0	7.5
3	1	0.5	8
4	0.5	2.5	9
5	1	0.5	5.5
6	4.5	0	6.5
7	1	0	8
8	0.5	0	5
9	3	3.5	5
10	0	5	6
11	0.5	8	5
12	4.5	12.5	8.5
13	6	16	11
14	1	16.5	16
15	0.5	25.5	2.5
16	0.5	26.5	3
17	1	28.5	2.5
18	1	29.5	2.4
19	0.5	29.9	5.5
20	0.5	15	6.5
21	4	20.5	3.5
22	3	19.5	2.5
23	1	15	5
24	1	16	6.5
25	1	20.5	4.5
26	5.5	23	5.5
27	4.5	22	2.5
28	1	14.5	5.5

Cont. table 4.

29	0.5	14.5	3.5
30	1	0	3
31	0.5	0	5
32	1	3.5	4
33	1.5	6	7
34	1	10.5	5
35	1	13	5.5
36	1.5	16.5	6.5
37	1	20.5	4.5
38	0	22.5	8
39	0	29.5	7.5
40	2	37	3
41	1	38	4.5
42	1	39.5	3.5
43	0.5	41	1.5
44	1	41	1
<b>TOTAL</b>	<b>66</b>	<b>703.9</b>	<b>237.9</b>

Source: Own study based on the conducted observations.

Arrival rate on Monday from 13:00 to 16:00 is:

$$\lambda = \frac{44}{66} \approx 0.667 \quad (1)$$

Service rate:

$$\mu = \frac{44}{237.9} \approx 0.185 \quad (2)$$

Using the values of both parameters, the traffic intensity parameter was calculated while two service points are open, i.e.  $r=2$ :

$$p = \frac{\lambda}{2 * \mu} = \frac{0.667}{2 * 0.184} \approx 1.8 \quad (3)$$

The above calculations show that  $\lambda > r\mu$ , which means the advantage of the arrival rate over the service rate. The  $p$  parameter value is also greater than 1, which suggests that the above system is unstable, i.e. the queue length is constantly increasing. Hence, achieving a state of balance is only possible if the time to service individual customers is reduced or a new service point is opened. The probability that there will be no queue in this system was calculated from the formula:  $P(n=0)$ .

$$P(n = 0) = \frac{1}{1 + 1.8 + \frac{1.8^2}{(2-1.8)(2-1)!}} = \frac{1}{2.8 + \frac{3.24}{0.2}} = \frac{1}{20.05} \approx 5.2\% \quad (4)$$

It was next calculated what the probability was that the customer would not have to wait in a queue when coming to the City Hall, assuming that only two service points are open.

$$P(n > 0) = \frac{2^{2-0} 1.8^{0+1} 5.2}{(2-1.8)2!} = \frac{4 * 1.8 * 5.2}{0.2 * 2} \approx \frac{37.9}{0.4} \approx 94.8\% \quad (5)$$

This means that there is as much as 94.8% probability of event A occurring, which means that the customer entering the system will have to wait in the queue.

Subsequently, it was ascertained as to what the probability was that there would be more than two people in a queue when coming to the City Hall on a given day, and that the waiting time would be more than 3 minutes.

Probability of more than 2 people in the queue:

$$p(n > 2) = \frac{2^{2-2} * (1.8)^3 * 5.2\%}{0.2 * 2!} \approx 76.98\% \quad (6)$$

The probability that the waiting time in the queue will be over 3 minutes, assuming that  $\rho$  is 2.7182:

$$p(t > 3) = p(n > r - 1)e^{-\mu t_0(r-p)} = p(n > 1)e^{-0.185 * 3 * (2-1.8)} \approx 91\% \quad (7)$$

Average number of customers waiting in the queue:

$$Q = \frac{p^{r+1}P(n=0)}{(r-p)^2(r-1)!} = \frac{1.8^3 * 0.052}{(2-1.8)^2 * 1!} \approx 7.6 \quad (8)$$

In order to check the probability of waiting time over 5 minutes, 7 minutes, 9 minutes, 12 minutes and 15 minutes, subsequent calculations were made, the results of which are presented in Table 5.

**Table 5.**  
*Probability of waiting time*

Probability of waiting time	Calculation result
Over 5 minutes	71%
Over 7 minutes	66%
Over 9 minutes	61%
Over 12 minutes	55%
Over 15 minutes	49%
Over 30 minutes	29%

Source: Own study based on the conducted research.

The results of calculations carried out in a manner analogous to Monday for the remaining days are presented in Table 6.

**Table 6.**  
*Test results from subsequent days of the week*

Day of the week	Tuesday	Wednesday	Thursday	Friday
Observation hours	10:00-12:00	11:00-13:00	9:00-11:00	12:00-14:00
Number of open service points	2	2	2	2
Number of customers served	29	34	37	39
Number of people abstaining from the service	5	7	2	5
Parameter name	Calculation result			
	Tuesday	Wednesday	Thursday	Friday
Arrival rate	0.70 persons per minute	0.64 persons per minute	0.58 persons per minute	0.64 persons per minute
Service rate	0.21 persons per minute	0.24 persons per minute	0.17 persons per minute	0.24 persons per minute
Traffic intensity parameter	1.67	1.34	1.37	1.34
The probability that there will be no queue	8.89%	19.81%	9.14%	19.81%

Cont. table 6.

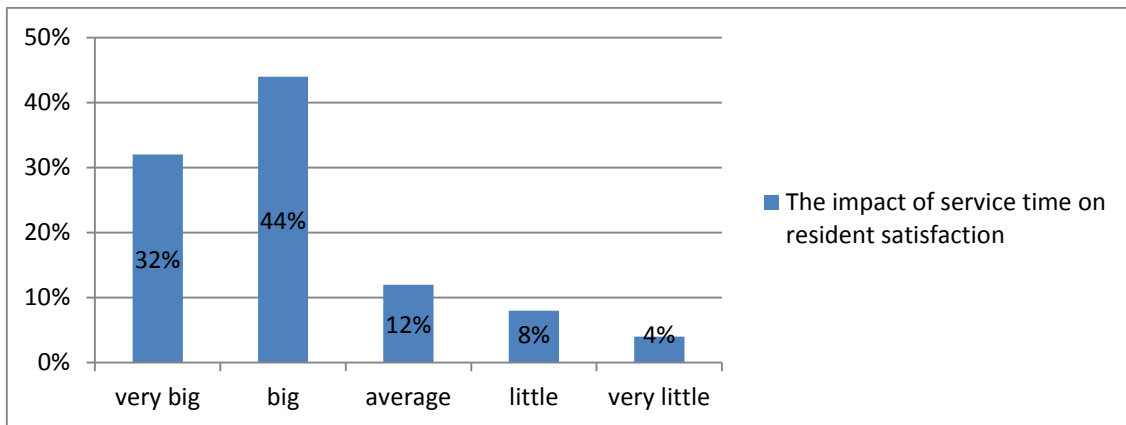
<b>The probability of more than 2 people in the queue</b>	63.79%	35.93%	62.97%	35.93%
<b>The probability that the waiting time will be over 3 minutes</b>	86.16%	35.5%	88.15%	62.1%
<b>Average number of people waiting in queue</b>	4 people	1 person	4 people	1 person
<b>System Type</b>	Unstable system	Unstable system	Unstable system	Unstable system
<b>The probability of a waiting time over 5 minutes</b>	54.2%	24.3%	56.5%	54.2%
<b>The probability of a waiting time over 7 minutes</b>	47.3%	17.7%	50.3%	41.3%
<b>The probability of a waiting time over 9 minutes</b>	41.3%	12.9%	44.7%	40.3%
<b>The probability of a waiting time over 12 minutes</b>	33.6%	8%	37.6%	33.6%
<b>The probability of a waiting time over 15 minutes</b>	27.4%	5%	31.5%	25.4%
<b>The probability of a waiting time over 30 minutes</b>	9.9%	0.5%	13.1%	9.9%

Source: Own study based on the conducted research.

The research shows that the queue system was not stable on any day of the week, which means that the probability of the queue occurring continued to increase. The lowest traffic intensity parameter occurred on Wednesday between 11:00-13:00 and on Friday between 12:00-14:00 and was 1.4. The average probability that there will be no queue is around 15%.

The next stage of the research was to conduct a survey addressed to adult residents of the studied city, containing questions about service time, waiting time in queues, quality of the service and information flow. 100 respondents: 66 women and 34 men took part in the questionnaire sent via e-mail. The conducted research shows that the average waiting time in a queue, according to clients of the City Hall, is 2-10 minutes (47% of all respondents), 11-15 minutes (44% of all respondents), over 15 minutes (8% of all respondents), 0-1 minutes (1% of all respondents). In addition, 73% of all respondents believe that the waiting time in a queue should be shorter, as it significantly affects the quality of the service. Thus, the waiting time in the queue is strongly correlated with the speed of service of individual people. Most of the respondents (79%) believe that the service should be much faster. The remaining respondents have no objections to the time of service. 78% of all respondents confirmed that it is necessary to introduce an electronic queuing system that would shorten the waiting time for service or force opening of one additional customer service station.

Another question was about the impact of the speed of service and waiting time in queue on customer satisfaction. The answers to this question are presented in figure 1.



**Figure 1.** The impact of service time on resident satisfaction. Source: Own study based on the conducted research.

Figure 1 shows that service time is a very important factor that affects customer satisfaction. Overall, 76% of all respondents feel that it has a big or very big impact, and the studies have confirmed that the waiting time in the queue at the city council office is very long, which significantly affects customer satisfaction.

The survey ended with an open question soliciting changes that might improve the logistics of mass customer service. Examples of enhancements provided by respondents include:

- “Possibility to start the procedure via the Internet. In this case, I would come to the office to finalize the case, without the need of several visits.”
- “Introduction of an electronic queue system and opening more service stations in case of increase of queues.”
- “Better description of each service station to avoid waiting in a wrong queue.”
- “Increase number of customer service stations”.

In order to check what actions should be taken to improve the mass customer service process, simulations were carried out, consisting in calculating the arrival rate, service rate, probability of queue occurrence, average number of people waiting in the queue and type of arrangement for two systems:

- system 1, in which three service points are open,
- system 2, in which the time of serving a single customer amounts to a maximum of 5 minutes.

### System 1 simulation

In the initial phase, an additional service point is opened, i.e.  $r = 3$ . The number of customers, service time and time from arrival to service does not change. The simulation results are presented in Table 7.

**Table 7.**  
*System simulation with an additional service point*

Parameter name	Calculation result
Arrival rate	0.67 persons per minute
Service rate	0.18 persons per minute
Traffic intensity parameter	1.8
The probability that there will be no queue	28%
Average number of people waiting in queue	1 person
System Type	Stable system

Source: Own study based on the conducted research.

### System 2 simulation

It has been assumed that the introduced service time does not exceed 5 minutes. The number of customers, the number of service points and the time between the arrival of subsequent customers does not change. The simulation results are presented in Table 8.

**Table 8.**  
*Service system with fixed service time*

Parameter name	Calculation result
Arrival rate	0.67 persons per minute
Service rate	0.31 persons per minute
Traffic intensity parameter	1.06
The probability that there will be no queue	29.10%
Average number of people waiting in queue	0-1 person
System Type	Unstable system

Source: Own study based on the conducted research.

### Comparison of the proposed systems with the current state

In Table 9, the following were compared: current state, predicted state after starting system 1 and predicted state after starting system 2. All systems are based on data from Monday.

**Table 9.**  
*Comparison of the current state and predicted states*

Parameter	Current state	System 1	System 2
Arrival rate	0.67	0.67	0.67
Service rate	0.18	0.18	0.31
Traffic intensity parameter	1.8	1.8	1.09
The probability that there will be no queue	5.2%	27.65%	29.1%
Average number of people waiting in the queue	7.6	1.02	0.47

Source: Own study based on the conducted research.

Based on the above results, it can be seen that both the introduction of an additional service point and the reduction of service time for individual customers to a maximum of 5 minutes will increase the performance of the system, reduce the probability of queues, and reduce the number of people waiting in the queue. The rate of arrival of customers has not changed in any

of the systems, while the service rate has only changed in system 2, which assumes a change in customer service time.

The results of statistical manipulation indicate that opening another service point will allow faster customer service, and that shorter waiting time in the queue will improve customer satisfaction. The above improvements will increase the probability that the customer will not have to wait by more than 22% (from 5.2% to 27.65%). The average number of people waiting in the queue will also decrease from seven to one.

## 6. Summary

Queuing systems have particular use in administration. Proper organisation of the work of an office or department enables fast and efficient service and customer satisfaction. The analysis of customer mass service systems is carried out in order to determine the optimal number of stations and to ascertain the general rules prevailing in the queue. When analysing the City Hall as a customer service system, it can be noticed that the usage of queuing theory to evaluate the system performance allows assessing the ability of the entity's logistics system to meet customer needs in terms of time, reliability and quality in accordance with the level of customer service.

Customer service is defined in the literature as a system of solutions ensuring such relations between the time of placing the order and the time in which the product is delivered to the customer so as to fully satisfy them and maintain this satisfaction as long as possible. Therefore, queue theory can help shorten the waiting time and customer service, which according to the research, will significantly affect the satisfaction of residents. The conducted simulations showed that the introduction of a new service point or reduction of customer service time to 5 minutes, would improve the logistic process of customer mass service, and increase the customer's satisfaction. The usage of quantitative methods in the process of servicing residents in the City Hall helps to increase customer satisfaction.

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# UTILIZING DECISION TREES ON EMPLOYEE DECISION-MAKING PROCESSES: A MODEL PROPOSAL

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**Introduction/background:** This paper offers an idiosyncratic relational framework built on the organizational silence theory and the organizational support theory. It exploits the distinct advantages that using decision trees in classification and prediction applications offer to form a unique predictive model.

**Aim of the paper:** This paper argues that a relational framework built on the organizational silence theory and the organizational support theory can give important clues about how employees make certain decisions in the workplace as well as about factors that have an impact on their decision-making processes.

**Materials and methods:** The research applies decision trees learning – a data mining technique – to unfold the hidden patterns and unprecedented relationships between the two constructs that until now had not been revealed.

**Results and conclusions:** The suggested model, which consists of 13 rules, exhibits the effects of perceived organizational support and employee silence behavior on employee decisions with an approximately 79% correct classification rate, showing the success of the model as well as its appropriate relational framework.

The presented findings indicate that a relational framework built on the organizational silence theory and the organizational support theory has a lot to offer in terms of building effective HR strategies and policies. The study also extends the understanding of the antecedents of silence behavior in different social contexts.

**Keywords:** Perceived Organizational Support, Employee Silence, Decision Trees, HRM.

## 1. Introduction

Decision making is an inherent characteristic of human life, and therefore an inseparable part of our lives. We make hundreds of decisions and choices every day either consciously or not. What we do and what we feel are ultimately the results of our decisions. By all means, decision making which is an important aspect of the overall cognitive function that determines our life choices (Sahakian & Labuzetta, 2013) is influenced by so many factors including our

beliefs regarding personal relevance (Acevedo, & Krueger, 2004) as we have rather divergent personal aspirations, interests, experience (Juliusson et al., 2005) as we make judgments based on our experiences and interpret them accordingly, individual differences (de Bruin et al., 2007) reflecting different psychological characteristics or simply cognitive biases (Stanovich & West, 2008) that root in our way of thinking or the way we perceive the world. In other words, this complex cognitive function that is integral to our everyday lives may well be subject to perceptual, individual, organizational, or environmental issues that are often contextually constructed. In this study, however, we focus on the two pivotal organizational issues that influence this complicated cognitive process: employee silence, and perceived organizational support. As in almost every area of life, we make decisions and arrive at certain judgments in our workplaces and these judgments forming a common framework of attitudes affect the next decisions to be made. Thus, just as successful managers should have good decision-making skills reflecting their ability to correctly recognize and define problems and to then select an appropriate course of action to solve problems, they also need to develop an understanding of the effects of employees' workplace experience and thoughts on their decisions. In this sense, we suggest that a relational framework built on organizational silence theory (Morrison & Milliken, 2000; Milliken, Morrison & Hewlin, 2003; Pinder & Harlos, 2001) and the organizational support theory (Eisenberger et al. 1986; Rhoades & Eisenberger, 2002; Shore & Shore, 1995) will give important clues of how employees make certain decisions in the workplace and factors that have an impact on their decision-making processes. Accordingly, the present study extends the prevailing views regarding the relationship between organizational silence and organizational support by applying decision trees learning – a data mining technique – to explore the hidden patterns or relationships that prior studies haven't been able to reveal. Decision trees algorithm is a technique that is utilized in classifying and obtaining rules and the algorithm seeks for the best ranking to guess target variables (Yüncü & Fidan, 2019). Hence, the study primarily offers a novel and idiosyncratic perspective for both theoretical frameworks by utilizing the distinct advantages of using decision trees in classification and prediction applications (Kotu & Deshpande, 2015) to form a unique predictive model. The model exhibits the effects of perceived organizational support and employee silence behavior on employees' decisions with an approximately 79% correct classification rate. Along similar lines, by utilizing a supervised machine learning technique (Tan, 2015), the study also extends the understanding of the antecedents of silence behavior and the impact of perceived organizational support on employees' attitudes towards the organization.

## 2. Literature Review

Previous studies within the field of organizational behavior have well established the importance of perceived organizational support and employee silence as two fundamental constructs, though within different theoretical frameworks. As literature regarding the relationship between the two constructs is yet far from reaching maturity, the two multi-dimensional constructs still offer a wide range of areas to explore, particularly for those who aim at reaching comprehensive relational models. However, one should also see that building such powerful models require a high level of knowledge and familiarity of two profound and compelling theoretical background.

Employee silence theory which dates back to the 1970s explores hypotheses to determine why some groups remain silent while others are more vocal in forums of public discourse (Beheshtifar et al., 2012). Accordingly, employee silence refers to the intentional withholding of information, opinions, suggestions, or concerns about potentially important organizational issues (Wang & Hsieh, 2013). Today, the literature on employee silence, however, is largely grounded on the studies conducted by Morrison & Milliken (2000), Pinder & Harlos (2001), Milliken et al. (2003), Van Dyne et al. (2003), who indicate that employee silence is a pervasive, multi-dimensional phenomenon and therefore has become an issue particularly for modern organizations. Morrison & Milliken (2000) refers to employee silence (they prefer to use the term organizational silence) as a collective-level phenomenon by arguing that there are powerful forces in many organizations that cause widespread withholding of information about potential problems or issues by employees. For Morrison & Milliken (2000), employee silence is a consequence that roots in managers' fear of negative feedback and a set of implicit beliefs often held by managers. They put forth the concept of climates of silence to explain how norms in organizations influence some victims of abuse to keep quiet (Pinder & Harlos, 2001) on the assumption that there are certain organizational norms that very often prevent employees from speaking up. Accordingly, Morrison & Milliken (2000) suggest a model through which the authors identify contextual variables (rather than individual variables) that create conditions conducive to silence and explore the collective sense making dynamics that can create the shared perception that speaking up is unwise. They also discuss the negative consequences of systemic silence in terms of organizational change and development. Pinder & Harlos (2001), on the other hand, criticize the traditional assumption that employee silence is merely the absence of voice that reflects inaction and endorsement and assert that silence can communicate and that it is accompanied by characteristic thoughts, feelings, and actions.

By reviewing distinct pieces of literature such as anthropology, sociology, and linguistics to unfold further meanings and conceptual challenges related to employee silence behavior, they define employee silence as the withholding of any form of genuine expression about the individual's behavioral, cognitive and/or affective evaluations of his or her organizational

circumstances to persons who are perceived to be capable of effecting change or redress. Hereby, Pinder & Harlos (2001) and introduce quiescence and acquiescence silence as the two forms of employee silence along with their behavioral, affective, and cognitive components. Within this integrative model of employee silence in organizations, they also explain why some mistreated employees become silent, how some break their silence, and what organizational contexts produce and reinforce employee silence. Milliken et al. (2003), later, focused on the types of issues that employees are reluctant to raise, and investigated the reasons why employees sometimes prefer to remain silent rather than speak up. Based on an interview with 40 employees, they found that the fear of being viewed or labeled negatively was found to be the most common reason for employees' silence behavior within an organizational setting. In their model through which they primarily aim to develop a better understanding of how and why employees sometimes choose to remain silent about their concerns, they underline two salient insights. First, interviewed employees were quite focused on the potential risks of voicing their concerns, which means that their decisions to remain silent are largely driven by the desire to avoid negative outcomes. Second, in asking the question 'What will happen if I raise this issue?' employees consider information culled from both past experiences and observations of the present context. Another study that contributed to the employee silence literature was made by Van Dyne et al. (2003) and we also utilized these forms of silence throughout this study. By asserting that the traditional conceptualizations of silence urge on relatively passive behavior, Van Dyne et al. (2003) differentiated three forms of silence in their novel conceptual framework based on employee motives (Acquiescent Silence, Defensive Silence, and ProSocial Silence). Accordingly, acquiescent silence refers to withholding relevant ideas, information, or opinions, based on resignation. Hence, it raises disengaged more passive behavior. Defensive Silence, on the other hand, refers to withholding relevant ideas, information, or opinions as a form of self-protection, based on fear and contrary to acquiescent silence it is both an intentional and a proactive behavior the purpose of which is to protect the self from external threats (Van Dyne et al., 2003; Schlenker & Weigold, 1989). The final form of employee silence asserted by the authors is Prosocial silence. Indeed, it is this third form of silence through which Van Dyne et al. (2003) extend existing conceptualizations of silence, thereby contribute to the employee silence literature significantly. With this new form of silence that had not been addressed before, the authors refer to the silence behavior of withholding work-related ideas, information, or opinions to benefit other people or the organization. In this regard, ProSocial Silence is discretionary behavior and based on awareness and consideration of alternatives and the conscious decision to withhold ideas, information, and opinions.

As for the theory of perceived organizational support, the literature on perceived organizational support is largely grounded on the studies conducted by Eisenberger et al., (1986), Shore & Shore, (1995), Rhoades & Eisenberger (2002). Indeed, the theory adopts Levinson's (1965) point of view that employees personify the organization, viewing it as having dispositional characteristics including benevolent or malevolent intentions toward them

(Hayton et al., 2012). With the contributions of Chen et al. (2009), Neves & Eisenberger (2014), Hayton et al. (2012), Eisenberger et al. (2013), Kurtessis et al. (2015), and Shanock et al. (2019), however, the theory has made significant progress in a way that extended the understanding of perceived organizational support significantly. In short, the theory suggests that Perceived Organizational Support (POS) refers to employees' perception concerning the extent to which the organization values their contribution and cares about their well-being. Therefore, the theory discusses the development, nature, and outcomes of such perceived organizational support. In point of fact, POS literature contains plenty of evidence that indicates that employees with high POS levels evaluate their jobs more positively in terms of their mood, stress level, or job satisfaction (Chen et al., 2009; Rhoades & Eisenberger, 2002). Alternatively, if the employees get valued resources such as pay raises, based on the reciprocity norm they will develop their POS positively and therefore, feel obligated to make an effort to repay the organization by helping it to reach its valued objectives (Neves & Eisenberger, 2013). Therefore, the POS theory, which approaches the relationship between organization and employee from the employee's perspective, holds great potential for understanding how and why HR management strategies are built and how they work (Shanock et al., 2019).

Hereby, the importance of perceived organizational support and employee silence as two fundamental constructs is well established within prior literature. However, the literature regarding the relationship between the two constructs is yet far from reaching maturity, there are still prominent gaps to be filled particularly regarding both this relationship and the antecedents of these constructs. The number of studies with such a perspective is very limited. Although these constructs have been investigated in many studies separately, it is clear that the number of studies in which the concepts of employee silence and perceived organizational support are discussed together is relatively few. Some examples of studies with similar perspectives include Khalid & Ahmed (2016), Tucker et al. (2008), Tangirala & Ramanujam (2008), Wang & Hsieh (2013), Singh & Malhotra (2015) and Yu & Liu (2016). However, the two multi-dimensional constructs still offer a wide range of areas to explore, particularly for those who aim at reaching comprehensive relational models. This is mainly because the relationship between perceived organizational support and employee silence must be examined using multidimensional and alternative techniques by re-evaluating the constraints related to the direction of the relationships. In this sense, data mining methods offer a great opportunity to reveal hidden patterns between the two constructs. In this context, this study extends the prevailing views regarding the relationship between organizational silence and organizational support by applying decision trees learning to explore the hidden patterns or relationships that prior studies haven't been able to reveal.

### 3. Methodology

As we are actually living in the data age in which a large spectrum of data is collected on a daily basis, analyzing this big data has become a pivotal need. Data mining, which can meet this need by providing tools to discover knowledge from data, is a family of methods used to access information by creating systematic rules from data (Han et al., 2011). Compared to statistical models, more successful results are obtained both on the real data and the one created through simulations (Agrawal & Srikant, 2000). Since real-life data often do not have easily noticed rules unlike synthetic data, data mining methods are preferred to reveal hidden patterns (Hand & Adams, 2014; Maimon & Rokach, 2005). Understanding hidden patterns that cannot be easily noticed, especially in decision problems, can be easily achieved under data mining methods inspired by the decision-making construct of the human brain. Instead of obtaining linear relations in the data, the realization of artificial learning, which basically means understanding the internal nature of the data and its effects on the decision process, reveals more effective results in the solution of the decision problem. In simpler terms, artificial learning provides a powerful method to create high-performance systems (Quinlan, 1986). Data mining is handled within the scope of three different scenarios, namely classification, clustering, and prediction (Agrawal & Srikant, 2000). In this research, a classification scenario was created by using decision trees, one of the data mining methods. With this design, 692 blue-collar employees from different sectors were asked 25 questions from two different scales and one decision variable question, apart from demographic questions. In this study, employee silence scale developed by Van Dyne et al. (2003) and perceived organizational scale developed by Shanock et al. (2019) were utilized. The obtained data were analyzed through decision trees, which is a data mining technique.

#### Decision Trees

Decision trees is a data mining technique used in classification and solution of prediction problems (Han et al., 2011; Silahtaroglu, 2008; Agrawal & Srikant, 2000; Quinlan, 1986). It is faster and easier to understand and interpret than a large number of methods used in complex decision problems (Silahtaroglu, 2008). In the decision tree application, part of the data set is used for the training of the decision tree. Then, the model is created by means of the rules obtained from the learning data set. Each branch on the decision tree model from nodes to leaves represents a rule. Thus, the decision tree diagram enables us to understand which of the factors used in the study is effective on the decision variable and to reveal the relationships between these factors (Quinlan, 1986). The decision tree diagram that is formed here is obtained by following two basic steps below (nodes, branches, and leaves, respectively):

I) Entropy values are calculated with the help of equation 1 for each variable (factor) other than the decision variable. The factor with the highest knowledge gain is determined and selected as the starting node, or in other words, the root node.

Since the increase in entropy value shows that the uncertainty in the variable increases, a tree structure is created from a low uncertainty level to high. This process is continued at every step and the decision variable (leaf) is reached.

$S_i$  signifying the factors, for the entropy value:

$$E(S) = - \sum_{i=1}^n \frac{S_i}{S} (\log \frac{S_i}{S}) \quad (1)$$

For information gain, the conditional entropy value is calculated and subtracted from the total entropy value:

$$E(S_j|S_n) = \frac{S_i}{S} (\log \frac{S_i}{S}) \quad (2)$$

Information gain:

$$E(S) - E(S_j|S_n) \quad (3)$$

Thus, a tree diagram is created by determining the factor with the highest knowledge gain and placing it in root and successive nodes (Bhargava et al., 2013).

ii) By determining the minimum threshold value for the number of observations per leaf, branches that are deemed unimportant are pruned and more understandable rules are obtained. Pruning also increases the power of generalization by removing the rules with few examples in the resulting decision tree (Quinlan, 1986).

## 4. Findings

### 4.1. Decision Trees Demographic Characteristics of the Participants

In addition to questions about their gender, age, education level, marital status, the participants were also asked about their professional life, such as experience, rotation status, working time at the last place of work. Summary tables for this information are given below.

**Table 1.**  
*Demographic variables summary*

Variable	Category	Frequency	Percentage
Gender	Woman	359	51.9
	Man	333	48.1
Marital Status	Single	367	53.0
	Married	325	47.0
Level of Education	High School	144	20.8
	Associater degree	129	18.6
	Under Graduate	237	34.2
	Graduate	182	26.3

As stated in Table 1, 359 people, 51.9% of 692 participants, are women and 333 people, 48.1% are men.

53% of the participants, that is 367 people, defined themselves as single and the remaining 47%, that is, 325 people, as married (Table 1).

The education levels of the participants are specified in Table 1 as 20.8% and 144 persons, 18.6% and 129 persons, 237 persons with 34.2% and 182 persons with 26.3%, respectively, as high school, associate degree, undergraduate and graduate.

Among the participants, there are those who continue their professional life in a single business as well as those who has worked in more than one business. In order to determine the effects of this situation on the decision process, the total experience and working periods in the last workplaces are considered separately.

In Table 2, the total experience times taken from the participants as open-ended are categorized. Accordingly, 139 people with less than 6 years of experience make up 20.1% of the total, 134 people with 6-10 years of experience make up 19.4% of the total, 88 people with 11-15 years of experience make up 12.7% of the total, 83 people with 16-20 years of experience make up 12% of the total, 73 people with 21-25 years of experience make up 10.5% of the total, and finally 175 people with more than 25 years of experience make up 25.3% of the total.

**Table 2.**  
*Experience variables summary*

Variable	Category	Frequency	Percentage
Total Experience	Less than 6	139	20.1
	6-10	134	19.4
	11-15	88	12.7
	16-20	83	12.0
	21-25	73	10.5
	More than 25	175	25.3
Experience in the current work	Less than 6	177	25.6
	6-10	146	21.1
	11-15	85	12.3
	16-20	82	11.8
	21-25	74	10.7
	More than 25	128	18.5
Working Rate	0.00-0.25	11	1.6
	0.26-0.50	34	4.9
	0.51-0.75	203	29.3
	0.76-1.00	444	64.2

The experience of the participants where they are currently working were also categorized the results in Table 2 were obtained. Accordingly, 177 people working less than 6 years in the last place make up 25.6% of the total, 146 employees between 6-10 years make up 21.1% of the total, 85 employees between 11-15 years make up 12.3% of the total, 16-20 years 82 employees make up 11.8% of the total, 74 people working 21-25 years make up 10.7% of the total, and finally, 128 people working more than 25 years make up 18.5% of the total.



Since the questionnaire form answered by the participants is related to their current job, the variable of working rate = experience in the current work (year) / Total experience (year) was calculated and the results are given in Table 2 in order to take the experience effect into account.

Working rate variable calculated in Table 2 is categorized in quarters. 11 people with a working rate of 0.00-0.25 were 1.6%, 34 people between 0.26-0.50, 4.9%, 203 people between 0.51-0.75, 29.3% and finally 444 people with a range of 0.76-1.00 were obtained as 64.2%. A large number of items were used to measure the factors discussed in the questionnaire. For this reason, in order to determine the each factor load, the averages of the related items were taken. However, this average alone is not sufficient to understand data. In order to understand the distribution of the data, five-number summary tables that are frequently used in data mining techniques have been created and this table is given in table 3.

**Table 3.**

*Five number summary*

	Working Ratio	Acquiescent Silence	Defensive Silence	Prosocial Silence	Perceived Organizational Support	Decision Variable
Minimum	0.20	1.00	1.00	1.00	1.00	1.00
Quartile 1	0.67	2.60	2.20	3.20	3.10	5.00
Median	1.00	3.60	3.60	3.60	3.90	6.00
Quartile 3	1.00	4.40	4.30	4.20	4.50	6.00
Maximum	1.00	7.00	7.00	6.20	7.00	7.00

Summary table given here includes the first, median (Q2) and largest values of each variable to be used in the Decision Tree, as well as the Quartile 1 (Q1) and Quartile 3 (Q3) values. The statement directed to the participants as the decision variable is: "The support given to me by the organization I work for affects my perspective on the organization".

In order to model the data obtained within the scope of the study, the data are divided into different clusters as training data and test data as indicated in Table 4. The accuracy of the decision trees created with different training and test sets was evaluated with the correct positive classification rate (accuracy) and under the ROC curve, and is shown in Table 4. Since the highest accuracy rate is obtained when the training data set is 80% of the whole data set, in the study, training and test data were considered as 80% - 20% respectively. While evaluating the rules in decision trees, each branch from the beginning node to the last leaf is specified as a rule. The rules obtained in this way were formed on the tree from left to right, respectively:

**Table 4.**

*Model success summary*

Train Set – Test Set	Accuracy	Area under ROC Curve
% 30 - % 70	% 68.801	% 79.10
% 40 - % 60	% 71.325	% 82.80
% 50 - % 50	% 72.543	% 83.30
% 60 - % 40	% 74.368	% 85.10
% 70 - % 30	% 77.404	% 86.40
% 80 - % 20	% 79.710	% 89.30
% 90 - % 10	% 78.261	% 87.60

As a result of the analysis, the decision tree in figure 1 was obtained, and the rules obtained from the decision tree are given in Table 5.

Rule 1:

When the defensive silence, perceived support and prosocial is low, the answer to the decision question was determined as strongly agree. Of the 62 samples that fit this example, 15 are fully consistent with the result. For this reason, the correct classification rate of rule 1 has been calculated as approximately 24%.

Rule 2:

When the defensive silence and perceived support is low but prosocial silence is medium, the answer to the decision question was determined as agree. Of the 56 samples that fit this example, 55 are fully consistent with the result. Hence, the correct classification rate of rule 2 has been calculated as approximately 44%.

Rule 3:

When the defensive silence and perceived support is low but prosocial silence is high and working ratio is  $<0.25$ , the answer to the decision question was determined as agree. Of the 26 samples that fit this example, 26 are fully consistent with the result, which indicates a correct classification rate of 100%.

Rule 4:

When the defensive silence and perceived support is low but prosocial silence is high and working ratio is between 0.26 and 0.50, the answer to the decision question was determined as strongly agree. Of the 16 samples that fit this example, 16 are fully consistent with the result, which indicates another correct classification rate of 100%.

Rule 5:

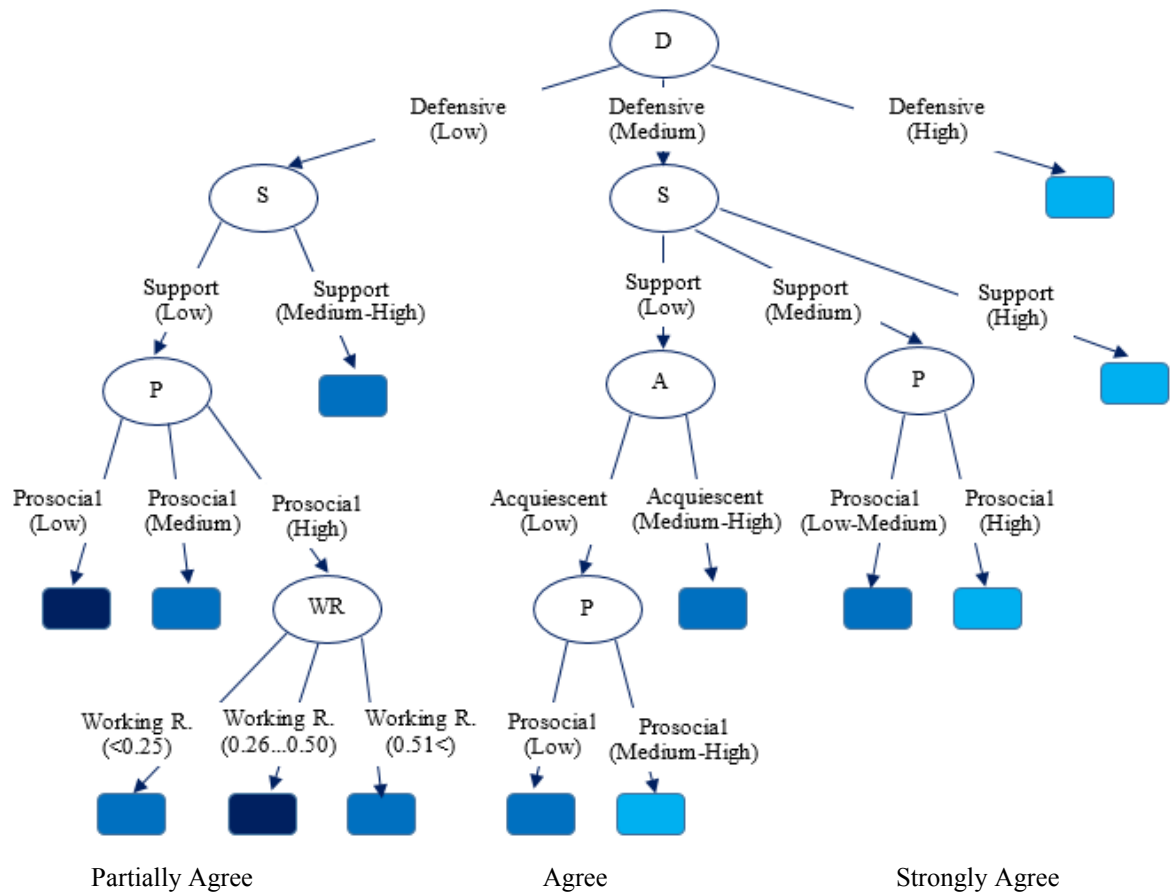
When the defensive silence and perceived support is low but prosocial silence is high and working ratio is between 0.51 and 1.00, the answer to the decision question was determined as agree. Of the 74 samples that fit this example, 35 are fully consistent with the result. Hence, the correct classification rate of rule 5 has been calculated as approximately 47%.

Rule 6:

When the defensive silence and perceived support is medium or high, the answer to the decision question was determined as agree. Of the 29 samples that fit this example, 10 are fully consistent with the result. Hence, the correct classification rate of rule 6 has been calculated as approximately 35%.

Rule 7:

When the defensive silence is medium and perceived support and prosocial silence are low, the answer to the decision question was determined as agree. Of the 57 samples that fit this example, 32 are fully consistent with the result. Hence, the correct classification rate of rule 7 has been calculated as approximately 56%.



**Figure 1.** Obtained Decision Tree

Rule 8:

When the defensive silence is medium, perceived support is low and acquiescent silence is low and prosocial silence is medium or high, the answer to the decision question was determined as partially agree. Of the 27 samples that fit this example, all 27 are fully consistent with the result. Hence, the correct classification rate of rule 8 has been calculated as 100%.

Rule 9:

When the defensive silence is medium, perceived support is low and acquiescent silence is medium or high, the answer to the decision question was determined as agree. Of the 19 samples that fit this example, all 19 are fully consistent with the result. Hence, the correct classification rate of rule 9 has been calculated as 100%.

Rule 10:

When the defensive silence and perceived support are medium and prosocial silence is low or medium, the answer to the decision question was determined as agree. Of the 46 samples that fit this example, all 31 are fully consistent with the result. Hence, the correct classification rate of rule 10 has been calculated as approximately 67%.

**Table 5.**  
*Rules*

	Node 1 (Factor)	Node 2 (Factor)	Node 3 (Factor)	Node 4 (Factor)	Leaf (Decision)	Accuracy Rate
1	Defensive (Low)	Support (Low)	Prosocial (Low)		Strongly Agree	% 24
2	Defensive (Low)	Support (Low)	Prosocial (Medium)		Agree	% 44
3	Defensive (Low)	Support (Low)	Prosocial (High)	Working Ratio ( $\leq 0.25$ )	Agree	% 100
4	Defensive (Low)	Support (Low)	Prosocial (High)	Working Ratio (0.26...0.50)	Strongly Agree	% 100
5	Defensive (Low)	Support (Low)	Prosocial (High)	Working Ratio (0.51...1.00)	Agree	% 47
6	Defensive (Low)	Support (Med.-High)			Agree	% 35
7	Defensive (Medium)	Support (Low)	Acquiescent (Low)	Prosocial (Low)	Agree	% 56
8	Defensive (Medium)	Support (Low)	Acquiescent (Low)	Prosocial (Med.-High)	Partially Agree	% 100
9	Defensive (Medium)	Support (Low)	Acquiescent (Med.-High)		Agree	% 100
10	Defensive (Medium)	Support (Medium)	Prosocial (Low-Med.)		Agree	% 67
11	Defensive (Medium)	Support (Medium)	Prosocial (High)		Partially Agree	% 36
12	Defensive (Medium)	Support (High)			Partially Agree	% 76
13	Defensive (High)				Strongly Agree	% 47

Rule 11:

When the defensive silence and perceived support are low but prosocial silence is high, the answer to the decision question was determined as partially agree. Of the 23 samples that fit this example, all 8 are fully consistent with the result. Hence, the correct classification rate of rule 11 has been calculated as approximately 36%.

Rule 12:

When the defensive silence is medium but perceived support is high, the answer to the decision question was determined as partially agree. Of the 14 samples that fit this example, all 10 are fully consistent with the result. Hence, the correct classification rate of rule 11 has been calculated as approximately 76%.

Rule 13:

When the defensive silence is high, the answer to the decision question was determined as partially agree. Of the 19 samples that fit this example, all 9 are fully consistent with the result. Hence, the correct classification rate of rule 11 has been calculated as approximately 47%.

## 5. Conclusions and Suggestions

This study investigates the effects of employee silence and perceived organizational support on decisions of employees through an idiosyncratic perspective and proposes a unique predictive model. By utilizing a data mining technique to trace the hidden patterns or relationships that prior studies haven't been able to reveal, it contributes significantly to the relational literature as it offers insight regarding the antecedents of silence behavior and the impact of perceived organizational support on employees' attitude towards the organization. The present findings confirm that a successful relational framework like the one proposed in this study has a lot to offer in terms of building effective HR strategies and policies. Findings also reveal that perceived organizational support as a part of organizational characteristics and employee silence behavior based on employees' experiences in the workplace have pivotal implications on their decision-making processes. In the suggested model, for instance, 13 rules were obtained with approximately 79% correct classification rate, which exhibits the success of the created model as well as a proper relational framework. The rules 3,4,8 and 9 that has a classification rate of 100% are of particular importance though the other rules also point to critical relationships. Accordingly, these rules reveal unprecedented relationships between the forms of silence, perceived organizational support, and working rate. We would also like to draw attention to a few points for future work. First, the questionnaire surveys reflect the situation of the participants in the current period. However, since the experience levels of the participants are different from each other, similar problems can be examined over their experience levels or the working time in the last workplace. Second, although demographic data were collected in this study, they were not included in the decision tree in order not to break the simplicity of the decision tree. Participants' gender, age, and education level can be added to the model in future studies. Third, the predictive factor in the study is the decision variable. Similar studies can be repeated for different decision variables to examine the effects of organizational silence factors and perceived support factors. Fourth, Decision Trees are very useful for mapping the responses of employees to a decision problem they encounter. For this reason, alternative models can be obtained by utilizing different scales. Finally, the factors discussed in this study are of great importance for businesses and their HRM strategies. The same problem can be evaluated with multi-criteria decision-making methods that can affect decision processes.

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