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## FROM THE EDITORIAL COMMITTEE

We are giving you the next 31th 2 (2024) issue of the Scientific Journal of the Faculty of Management at the Rzeszow University of Technology entitled “Humanities and Social Sciences”.

The aim of the Publisher is to raise the merits and the international position of the quarterly published by the Faculty of Management, that is why we are still developing the cooperation with foreign team of reviewers, as well as an international Scientific Council. The Editors have also attempted to apply for international databases; currently the quarterly HSS is indexed in **Index Copernicus Journal Master List, The Central European Journal of Social Sciences and Humanities (CEJSH) ERIH PLUS, DOAJ and EBSCO**.

The Journal has been also included in the list of projects qualified for funding under the **“Support for scientific magazines program”**.

The articles published in this publication are devoted to the broader issues of the humanities and social sciences. They are the result both of theoretical and empirical research. The subjects covered vary considerably and reflect the interdisciplinary nature of the Journal. We do hope that the papers published will meet your kind interest and will be an inspiration to further research and fruitful discussions.

On behalf of the Editorial Board of “Humanities and Social Sciences” we would like to thank the Authors for sending the outcomes of their research. We would like to express particular gratitude to the Reviewers for their valuable feedback that greatly contributed to increasing values of the scientific publications.

With compliments  
*Editorial Committee*



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Alicja BALCERAK<sup>1</sup>  
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## FACTORS AFFECTING THE PERCEPTION OF AN ELECTRONIC PERFORMANCE MONITORING SYSTEM IN ACTION

As technology continues to change, electronic monitoring of work performance is experiencing another wave of interest from businesses and scientists. Based on the opinions of 100 warehouse employees, whose work is monitored using electronic tools, it was shown that the perceived impact of monitoring on increasing effectiveness and positive evaluation of the workplace are the best predictors for reducing dissatisfaction with monitoring, while the emotional cost and quality of one's work do not affect this dissatisfaction. It was also shown that evaluation of the workplace is related to employees' use of the opportunities offered by the monitoring tool, i.e., the use of help from superiors via monitoring. Several practical recommendations and directions for further research were formulated.

**Keywords:** work monitoring, EPMS, acceptability, warehouse monitoring.

### 1. INTRODUCTION

The use of work monitoring tools is experiencing another wave of interest from business and scientists. Although work monitoring is a standard managerial activity, successive waves of innovation in the field of information and communication technology (ICT) cause not only the emergence of new ways of implementing monitoring activities, but also a sharp increase in the interest of practitioners and researchers in the issues of work monitoring (Stanton, 2000; Backhaus, 2019; Thiel et al. 2019; Ravid et al., 2020; 2023; Woźniak, 2021). An additional impulse for the interest in work monitoring with the use of technological tools was created by the pandemic, during which the necessity of remote work not only made the physical dispersion of work teams widespread, but also provided an incentive to look for new solutions in the field of monitoring. The benefits that both employers and employees have noticed in remote work have meant that even after the pandemic, hybrid work remains a fairly common way of organizing workstations, which as a result forces the use of various remote methods of monitoring.

Scientific research into the next wave of work-monitoring technologies yields fairly consistent results, showing workers' concerns about having their work being monitored by

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technological solutions (Stanton, 2000; Backhaus, 2019; Ravid et al., 2020; 2023), as well as benefits for productivity of such monitoring (Goomas, Ludwig, 2009; Backhaus, 2019; Thiel et al., 2019). However, these results are often based on laboratory experiments and opinions of people formulated in hypothetical situations. Hence, the literature repeatedly emphasizes the need to research the opinions of people who already have experience with work monitored with new monitoring solutions, so that scientific findings can become the basis for well-established practical recommendations.

The aim of this text is to analyze the perception of the ICT-based work monitoring of warehouse workers, implemented by the organization six months earlier. The opinions of 100 warehouse workers were analyzed to check which characteristics of people favor a more positive attitude towards work monitoring with the use of technological tools. It was found that positive evaluation of the workplace and perceived impact of monitoring on increasing effectiveness are better predictors of attitude towards monitoring, than self-assessment of work quality and monitoring-related emotional cost.

The article is organized as follows. The first part presents the issues of monitoring and its new possibilities resulting from the development of ICT technology. It also indicates a few key questions for understanding the conditions of employees' perception of modern work monitoring systems. Part 2 presents the research methodology, and the third – its results. The text ends with a discussion of results, and conclusions with practical advices and indications for further research. Main body – only texts written in English will be accepted: font size 10, indent of the first line 0.5 cm, justified, single line spacing, space before and after paragraph size 0. Please do not insert additional lines between the paragraphs.

## **2. ELECTRONIC MONITORING OF WORK AND ITS PERCEPTION BY EMPLOYEES**

Work monitoring is generally understood as “the observation, examination, and/or recording of employee work-related behaviors, with and without technological assistance” (Stanton 2000; Thiel et al., 2019). This understanding separates monitoring from the further use of the collected data, and thus in particular from the assessment of work, which is based on the analysis of data collected by monitoring. Work monitoring is usually placed in performance management, as it provides data for managerial decisions as to whether and which interventions are worth implementing to ensure proper performance by the monitored employee. Monitoring data – part of which is a record of behaviors and part, the results of actions that were carried out through these behaviors – has always served managers as a basis for recognizing signals of situations requiring their intervention. In addition, the very fact that the work is monitored was supposed to encourage workers to perform with greater care, by emphasizing the importance of the tasks as well as the possible consequences of the supervisor's intervention.

Traditionally, work monitoring was a managerial task, which, due to the need to devote time to observing behavior, was carried out incidentally and in short periods of time. Most often, instead of observing work, managers drew conclusions about its correctness on the basis of monitoring its results. The transfer of some tasks to the sphere of ICT enabled the use of these technologies to automate some work monitoring tasks, and subsequent waves of ICT-based solutions in the field extended this type of monitoring to new industries and types of work.



Since the 1980s, monitoring has been widely used in call center work management (Holman, 2003), and the development of GPS enabled the use of monitoring technology in (mainly truck) transportation at the beginning of the 21st century (Woźniak, 2020). The dissemination of cheap RFID technology (Radio-Frequency Identification) allowed for the spread of work monitoring in logistics and warehousing (Woźniak, 2021; 2023). In the latter, electronic monitoring systems are currently a commonly used standard in work supervision (Goomas, Ludwig, 2009; Kantor, Streitfeld, 2015; Woźniak, 2023), although it is expected that the dissemination of the Internet of Things will cause another breakthrough.

The Internet of Things, and the possibility of transferring information between all objects (including people) at all times and to all places (Lu et al., 2018), should effect in the next wave of types of electronic performance monitoring systems (EPMS). This new wave will be based on so called smart monitoring tools which will be used not only for collecting data, but also for analyzing it on an ongoing basis and for implementing appropriate corrective actions immediately, without the need for the supervisor to act (Woźniak 2023). The dissemination of such solutions in the practice of enterprises will radically expand the application and scope of monitoring, hence the need for research on the determinants of how technical solutions in this area are perceived by employees of industries that have experience with previous generations of work monitoring tools, e.g. warehouse workers. This issue has already been recognized in the world scientific literature, e.g. (Backhaus, 2019; Ravid et al., 2020).

The need for research on people with experience in using a given technology results from the expected differences between two different types of opinions that potential users may have toward innovative technological devices, i.e. acceptance and acceptability (Alexandre et al., 2018; van Acker et al., 2020).

Acceptability is an a priori phenomenon in the time scale of our confrontation with a tool, and it predicts intent to use... [while] Acceptance is defined as an a posteriori pragmatic evaluation, implying that a real activity is required from the user prior acceptance evaluation (Alexandre et al., 2018).

These two measures of emotional and cognitive attitudes toward new tools are opinions formulated at two different points in time – before experiencing a tool and after. Therefore the first is an opinion expressed by someone without personal experience with the tool, who bases their views on imagined (stereotypical) features of the tool and the consequences of its use. The second type of opinion is based on the actual experience of the person who formulates it. It is obvious that these opinions could be conditioned in a different way. The first one can be explained by the Technology Acceptance Model (TAM) (Davis et al., 1989; Davis, 1989) with later extensions (Venkatesh, Bala, 2008; Venkatesh et al., 2016), but the second one is based primarily on the evaluation of previous use and should better predict actual subsequent use than intention-related opinions created as measures of acceptability. This difference has been already identified by research on e-learning (Woźniak, 2009). However research on electronic monitoring did not until very recently distinguish between the above two ways of forming an opinion (van Acker et al., 2020).

Theoretical explanations of the formation of employees' opinions about being monitored by EPMS usually refer to theories describing the formation of attitudes towards new technologies arising from models of reasonable action (Fishbain, Aizen, 1975; Ajzen, 1991), such as the aforementioned versions of TAM or theory of perceived risky decision

taking (Bauer, 1960). They show that the monitored person's opinion about being monitored is based on perceived risks, losses and benefits associated with being monitored. Losses include various current emotional costs, such as threat to privacy or psychophysical stress; real adverse consequences; and lastly ones that appear when the assessment of behavior and work results is negative. Additionally, in theories based on TAM, the difficulty of using a given tool (the monitoring) is also a cost, and this impacts the intention to use the tool. Benefits include, among others, possible help from the monitor and indirect impact on the positive assessment of the effects of work and its consequences. It is obvious that assessments of the probability of each of these losses and benefits are subjective and dependent on various individual characteristics, hence different people may have a different assessment of the same technological and management system, which is a specific EPMS. We expect the variable modifying this attitude to be trust in the company and the monitoring supervisor (Stanton, 2000; Alge, Hansen, 2014). This variable affects not only how the risk of consequences unfavorable for the individual in the event of a wrong action are perceived, but it also affects how convinced the individual is that the actions of persons installing monitoring systems are reasonable.

As has already been mentioned, these theories explain the opinions people form about monitoring *ex ante*, before a monitoring system is put into practice. Research on the feelings of employees who are already subject to EPMS in a standardized manner was conducted primarily on call center employees (Backhaus, 2019; Ravid et al., 2020), where monitoring using EPMS became the earliest management standard (Holman, 2003). Even there, not current behavior but performance indicators (results of actions) were primarily monitored, because – although the systems collected this information – data analysis required a lot of time from managers, hence it was carried out occasionally (usually – randomly for a while and not more often than once a week – Holman, 2003; Holman et al., 2009; Woźniak, 2023). Scientific research on these practices has yielded results that are only partially in line with expectations (Ball, 2010; 2021). Indeed, according to Zajonc's theory of social facilitation (1965; 1980), work monitoring promotes higher efficiency for standard (easy) tasks (Backhaus, 2019), but also higher stress during its performance (Thompson et al., 2009; Ravid et al., 2023) – according to the theory of arousal caused by the presence of others (Baron, 1986). However, call centers' employees' opinions on monitoring tend to be divergent (Holman, 2003), and trust in the company and the manager (Alder et al., 2006) and positive evaluation of the workplace foster positive opinions on monitoring (McNall, Roch, 2009).

Explanations for these discrepancies in research may be various, and one of them may be the phenomenon of habituation (cf. Stanton and Sarkar-Barney, 2003). When work is constantly monitored, and so perceived risks and subjective assessments of the threat of consequences are verified, EPMS ceases to be a new technology and becomes an ordinary management tool. For its assessment, various imagined and potentially occurring risks cease to be relevant, and only past experience of being monitored with such a tool becomes significant. No scientific studies on monitoring directly address this thesis. However, this fact has been well known for many years in a similar situation, i.e. attitudes to e-learning. The attitude of respondents to e-learning *ex ante* is well explained by the TAM model and its variants, but the attitude towards e-learning, when the learner already has their own experience in using these technologies, is mainly influenced by the assessment of past experience (cf. literature review in Woźniak, 2009). The premise for establishing this mechanism also in the area of work monitoring can be confirmed by numerous studies showing the importance of trust in shaping employees' reactions to monitoring (Alder et

al., 2006; McNall, Roch, 2009; cf. Ball, 2010; 2021). Bad experiences with the consequences of being monitored should be reflected most quickly in a decrease in trust in the company, hence it can be considered that our hypothesis is also supported by previous EPMS research.

A positive experience of being monitored can effect in different results that have a feedback effect on increasing positive assessment of monitoring. Firstly, people whose work is of a high quality should experience positive reactions from supervisors observing their work, and at the very least – should not experience negative ones. This suggests they will be more in favor of being monitored, and there will be a greater chance of habituation and a lower emotional cost of monitoring.

It should also be expected that people who see the benefits of monitoring for increasing their work efficiency, or who use the monitoring tool to obtain help from the manager in difficult situations (a monitoring scanner in the company we surveyed enables direct visual contact with the manager), will better evaluate the monitoring, either directly or thanks to good past monitoring experience. Therefore, the following factors will have a positive impact on attitude towards monitoring: positive evaluation of the workplace, taking advantage of opportunities to get help from the manager via monitoring tools, perceived impact of monitoring on increasing effectiveness, and self-assessment of one's work quality.

However, it should be remembered that the monitoring situation evokes reactions conditioned also by certain individual factors (Stanton, 2000; Alder et al., 2008; Ravid et al., 2023). Regardless of fears related to the consequences of the observation results, the strength of emotional tension related to being observed depends on individual characteristics. It is conditioned by individual sensitivity to such action, but also vulnerability to privacy violations. It can therefore be assumed that this individually conditioned emotional cost will be a factor independently influencing reactions related to monitoring, as it is conditioned more by individual characteristics than by the work situation.

This allows the formulation of the following hypotheses:

**Hypothesis 1:** Evaluation of the workplace is higher among respondents who declare that they are monitoring-habituated.

**Hypothesis 2:** Evaluation of the workplace is higher among respondents using help from the manager via monitoring.

**Hypothesis 3:** The predictors of reducing dissatisfaction with monitoring are: evaluation of the workplace, perceived impact of monitoring on increasing effectiveness, and higher than average self-assessment of work quality, while its increase is influenced by emotional cost.

### 3. METHOD

#### 3.1. Participants

The sample consisted of 100 employees of a large international logistic company in its logistic center near Warsaw (c. 75% of all workers from this logistic warehouse). The center is one from 150 branches of the 10 000 employees' company (other centers are located in 13 EU countries). The data was collected by E. Kluczek, MA student of one of the authors and administrative employee of the center, who kindly added the authors' questions to her e-questionnaire in May 2022. A summary of the subjects' demographics is given in Table 1.

Table 1. Sample table and caption (font size 9, hanging indent 0.5 cm, space before paragraph size 6, space after paragraph size 3)

Characteristics	N=100	Percentage
Age		
18–30	38	38.0
31–45	34	34.0
46–60	18	18.0
more than 60	10	10.0
Length of professional experience in the company		
less than 3	11	11.0
3–5	34	34.0
6–10	21	21.0
11–20	23	23.0
more than 20	11	11.0
Position		
warehouseman	49	49.0
senior warehouseman	50	50.0
no answer	1	1.0
Work productivity (% of factory standard)		
less than 80%	14	14.0
81–120%	63	63.0
more than 120%	23	23.0

Source: own research.

### 3.2. Measures

*Habituation* was measured by a resolution (single choice) question: *Do you work differently knowing that your work is being monitored?* The respondents chose one of two answers: 1. *Yes, knowing that I am being monitored, I try to do my job accurately.* 2. *No, I don't usually pay attention to monitoring.* Respondents who chose answer 2 (51%) were considered to be monitoring-habituated.

*Emotional cost* was measured using three items: *Being aware that my work is monitored, I feel more stress in my daily work; Knowing that my work is monitored, I do not feel comfortable and at ease; I feel followed by my employer in every activity.* Participants responded on a five-point Likert-type scale (from 1 – strongly disagree to 5 – strongly agree). The factor analysis extracted one component with no items being discarded. (KMO=0.69; the Bartlett test of sphericity:  $\chi^2 = 90.77$ ,  $df=3$ ,  $p < 0.001$ ; 70.64% of variance explained). Loadings ranged from 0.80 to 0.88; Cronbach's alpha=0.79.

*Dissatisfaction with monitoring* was a dichotomous variable with a value of 1 if participants answered negatively (67%) to the question about their satisfaction with monitoring their work, and 0 if they answered positively or were undecided.

*Self-assessment of work quality* was a dichotomous variable with a value of 1 if participants rated their work quality higher than average (66%) and 0 otherwise.

*Perceived impact of monitoring on increasing effectiveness* was measured using four items: *Thanks to monitoring, the work is done conscientiously; Thanks to monitoring, I started to pay more attention to the length of my breaks at work; Being aware of the fact that my work is monitored, I apply myself more diligently to its performance; Thanks to the*

*fact that I am aware that my work is monitored, I try to work faster.* Participants responded on a five-point Likert-type scale (from 1 – strongly disagree to 5 – strongly agree). The factor analysis extracted one component with no items being discarded (KMO=0.72; the Bartlett test of sphericity:  $\chi^2 = 102.43$ ,  $df=6$ ,  $p<0.001$ ; 58.59% of variance explained). Loadings ranged from 0.69 to 0.85; Cronbach's alpha=0.76.

*Help from the manager via monitoring* is a dichotomous variable dividing the respondents into using the help of their superiors via monitoring (78%) and not using such help (22%).

*Evaluation of the workplace* was measured using seven items: *I would like to work in this company until I retire; This company is a good place to work; This company gives me the opportunity to develop professionally and learn; This company gives me the opportunity to plan my professional career in the long term; My manager is better than average; Earnings in this company are not worse than elsewhere; This job does not interfere with private life.* Participants responded on a five-point Likert-type scale (from 1 – strongly disagree to 5 – strongly agree). The factor analysis extracted one component with no items being discarded. (KMO=0.87; the Bartlett test of sphericity:  $\chi^2 = 350.92$ ,  $df=21$ ,  $p<0.001$ ; 60.09% of variance explained). Loadings ranged from 0.69 to 0.89; Cronbach's alpha=0.89.

All statistical analyses were completed using IBM SPSS Statistic software (v. 28). Statistical significance was set at the 0.05 level.

### 3.3. Results

Table 2 presents the means, standard deviations, and correlations among the variables used in this study.

Table 2. Means, standard deviations, and correlations

Measure	M	SD	Correlations					
			1	2	3	4	5	6
1. Dissatisfaction with monitoring	0.67	0.47						
2. Habituation	0.51	0.50	-0.18					
3. Emotional cost	3.07	1.26	-0.11	0.10				
4. Self-assessment of work quality	0.66	0.48	-0.10	0.06	0.08			
5. Perceived impact of monitoring on increasing effectiveness	2.97	1.16	-0.37**	0.06	0.46**	-0.03		
6. Help from the manager via monitoring	0.22	0.42	-0.04	-0.11	-0.06	0.18	-0.20*	
7. Evaluation of the workplace	3.13	1.08	-0.34**	0.09	0.11	0.18	0.48**	-0.19

Notes: \*\*Correlation significant at the 0.01 level.\* Correlation significant at the 0.05 level.

Source: own research.

In order to verify hypotheses 1 and 2 two independent samples t-tests were performed (Table 3). There is no significant difference in means of evaluation of the workplace measure between monitoring-habituated and not habituated subjects. Thus, hypothesis 1 is rejected. Evaluation of the workplace is significantly higher in the group that uses help from the manager via monitoring, which confirms hypothesis 2.

Table 3. Evaluation of the workplace in categories and comparisons of means scores

Independent variable	Categories	n	M	SD	t-test for equality of means	p (one-sided)	Cohen's d
Habituation	Yes	51	3.20	1.10	$t_{(98)} = 0.868$	0.194	
	No	49	2.99	1.20			
Help from the manager via monitoring	Yes	78	3.21	1.15	$t_{(98)} = 1.930$	0.028	0.48 (moderate)
	No	22	2.68	1.04			

Source: own research.

To investigate factors affecting dissatisfaction with monitoring binary logistic multivariate regression analysis was performed. Due to weak correlation between dissatisfaction with monitoring and self-assessment of work quality and emotional cost (Table 2), the model was specified as follows: dependent variable: dissatisfaction with monitoring; predictors: perceived impact of monitoring on increasing effectiveness, and evaluation of the workplace.

The Hosmer and Lemeshow test is not statistically significant ( $\chi^2(8)=7.085$ ,  $p=0.527$ ), which means that the model met the goodness of fit criterion. The regression results (Tab. 4) show that both perceived impact of monitoring on increasing effectiveness and evaluation of the workplace are significant (and, in line with the hypothesis 3, negative) predictors of the probability of dissatisfaction with monitoring.

Table 4. Logistic regression results

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for Exp(B)	
							Lower	Upper
Perceived impact of monitoring on increasing effectiveness	-0.559	0.235	5.661	1	0.017	0.572	0.361	0.906
Evaluation of the workplace	-0.480	0.240	4.010	1	0.045	0.619	0.387	0.990
Constant	40.014	0.931	18.579	1	<0.001	55.382		

Source: own research.

The tolerance and the variation inflation factor values (resp. 0.766 and 1.305) do not suggest problems with multicollinearity among predictors. Nagelkerke's  $R^2=0.234$  which means that the model explains about 23% of the variation. The odds ratio for perceived impact of monitoring on increasing effectiveness indicates that each increase on this

predictor scale leads to a  $100\% \cdot (0.572 - 1) = -42.9\%$  change in the odds of dissatisfaction with monitoring i.e. to its decrease. In the case of evaluation of the workplace this change is  $100\% \cdot (0.619 - 1) = -38.1\%$ .

The third hypothesis was therefore only partially confirmed. Out of the hypothetical four predictors, only two significantly and expectedly negatively affect dissatisfaction with monitoring.

#### 4. DISCUSSION OF THE RESULTS

Contrary to expectations, the hypothesis about the relationship between habituation and evaluation of the workplace was not confirmed by the collected data. There may be several reasons for this result. First, the habituation variable used in the study is based on a dichotomous declaration, so people who may not have been sure of their level of habituation were incidentally classified as a result of forced distribution. However, habituation – whether short-term or long-term, which we used in our study – is a phenomenon that is not fully conscious (Groves, Thompson, 1970; Rankin et al., 2009). It could therefore be expected that a part of the respondents did not have a well-established opinion on this issue and were incorrectly classified. Secondly, since habituation is poorly conscious, it is difficult to precisely measure it with direct questions, regardless of how they are formulated. It is usually measured by reaction time to a repetitive stimulus, but research on habituation is ongoing and discusses several different mechanisms of its formation that suggest different ways of measuring it (Rankin et al., 2009; Colwil et al., 2023; Turatto, 2023). Third, the relationship between evaluation of the workplace and habituation is probably not direct. The current theories of habituation, treating it rather as a cognitive phenomenon (Colwil et al., 2023; Turatto, 2023), suggest that the lack of fear may be conducive to habituation. However, one could expect an emotional component to mediate this relationship. Nevertheless, habituation according to our measure does not differentiate the subjects in terms of emotional cost ( $t_{(98)} = 0.994$ ;  $p = 0.161$ ).

Hypothesis 2 was confirmed. Those using help from the manager via monitoring are characterized by a higher assessment of their workplace. Regardless of whether the use of help via monitoring is a symptom of a positive assessment of the workplace or is influenced by other factors, this suggests beneficial effects of positive evaluation of the workplace for monitoring effectiveness measured by productivity. The benefit of monitoring is not only the possibility of supervising work, but also quick intervention when an employee needs help during work. As long as EPMSs are not smart (so they do not independently analyze the content they collect), the signal from the employee is the best sign that such help from the manager is needed.

Examination of the third hypothesis showed that dissatisfaction with monitoring is significantly reduced by two factors: the perceived impact of monitoring on increasing effectiveness and evaluation of the workplace. What should arouse attention is the lack of importance of the affective variable, i.e. emotional cost, as well as the variable characterizing an individual, i.e. perceived ones work quality. This seems to prove that when monitoring becomes a standard tool in the work environment, the attitude towards monitoring is shaped by the very fact that it is possible to use its usefulness for the effects of work (i.e. the way of designing the monitoring system and the functionalities it contains) and the general attitude towards the company. If this fact were confirmed by further research, it would show that for the acceptance of the change (that is the introduction of EPMS), the key factor is whether the new tool brings benefits for employees' work

effectiveness, and not an emotional reaction to being watched. This result is consistent with the general idea of habituation as a decline in the importance of an emotional stimulus long-term present in the work environment, as well as with previous results of monitoring studies that showed that employees relate more favorably to ESMP when they see in it benefits for themselves (Ravid et al., 2020).

The second significant predictor of reducing dissatisfaction with monitoring is evaluation of the workplace. It suggests the hypothesis that positive evaluation of the workplace may be a factor that limits employees' fears and their emotional reactions related to being monitored. What is a challenge for the conclusions formulated in the research reviews regarding the criteria for the emergence of negative employee reactions to monitoring (Ravid et al. 2020; 2023) is the lack of a significant impact on dissatisfaction with monitoring of emotional costs. Ravid and colleagues (2020) proposed a typology of EPMS in which monitoring characteristics – the purpose, invasiveness, synchronicity, and transparency of the monitoring – interact to affect individual-level work outcomes. Our study, although it showed the importance of the monitoring objective (whose indicator was observing the benefits of monitoring for increasing work effectiveness), did not show the importance of invasiveness (which in our study corresponded to the measurement of the emotional burden of monitoring).

Our data do not allow us to discuss neither the aspects of synchronicity, nor transparency, because the specific EPMS that was implemented in the surveyed company had relatively identical characteristics due to these criteria between employees. However, the importance of trust in the company as a good workplace, i.e. evaluation of the workplace, for reducing dissatisfaction with monitoring, seems to show that general trust in the subject introducing the change is more important for the perception of EPMS than the nuisances caused by this system, e.g. stress. This result is important in the sense that ESMP research emphasizes that “organizations that monitor more transparently and less invasively can expect more positive attitudes from workers” (Ravid et al., 2023). Our study showed that trust is a better predictor of attitudes towards long-term monitoring than perceived emotional costs. It also showed lack of significant correlations between emotional cost and using help from the manager via monitoring, nor perceived impact of monitoring on increasing effectiveness. It can therefore be assumed that the results of the meta-analysis (Ravid et al., 2023), were based more on laboratory studies and ex-ante opinions than on research of functioning work monitoring systems. This is confirmed by the proportions of data sources for this meta-analysis (see: Table 6 in Ravid et al., 2023).

## 5. CONCLUSIONS

Work monitoring tools are experiencing another wave of interest from business and scientists. One of the causes is that with the spread of monitoring related to the Internet of Things, the use of smart tools will spread and be used not only for collecting data, but also for analyzing it on an ongoing basis and for implementing appropriate corrective actions (Woźniak, 2023). However, research results are still dominated by data on acceptability rather than acceptance of (traditional) electronic performance monitoring systems, hence conclusions drawn may be misleading for management practice.

The purpose of this text was to analyze the perception of a specific implementation of tools for monitoring the work of warehouse employees in a chosen logistics company. Based on the opinions of 100 warehouse employees, perceived impact of monitoring on increasing effectiveness and positive evaluation of the workplace were shown to be the



best predictors for reducing dissatisfaction with monitoring, while the emotional cost and quality of one's work did not affect this dissatisfaction. It was also shown that evaluation of the workplace is related to the use by employees of the opportunities offered by the monitoring tool, i.e. the use of help from superiors via monitoring.

The results of the study suggest that also in the field of acceptance of electronic work monitoring systems, the conditions for acceptability and acceptance are different, which means that further research on acceptance is necessary so that science can formulate recommendations for practice based on well-founded findings. The study showed that acceptance is conditioned by trust, one of the variables analyzed in older trends of EPMS research, as it turned out that not only the features of the tool itself, but also contextual factors, such as evaluation of the workplace, are conducive to reducing dissatisfaction with monitoring. It has also been shown that, assuming that the EPMS is designed in a reasonable way, i.e. it enables employees to increase the efficiency of their own work through the operation of this system (e.g. by accessing chosen data), it can be expected that in a work environment where there is trust you can be less afraid of dissatisfaction with monitoring and its consequences. However, it should be remembered that dissatisfaction with monitoring is also affected by other factors not included in our study, as the obtained model explains only about 1/4 of the variance of this variable.

If we assume that further research will confirm the results of our case study, we can put out some practical recommendations and advice. Firstly, the most important thing for reducing dissatisfaction with monitoring is the perceived impact of monitoring on increasing effectiveness evaluation of the workplace. Therefore, when planning the introduction of such a system, it is worth conducting a professional well-being study as defined by Gallup (Rath, Harter, 2010) and interventions increasing well-being (Woźniak, 2012). Secondly, the system should be designed in such a way that people who are being monitored have access to such monitoring data that can help them increase their work efficiency. It is not enough to properly design the system itself, but it is necessary – and this is the third practical recommendation – to train employees, drawing their attention to this data and the possibilities of using it.

Our study also requires us to treat the recommendations that were formulated earlier with reservation. In particular, the recommendation concerning system transparency, often emphasized in the literature (Ravid et al., 2020; 2023; Tomczak et al., 2018), should not be treated as a recommendation that information needs to be fully disclosed. The only fact that has been verified is that “the most negative reactions to EPM come from employees who do not know whether they are being monitored, why they are being monitored, or how they are being monitored” (Ambrose, Alder, 2000; as cited in Tomczak et al., 2018). Excess information does not have to be conducive to a better reception of the monitoring system – if the conditions under which monitoring is carried out are characterized by mutual trust, any concerns and ambiguities can be clarified on an ongoing basis.

Our study did not provide a direct argument against the importance of monitoring invasiveness for its acceptance. However, it should be emphasized that the monitoring system we analyzed is quite invasive – it consists not only of video monitoring, but also a scanner supervising employees' location and the tasks they perform. It can therefore be assumed that, similarly to transparency, the general attitude towards those introducing the change is more important than the specific parameters of the change that is introduced, assuming of course certain boundary conditions, well reflected in our study by a number of benefits that an employee can derive from the monitoring.

It should be remembered that a number of factors resulting from the specificity of our study limit how strongly practical recommendations can be made. This was a case study, so its results are also affected by characteristics of the place other than just the variables we measured. So further research is necessary, in different kinds of companies with different internal conditions and different social contexts in which the monitoring is implemented, in order to be able to formulate conclusions. Secondly, our study is based on opinions collected via a questionnaire, so most of the measures are based on respondents' declarations. Hence, it is necessary to extend these studies, on the one hand to include data collected differently, and on the other – to replace questionnaire-elicited data with data collected using in-depth interviews or objective measures (e.g. for work efficiency, objective measures could be collected by direct observation or as data from monitoring devices). It is also hugely important to extend the research to other industries. We have no arguments that would undermine the thesis that the results we obtained are an artifact resulting from the specific expectations of warehouse workers, i.e. people with little opportunity to shape their career path with an employer other than a logistics warehouse operating near their place of residence. It is therefore necessary to extend research on monitoring to other industries, especially in view of the widespread expectation that electronic monitoring systems, and in particular monitoring and surveillance using AI, will become commonplace in the near future.

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## CSR AND COSMETIC STANDARDS OF RETAIL CHAINS: AN ANALYSIS OF THE EFFECTS FOR CARROT PRODUCERS. CASE STUDY

Representatives of retail chains emphasize in their statements how much importance they attach to conducting business according to the idea of CSR, especially in terms of limiting the amount of food wasted. On the other hand, when presenting product specifications to food producers, they require them to provide products that comply with specific standards. The aim of this article is to present the potential financial loss for the surveyed producers resulting from aesthetic/cosmetic losses at the stage of primary carrot production. The source material was subject literature, accounting documentation for the years 2019–2022, and information obtained during expert interviews with carrot producers. The size of the losses was presented based on the mass balance index. It was found that only 43.86% of the collected raw material is sold as a full-value product (accepted by retail chains).

**Keywords:** CSR, cosmetic standards, retail chains, food losses, carrot.

### 1. RETAIL CHAINS AND CSR – OUTLINE OF THE PROBLEM

Already at the turn of the 20th and 21st centuries, activities in the field of corporate social responsibility (CSR) began to become important in the activities of commercial enterprises. More and more organizations treat the idea of CSR as a way of taking responsibility towards society and the environment and implement it (Božić, Kolić Stanić, Jurišić, 2021). In the literature on the subject, CSR is understood as the organization's responsibility for the impact of its decisions and actions on society and the environment, therefore it should ensure transparent and ethical behavior that:

- contributes to sustainable development, including the well-being and health of society,
- takes into account stakeholder expectations,
- is consistent with applicable law and consistent with international standards of conduct,
- is integrated with the organization's activities and practiced in its relationships (Kowalska, 2016).

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Over the last three decades, the retail sector in Central and Eastern Europe has changed dramatically. The retail market is consolidated and retail chains from Western Europe have a competitive advantage. Their policy focuses on the organization's management process and consumer requirements. According to Mila Kavalić and her team (2019), examples of good practice (in line with the CSR idea) created by retail chains can become a strong positioning factor on the market and have an impact on building and maintaining a competitive advantage in the future.

The concept of CSR and the values associated with it meet the need for conscious consumption. As Marek Drzazga and Urszula Janeczek (2018) emphasize, the comprehensive application of the CSR concept in an enterprise requires the use of appropriate activities and measures at all levels of creating the value chain, starting from purchases through production, distribution, the type of products used, and ending with recycling. Contemporary retail (mainly large-scale retail trade operated by retail chains), due to its scale of operation, financial potential and transaction power, has a significant impact on shaping consumer tastes and preferences, and can therefore have a significant impact on the dissemination of socially responsible practices throughout the supply chain. Katarzyna Kowalska (2016) mentions above all:

- shaping ecological awareness of employees and customers,
- increase in product safety and quality,
- reduction of carbon dioxide emission,
- effective waste management,
- national use of natural resources,
- reducing employee rotation and improving their working conditions.

In relation to the above-mentioned practices, when thinking about the supply of food products, one should recall the model (Figure 1) developed by Xiao Liu and Kuen-Lin Lin (2020), which indicates that in order to maintain food security (by limiting food waste) and obtain safe products/ services, both collective belief and joint action are important. In their understanding, the “green” organizational culture of a company is the belief on the basis of which the CSR concept is created and implemented by both the organization's employees and their customers. In their opinion, the company's CSR activities have a positive impact on the perception of products and the behavior and purchase intention of consumers.

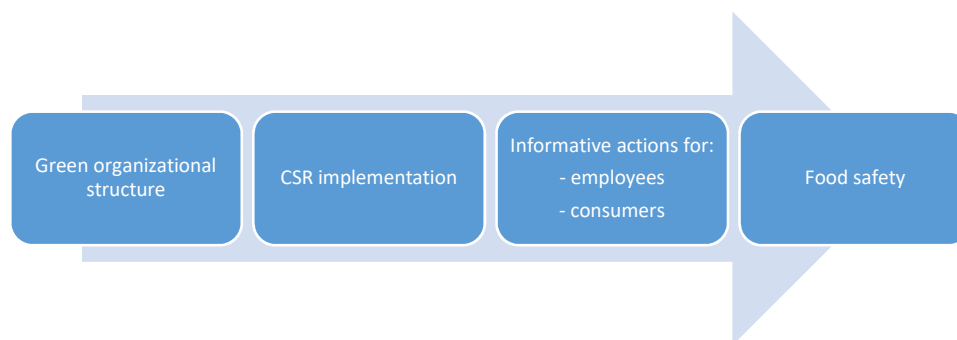


Figure 1. A model from “green” organizational culture to safe food

Source: own elaboration on the basis of (Liu, Lin, 2020).

Unfortunately, opportunistic behavior towards the implemented CSR strategies in retail chains may be exhibited by its employees (starting with managerial staff and ending with line workers), who, motivated by the desire to ensure a high level of freshness and customer satisfaction, often contribute to the increase in the amount of food wasted by disqualifying products even though they are suitable for consumption. According to Na Luo, government intervention and food policy may motivate retailers to make efforts and adopt corrective methods, e.g. by improving packaging, storage and display, which may affect the quality, spoilage rate and shelf life of food products. These actions would reduce the amount of food waste (Luo, Olsen, Liu, 2021). However, sometimes internal regulations of retail chains consistent with the CSR concept would be sufficient.

According to Marek Ciesielski (2017), issues related to CSR are often presented in a biased way - as manifestations of altruism. The domination of retail chains over suppliers (mainly small and medium-sized ones) is the basis for building entry barriers. Dominant networks often operate in oligopoly conditions. On the one hand, they compete with each other, and on the other, they pursue a limit price policy. Ciesielski also notes that the dominant retail trade puts pressure on suppliers. This pressure applies not only to the prices paid by suppliers, but also to the so-called unfair practices. These include primarily:

- ambiguous contractual terms,
- lack of written contract (despite legal order [Bieniek-Majka, 2023]),
- changes to the contract with retroactive effect,
- unfair transfer of commercial risk,
- unfair use of information,
- unfair termination of a commercial relationship,
- territorial supply restrictions.

Particularly negative consequences for suppliers arise when chains force suppliers to accept changes in order volumes, even just before the scheduled delivery date, or transfer commercial risk to suppliers by requiring them to collect unsold goods. Unfair practices lead to the same financial consequences as price pressure.

Large retailers (commercial chains) frequently use unfair trade practices in the supply chain and, on the other hand, undertake pro-environmental activities aimed at improving their image (Mayorova, 2021). Recently, there have been several actions carried out by retail chains to support agricultural producers in difficult situations. For example, the campaigns “it's what's inside that counts” and “the second chance of beets” concerned the chain's purchase of “crooked beets” from a farmer who claimed that their appearance was a consequence of a seed defect. The campaigns “give carrots a chance” and “give vegetables a chance” encouraged customers to buy high-value products that did not meet the criteria of cosmetic standards established de facto by the chain. A carrot producer, who, as in the case of beets, was helped by a retail chain in selling agricultural produce, says that

the perfect appearance of vegetables, beautiful color or regular shape are frequent reasons for purchasing a given product or rejecting it if these expectations are not met. Unfortunately, we know that customers are still ruthless in this respect, and that's not how nature works (www.portalspozywczy.pl, 2021).

Lu Shijun and the team (2022), who researched the Chinese market noticed that stringent requirements and irrational consumer preferences (“eye-catching”) regarding size and color often lead to throwing away large amounts of food already in the field or at the stage of primary production, which is reflected in the income of agricultural producers.

## 2. MATERIAL AND RESEARCH METHODS

The aim of this study is to show potential lost benefits for the surveyed carrot producers resulting from losses caused by the use of cosmetic standards imposed by retail chains that declare responsible business conduct. The source material was the literature on the subject, accounting documentation for the years 2019–2022 and information obtained during expert interviews with carrot producers, which were conducted in January 2023.

The study covered 7 purposively selected producers, whose aggregate volume of carrot harvests in 2021 was approximately 15% of the harvest volume in the Kuyavian-Pomeranian Voivodeship and approximately 2.8% in the country. The surveyed producers had modernized storage facilities, production lines and cars with semi-trailers equipped with refrigeration units. Carrot cultivation and the process of preparation for sale are carried out in accordance with GlobalGAP guidelines. The certificate allows you to cooperate with retail chains, which are the main recipients of carrots prepared for sale. The size of the losses was presented on the basis of the mass balance index (Niedek, Łaba, Szczepański, Krajewski, 2019), i.e. the share of the mass of finished products and the mass of raw material intended for sale as a material for processing or animal feed in the mass of received raw material.

$$\text{Losses} = \text{mass of finished products} + \text{mass of raw material for sale} \\ (\text{raw material for processing} + \text{animal feed}) / \text{mass of raw material received} \\ \text{into the warehouse}$$

The value of potential lost profits was estimated on the basis of the difference between the revenue obtained from the sale of rejected products, and the value of potential revenue obtained assuming that producers could sell 50% of the weight of rejected carrots at the average market price of a product meeting the “standards” with a price discount for imperfect appearance in the amount of 30%, 50% or 70%.

### *Cosmetic standards and the revenues of carrot producers*

Poland with average production in 2019–2021 of approximately 666 thousand tons is one of the largest carrot producers in Europe (after Great Britain and Germany, where the production volume in 2019 was approximately 758 and 791 thousand tons, respectively) (GUS, 2020). The carrot harvest in 2021 in Poland accounted for 16.4% of all vegetable harvests, and 18.5% in the Kuyavian-Pomeranian Voivodeship (GUS, 2022). The volume of edible carrot harvests in 2019–2021 among the surveyed producers from the Kuyavian-Pomeranian Voivodeship increased from 14.7 thousand tons to 17.8 thousand tons and accounted for approximately 15% of the vegetable harvest in the Kuyavian-Pomeranian Voivodeship and 2.8% in the country in 2021. The collected raw material was stored in refrigerated warehouses, then, depending on the size of orders received from customers, the carrots were successively washed, brushed, calibrated, packed and transported to the customer. The main recipients of the finished product are retail chains and wholesalers. Due to the requirements of recipients, specified in the literature on the subject of cosmetic standards, regarding primarily the parameters of carrots (weight 50–250 g, diameter 2–4 cm), some of the raw material with full nutritional properties is rejected as not meeting commercial standards. The sorted carrots are then divided according to size into those below and above the commercial standard. Raw materials with sizes above the norm may be desired by processing plants, while small carrots can be used as food for farm animals (mainly cattle), but also for wild animals (supplied to forest districts and zoos). Carrots



with signs of rotting and turning green are sent to the biogas plants. The carrot mass balance determined on the basis of warehouse and commercial documentation for the surveyed farms showed that in the production phase (from the storage warehouse, through washing, calibration, packaging and transport to the finished products warehouse), raw material losses averaged approximately 19%. They resulted from the natural processes of drying carrots in the cold store, losses during the internal transport phase and during the process of preparation for sale. Carrots for consumption, calibrated and intended for the final customer, constituted on average only about 44% of the weight of the collected raw material, while the share of the collected raw material that was intended for processing was on average about 7% of the total weight. On this basis, it can be concluded that only slightly more than half of the collected raw material was intended as food for humans, the rest was animal feed (on average, about 26% of the mass of the collected raw material) or fuel for biogas plants (on average, about 4%) (Figure 2).

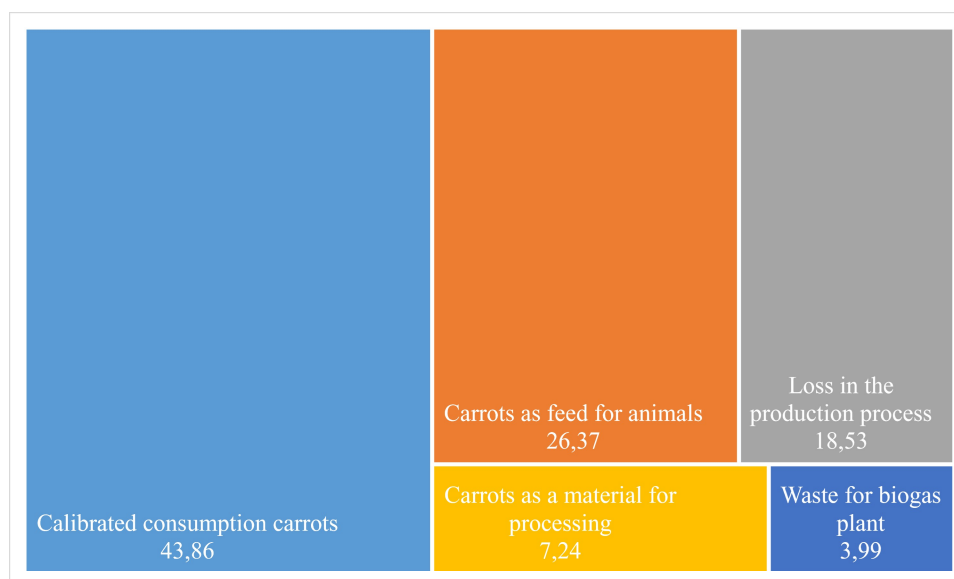


Figure 2. Structure of carrot harvests according to management method. Average share for 2019–2022 (%)

Source: own research.

In the years 2019–2022, the price (Figure 3) of calibrated carrots obtained by the surveyed producers varied, and interestingly, in the last season it was lower than in other years. However, a higher price this season was obtained from processors for the transferred raw material. The average price of calibrated carrots in the examined period was PLN 1.32, for carrots intended for processing – PLN 0.38, and for animal feed – PLN 0.16. The rejection of carrots for aesthetic reasons and the need for producers to sell them for other purposes reduces the revenues that producers can obtain. In the period under review, the average revenue from the sale of the “off-sort” was approximately PLN 1.11 million. Assuming that half of the raw material rejected for aesthetic reasons could be sold with a price discount of 30%, 50% and 70% from the price of the calibrated raw material

intended for sale. It should also be emphasized that producers are most often price takers, and retail chains are price setters. With the above assumptions, the surveyed producers could obtain revenues ranging from approximately PLN 3.04 million (with a 30% discount), through PLN 2.43 million (with a 50% discount), to PLN 1.46 million (with a discount of 70%). Which means that the revenue figure could be higher by 30% to 173%.

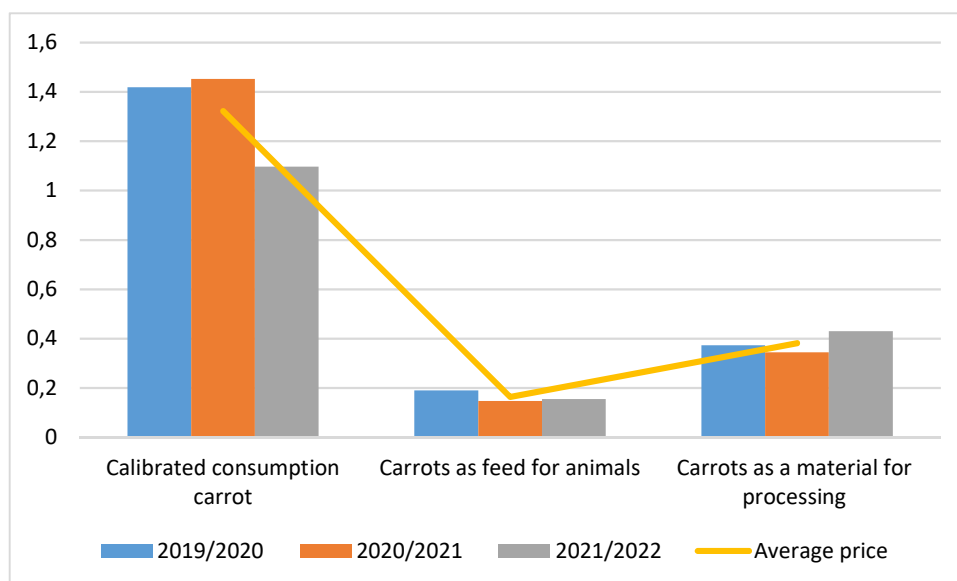


Figure 3. Carrot price depending on the direction of sales in 2019–2021 (PLN)

Source: own research.

Based on the amount of possible revenue, potential lost benefits were estimated, which ranged on average from PLN 0.34 million to PLN 1.92 million (Figure 4). Undoubtedly, the possibility of having greater financial resources would allow producers to increase the profitability of their operations. Retail chains often emphasize that they are socially responsible institutions and that preventing food waste is one of the most important goals of their activities. And in fact, they should be praised for incidentally implemented campaigns that helped farmers reduce financial losses and increase their brand value. But often the actions taken by retail chains may be greenwashing or whitewashing. Greenwashing is the deception of consumers or even societies by companies that pretend to be pro-environmental. Its purpose is to encourage the purchase of goods, increase the importance or value of the brand or simply create a good opinion about the company. The scope of this concept overlaps to a large extent with whitewashing. Both concepts describe activities that are contrary to the concept of CSR (Domański, 2022). Taking into account the role that retail chains play in shaping purchasing processes and influencing customer tastes, we should expect continuous support from producers by “relaxing” calibration requirements and increasing educational activities that change customers' perception of imperfect-looking vegetables. Vegetables produced but rejected for aesthetic reasons not only result in financial losses for the producer or a reduction in the amount of food available

on the market, but also in unnecessary greenhouse gas emissions (Porter, Reay, Bomberg, Higgins, 2018).

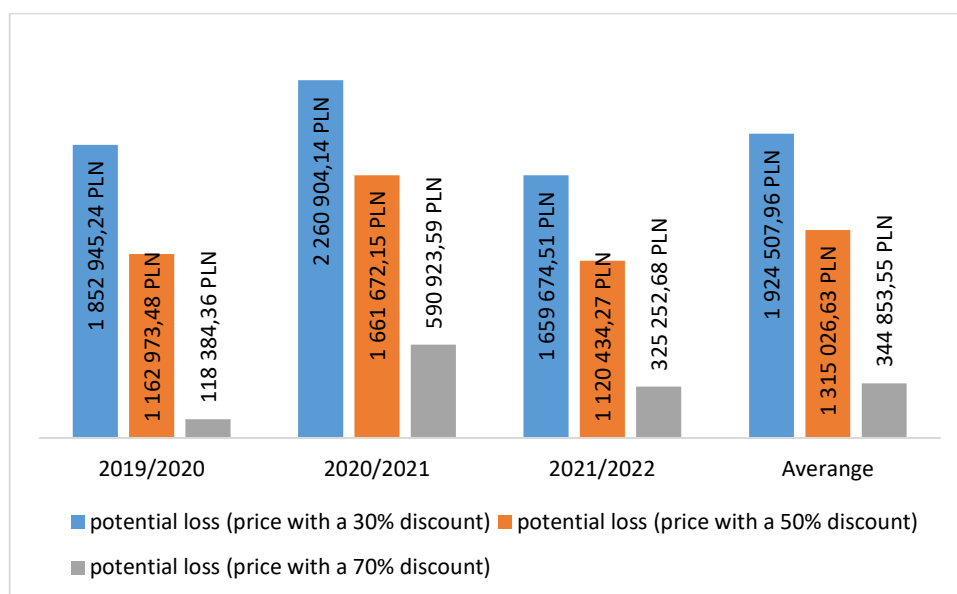


Figure 4. The value of potentially lost revenue depending on the amount of the trade discount granted

Source: own study.

### 3. SUMMARY

In practice, corporate social responsibility covers a wide range of aspects, such as: care for employees, involvement of local communities, and care for the environment. Assessing whether retail chains apply the concepts of corporate social responsibility (CSR) while setting very stringent requirements for aesthetic standards is a complex issue. On the one hand, positive aspects of the activities of retail chains should be noted, but on the other hand, one may be tempted to say that they have signs of whitewashing or greenwashing. These actions are intended to improve the assessment of their image, and perhaps to drown out reproaches related to the increase in the amount of food that may be wasted or written off due to not meeting high aesthetic standards. Rejecting fruit and vegetables, which are a valuable product, has negative social and ecological consequences. Therefore, it is very important for retail chains, as part of the implementation of the CSR concept, to implement educational campaigns aimed at raising the awareness of consumers and employees about the effects of depreciating food products.

The need for producers to sell a complete product at a lower price, such as feed, means that they are exposed to the loss of potential benefits. Enabling manufacturers to sell less aesthetically attractive products at a price discount can help increase their revenues by 30% to 173%, and this can be reflected in the profitability of their businesses. Moreover, this action may contribute to greater availability of products and better satisfaction of people's food needs.

Rigorous cosmetic standards applied by retail chains lead to negative consequences, which may undermine the overall image of these companies. Ultimately, the assessment of implemented activities as part of the corporate social responsibility of retail chains requires taking into account a broader context.

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## **FORMS AND PRINCIPLES OF STATE SUPPORT FOR PUBLIC-PRIVATE PARTNERSHIP PROJECTS**

Infrastructure projects are mostly capital-intensive, have a long payback period, and carry a social burden. The cost of services provided to society is usually regulated by the government. The participation of private investors in such projects is associated with significant risks that arise at the project level and in relation to the state as a partner. On the other hand, the implementation of PPP projects requires significant amounts of funding, which often necessitates the involvement of financial institutions. To implement such projects, it is necessary to provide state support. The article presents the forms of state support used in world practice. The essence and types of state guarantees as a form of state support for PPP projects are disclosed. The principles of their provision are systematized. The author proposes a conceptual approach to the decision-making by governments to provide state guarantees for PPP projects.

**Keywords:** public-private partnership, state guarantees, risks, project, state support.

### **1. INTRODUCTION**

Stable economic development in any country is impossible without ensuring the efficient operation of infrastructure sectors: transport, energy, communications, housing and utilities, education, healthcare, etc. Due to their great social importance, the cost of services provided to society in these sectors is regulated by the state. Sometimes, certain types of services are planned to be unprofitable (for example, urban transport services at tariffs set by the authorities). This significantly limits the commercial attractiveness of the respective projects. Consequently, the burden of financing the development of these sectors falls on the authorities.

Due to limited budgetary funds and the need for significant funds to maintain the working condition of existing infrastructure facilities, the creation of new facilities is slowing down and sometimes even stopping. That is why modern governments are increasingly using public-private partnerships (PPPs) to develop infrastructure sectors. Various forms of partnerships between the state and private business are actively used in all segments of infrastructure. Partnership projects may involve the construction,

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modernisation, operation, maintenance of infrastructure facilities, implementation of infrastructure management systems, etc. Such partnerships result in the implementation of projects that would be impossible to finance in the short term by the state alone. Implementation of these projects on a partnership basis allows not only to achieve the industry's development goals, but also to create additional jobs, boost entrepreneurial initiative, promote innovative development of the industry, and social stabilisation of society.

An important feature of PPP projects in many infrastructure sectors (transport, energy) is their high capital intensity, long payback period, and, due to the availability of alternative transport infrastructure facilities, the lack of confidence in the intensity of operation of new facilities. All of this leads to significant risks for both the project itself and its participants. Therefore, to attract investors to such projects, governments resort to providing appropriate support (Dailami and Klein, 1999; Kosov, Sigarev, Popkov, Ekimova, Fedotov, 2020).

In practice, the lack of government support or insufficient support often led to the closure of such projects as ineffective. Excessive project commitments by governments often resulted in the transfer of risk to society in the form of an increase in the budget deficit, the need to reduce public expenditures, and an increase in the tax burden (Irwin, 2007; Pellegrino, Carbonara, Costantino, 2019). This makes it important to study the validity of the provision of state guarantees (SG) by governments for such projects. The purpose of the article is to clarify the content of state guarantees provided to PPP projects, identify their most common types and formulate the principles of providing state guarantees to PPP projects.

## **2. RESEARCH METHODS**

The study used a variety of methods. The monographic method was used to study the opinions of scholars and research reports on the practice of implementing PPP projects, including the forms of state support provided. Comprehensive general scientific approaches such as analysis and synthesis were also used. Based on the systematic approach, the author's concept of government decision-making on the provision of state guarantees for infrastructure projects implemented on the basis of PPPs is proposed.

## **3. FORMS OF STATE SUPPORT FOR PPP PROJECTS**

PPP projects, in particular in the infrastructure sector, are typically implemented on the basis of project finance, whereby the project company formed by the public and private partners bears the debt obligations directly. Under this type of financing, lenders expect to repay the debt from the project's cash flows, and the collateral for their loans is limited to the project's existing assets or future revenues. This results in the transfer of some of the project risks to the lenders in exchange for higher interest rates than in conventional corporate financing.

At the same time, the main features of projects implemented in most infrastructure sectors on the basis of PPPs are: high capital intensity and uncertainty about the demand for services of new infrastructure facilities, sensitivity to changes in market conditions, government policies, negative changes in which reduce the value of projects (the sum of expected discounted cash flows from the project) and increase the risk of investors' investments (He, Shi, Li, 2022).

Therefore, investors will also try to obtain benefits that will cover their risk. All this increases the cost of infrastructure services that will ultimately be provided to society



(Grimsey and Lewis, 2007). Therefore, in order to maintain the cost of these services at an affordable level, there is a need for financial support of the project by the state.

Financial state support for the implementation of a PPP project can be provided in the form of

- direct support – in cash or in kind to cover construction costs, provision of inputs, etc.,
- granting privileges in the payment of duties, fees and other payments (e.g., granting tax holidays to the project company),
- financing of project implementation by providing loans (including mezzanine loans), investments in the equity capital of the project company,
- financing of „hidden” tariffs and subsidising tariffs for certain or all categories of consumers in order to reduce the demand risk borne by the project company.

These forms of support can be combined with each other.

Targeted support is aimed at achieving a specific result and may have an impact on the requirements for the result or quality of services (works) (e.g., provision of services to residents of a certain territory, etc.).

Other forms of support occur when the state does not directly participate in project financing, but assumes certain obligations in the form of

- guarantees. they relate to both loan repayments by the project company and the exchange rate, obligations to purchase services, collection of tariff payments, the permitted level of tariffs, the volume of demand for services, compensation to private businesses in case of contract termination,
- guarantees of reimbursement of losses in case of non-payment by public authorities, insufficient revenues or cost overruns,
- insurance; coverage of project risks (hedging against changes in the exchange rate, adverse weather conditions, etc.),
- contingent loan in the form of commitments to lend to the project company in the future.

In the course of implementing PPP projects, issues of risk allocation between partners arise. It is clear that such allocation should be based on the principle: whoever can influence the degree of risk manages it. However, there are often situations when the „standard” approach to risk allocation between partners does not provide the benefits of the PPP project (Li, 2020). In such situations, it is advisable to use the mechanism of state guarantees (GGs). Such guarantees can be applied in various forms and can be targeted at the entire PPP market, as well as at certain programmes or specific projects (Sant'Anna, Brandão, Bastian-Pinto, Gomes, 2022).

#### **4. STATE GUARANTEES AS A FORM OF STATE SUPPORT FOR PPP PROJECTS**

State guarantees have been an integral part of PPP projects for a long time, but since the global crisis in 2007, their use has become more widespread and diverse.

In terms of content, government guarantees can be viewed as agreements under which the government (any level of government with the authority to initiate and support the implementation of a PPP project) agrees to assume all or some of the risks of reducing the value of the PPP project.

By their nature, government guarantees can be viewed as secondary obligations that legally bind the government to assume the specified obligations if the events specified in the agreement occur.

Also, government guarantees should be considered as a contingent liability because there is uncertainty as to whether the government will be able to make the payments and, if so, how much and when it will be obliged to pay. As a rule, GGs are used when suppliers of long-term credit resources (commercial banks, national and international financial institutions, capital markets) are reluctant to provide them to a project company, fearing credit risks and the potential threat of losing the loan (Lu, Chao, Sheppard, 2019).

GGs can also be used to provide benefits to the participants (founders) of a project company when it is necessary to protect their investments from specific risks.

In general, the main reasons for the use of DGs by governments are as follows:

1. Political: 1) building confidence in PPP processes, supporting the development of the PPP market, demonstrating the government's commitment; 2) accelerating the implementation of investment projects; 3) supporting strategically important investment projects.
2. Financial: 1) stimulating investment in large-scale projects; 2) reducing the cost of capital of the project company and improving the value for money of services to be provided as a result of the project; 3) ensuring stability in financial markets by: increasing liquidity or reducing credit risks of creditors; 4) improving financing conditions through lower pricing and longer terms of debt capital use; 5) providing the public with an asset built without the need for significant public investment; 6) attracting new sources of financing for PPP projects, including capital markets (e.g., bonds issued by project companies).
3. Project risks: 1) project company default risks. In this case, the DG protects creditors from the risk of the project company's default and bankruptcy, regardless of the reasons for such a situation; 2) demand risks. These risks are commercial risks and are usually transferred to the private partner. In cases where the project involves significant investment and the forecast demand is uncertain, or the government is the sole user of the project company's services, the government may assume partial or full risk. This is done in order to reduce the risks of creditors associated with fluctuations in the company's income; 3) construction risks. The government considers the risks associated with the implementation of particularly complex projects (for example, geological surveys of large tunnel projects); 4) technological risks. As a rule, lenders avoid risks associated with the development and first steps of implementation of high-risk technologies, technological risks of obsolescence in PPP projects; 5) political risks. Such risks must be assumed by the government, as they are the result of unpredictable changes in government actions. They may relate to such issues as changes in the price (tariff) for the project company's services, changes in service fees, unforeseen changes in laws and regulations, changes in the quality of service, free confiscation, etc. In this case, the provision of DGs protects private participants from adverse changes in the macroeconomic environment (e.g., devaluation, interest rate fluctuations); 7) residual value risk. It relates to the value of an asset that will be returned to the government at the end of the project (e.g., concession).

Consequently, government guarantees are one of the most important instruments for reducing the risks of PPP projects.

From a legal point of view, PPGs can be guarantees in the narrow sense, but they can also take the form of contractual obligations (under the PPP agreement or other project agreements), cost reimbursement letters, and even letters of intent.

The most common types of GCs are:

1. financing guarantees. They focus on the lenders of PPP projects and can take the form of: loan guarantees; refinancing guarantees,
2. separate provisions in the PPP agreement, rather than additional agreements between the state and the creditor (investor). In particular, such provisions in the PPP agreement include the following typical clauses: income or guarantee of use; guaranteed minimum service fee; change in statutory (regulatory) obligations; and termination payments,
3. assumption by the government of the project company's debt obligations (issuance of bonds). In this case, the government becomes a borrower, relieving the project company of this obligation,
4. residual value payments. Such guarantees are used in projects where the duration of the contract does not allow the private investor to recover the investment. In this case, the government undertakes to reimburse the private investor for the relevant amount after the contract expires.

At the same time, different types of PPAs are not only mutually exclusive, but often complement each other in the spectrum of state support for a project in the interests of creditors and/or investors.

## **5. PRINCIPLES OF GOVERNMENT GUARANTEES FOR PPP PROJECTS**

The government guarantees for PPP projects should be based on the following principles:

1. The best value for money should be ensured for the services to be provided by the project.
2. Incentives should be maintained for private partners to carefully evaluate investment projects and to perform efficiently.
3. Governments should avoid implicit commitments in PPP projects and should not attempt to rescue all PPP projects at any stage of their implementation. All project participants should know in advance when, to what extent and under what conditions the government will support the project.
4. Guarantees should be subject to certain rules, as they entail risk management and additional obligations of the government.
5. DGs should be provided on a fee basis. The reasons for this are: 1) the government can act as an insurer that assumes the relevant risks; 2) the payment for GGs allows project companies to choose options for attracting guarantees; 3) the funds charged for GGs are an important determinant of the value of guarantees in monetary terms. The value should reimburse the government for the administrative costs of issuing and managing the GGs; 4) charging for GGs provides certain incentives to the financial market; 5) charging for GGs provides incentives to the project company to restructure its sources of financing.
6. Before granting a GGs, the government should decide on a number of key issues: 1) who will pay for the provided GGs; 2) when to charge for the provided GGs (during the operation period or at the end of the project); 3) determining the amount of the GGs payment.
7. GGs should be limited in scope and duration: 1) more active provision of GGs in the early stages of PPP projects, when there is significant uncertainty about the project outcomes; 2) not all project phases require government support.
8. GGs should be revolving.

As a result of its contingent nature, a GGs may have a significant impact on future public finances. The expected potential value associated with a GGs should be carefully assessed and taken into account in the budget of the country, region, etc. In addition, GGs are often limited by legal requirements, such as national or international (e.g. European) regulations.

In general, the provision of GGs entails financial risk that needs to be managed. To this end, all information on the provision of GGs should be centralised. The Ministry of Finance should play a key role in the development and review of the provision of GGs.

## **6. PROCEDURE FOR MAKING DECISIONS ON STATE GUARANTEES FOR PPP PROJECTS**

The decision-making procedure for providing government guarantees should include a number of steps that will allow for a realistic assessment of the need for such guarantees, their scope, forecasting the expected consequences for the government, and developing a number of preventive measures to eliminate the negative impact on the budget.

In general, the government's decision-making process for providing state guarantees should include the following steps (Figure 1):

1. Establishment of national legislative regulation of state support for public-private partnership programs (projects).
2. Establishing the configuration and constraints for the GGs for a specific PPP program (project). At this stage, the following tasks need to be solved:
  - define the configuration of the state guarantees: Are GGs provided under a specific PPP program or under a specific PPP project,
  - identify the problems to be solved by the provision of the GGs,
  - determine the limits of risks covered by the GGs,
  - evaluate the value for money of the GGs,
  - compare it with other forms of government intervention in the project (investment grants, credit lines, tax benefits, insurance systems),
  - define the limits of providing GGs in terms of limiting political risks.
3. Introduction of the rules for granting GGs for a specific PPP program (project). The following actions are envisaged:
  - establishing eligibility criteria for PPP projects to receive GGs,
  - establishing the basic conditions for granting GGs to PPP programs and individual PPP projects within the relevant programs,
  - involvement of government stakeholders in decision-making, whose competence includes approval of PPP projects and draft budgets,
  - clear definition of the governmental legal entity that will provide the GGs,
  - clear identification and structuring of potential recipients of the GGs,
  - determination of the range of risks associated with the provision of GGs,
  - establishing project phases of the PPP project to which the provision of GGs may be applied,
  - ensuring that investors are incentivised to manage the risks they can influence,
  - preserving a certain level of risk for lenders to avoid their bad faith,
  - drawing up plans for the provision of GGs.

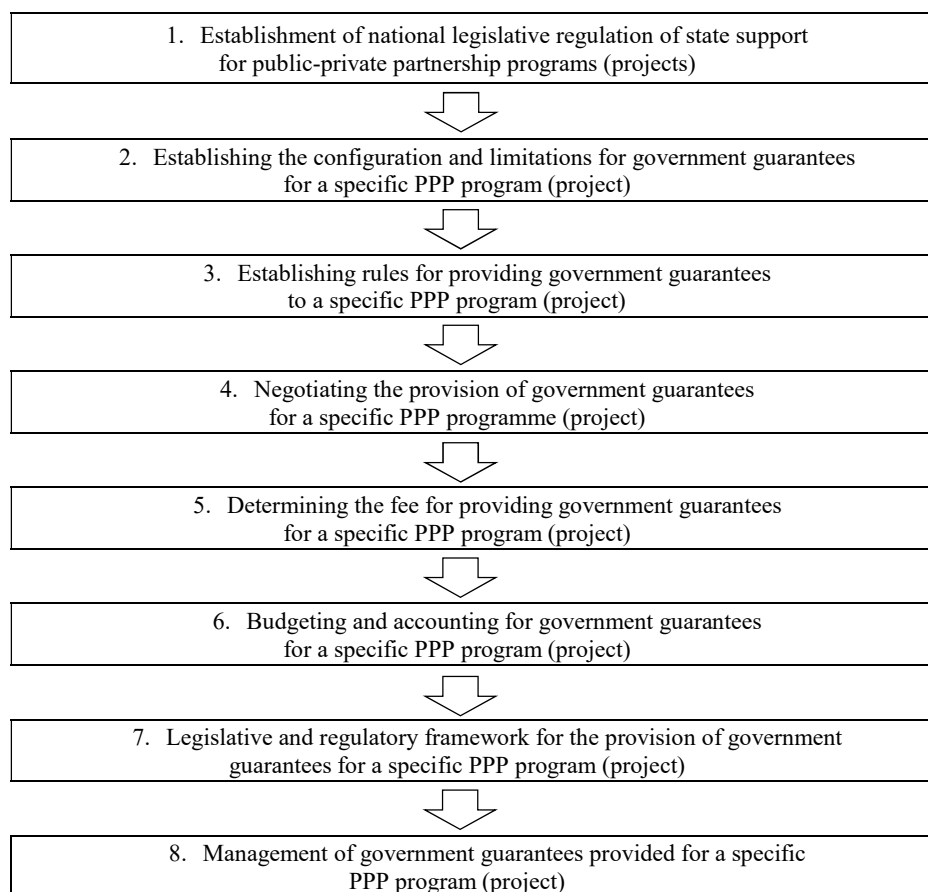


Figure 1. Conceptual scheme of the government's decision-making on the provision of government guarantees

Source: (Бондар, 2014).

4. Negotiate the provision of the GGs for a specific PPP program (project). At this stage, it is necessary to:
  - engage highly qualified specialists or consultants,
  - optimise the negotiation procedure to avoid bureaucracy and ensure quick decision-making,
  - study the problems of relations between the PPP project's creditors and the impact of the provision of GGs on the preferences of individual creditors,
  - to rank the creditors' requirements in terms of priority of granting them GGs.
5. Determination of the fee for the provision of GGs for a specific PPP program (project). It involves solving the following tasks:
  - engaging highly qualified specialists or consultants, as the decisions made may affect the behaviour of PPP participants,
  - establishing the cost of providing GGs, taking into account administrative costs and a certain remuneration to the state for risk,

- establishing the circle of persons who will pay and the terms of payment for the provided GGs,
  - establishing compliance of the amount of payment for the provided GGs with the current state support policy.
6. Budgeting and accounting for the provision of GGs for a specific PPP program (project). At this stage, actions are taken to:
    - establishing a procedure for accounting and planning for the provision of GGs,
    - full disclosure in the budget of the obligations assumed by the government as a result of the provision of GGs and ensuring the publicity of this information,
    - ensuring centralised management by the Ministry of Finance or another person authorised by it,
    - checking the compatibility of the granted GGs with the state budget constraints.
  7. Legislative and regulatory regulation of the provision of GGs for a specific PPP program (project). This stage is aimed at:
    - ensuring compliance of the granted GGs with the current legislation,
    - checking at the early stages the compliance of the project of providing the State Aid with the regulatory provisions of the GGs provision,
    - to ensure that the issues related to the provision of GGs are included in the project agreement or additional agreements.
  8. Management of the granted GGs for a specific PPP program (project). This involves assigning the leading role in the management of GGs to the Ministry of Finance.

Consistent implementation of these stages of the proposed „technological map” for consideration and decision-making related to the provision of GGs to PPP projects and their further management will optimise the budgetary burden caused by the government's assumption of the relevant contingent liabilities and ensure the fulfilment of the latter.

## 7. CONCLUSIONS

Government support is a prerequisite for the successful implementation of PPP projects. It can be provided in technical, financial, targeted and other forms (guarantees to the project company regarding the level of tariffs, provision of loans in the future, compensation for losses in case of insufficient demand, etc.). An important form of government support for PPP projects is the provision of government guarantees.

The issue of government guarantees is a complex one. It involves reconciling the interests of both PPP project participants and users of the services to be provided as a result of the project; it requires a certain level of protection of investors' and creditors' interests and fair risk sharing with them; and it should take into account the financial capacity of budgets. At the same time, due to the variety of forms of provision, state guarantees are becoming a universal instrument that increases the investment attractiveness of a PPP project, reduces the risks of loss of financial stability of the project company, disruption of project implementation, and risks of creditors. Ultimately, this creates the preconditions for ensuring the optimal ratio between the price and quality of services to be provided to society as a result of the project implementation.

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## FORFEITURE OF A MOTOR VEHICLE OR ITS EQUIVALENT: AN ANALYSIS OF THE NEW REGULATION OF THE PENAL CODE AND ITS IMPACT ON SAFETY

Crimes against safety in public transport constitute a serious problem and threat to social functioning. A failure to comply with the provisions of the Highway Code, especially excessive speeding, poses a serious threat to other road users, as well as to pedestrians who, as a result of drivers' carelessness, become victims of road accidents. However, drivers who decide to get behind the wheel after drinking alcohol pose a particularly serious threat. Therefore, legislation declares severe punishment for such actions. This paper is a response to the changes that came into force in the Polish legal system beginning March 14, 2024, which included extremely severe sanctions against people committing certain crimes against safety.

**Keywords:** safety in public transport, safety in land traffic, safety of road users, road accidents, vehicle forfeiture, Penal Code.

### 1. INTRODUCTION

The need to assess the introduced penal regulations is extremely important as the solutions themselves divide society into supporters and opponents of their implementation in the Act of June 6, 1997, Penal Code. On the one hand, tightening sanctions, among others, for drivers driving motor vehicles in land traffic while drunk or under the influence of an intoxicating substance is socially accepted and approved, on the other one, however, the sanction introduced by the Legislator is characterized by a certain injustice, and according to some experts speaking in public space, it may even violate the constitutional principle of proportionality in the judicial application of the law. It is undoubted that all the assessments and attempts to take sides in the dispute are purely hypothetical in nature since a clear answer to the question whether the change that is to become a permanent part of the Polish legal system from March 14, 2024 is good or not will be possible only after common courts start applying the provisions. It should also be noted that the provisions leave the court adjudicating in the case some discretion in certain matters, and also allow the court to waive the application of these sanctions in the event of *an exceptional case*

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*justified by special circumstances*. Certainly, this concept is vague and open, so only judicial practice will make it possible to complete this catalogue. The above inclusion is important as the authors would like to draw the reader's attention at the beginning that a categorical, unambiguous assessment of the introduced changes will only be possible after several years of application of the new regulations in practice by the adjudicating courts.

## **2. A COMPARATIVE ANALYSIS OF SELECTED PROVISIONS OF THE PENAL CODE AS AMENDED BY THE ACT OF JULY 7, 2022 AMENDING THE ACT – PENAL CODE AND CERTAIN OTHER ACTS**

Pursuant to art. 1 point 14 of the Act of July 7, 2022 amending the Act – Penal Code and certain other acts, a new provision has been encoded in the legal norms of Art. 44b. This article is divided into four paragraphs and sets out the following principles:

§ 1. In the cases specified in the Act, the court orders the forfeiture of the motor vehicle driven by the perpetrator in land traffic.

§ 2. If the forfeiture of a motor vehicle due to its disposal, loss, destruction or significant damage is impossible or inappropriate, or if the vehicle was not the exclusive property of the perpetrator at the time of committing the crime, instead of forfeiture of the motor vehicle, the forfeiture of the equivalent value of the vehicle shall be ordered. The equivalent of a vehicle is the value of the vehicle specified in the insurance policy for the year in which the crime was committed, and in the absence of a policy – the average market value of the corresponding vehicle, taking into account the make, model, year of production, body type, type of drive and engine, capacity or power. engine and approximate mileage, to the vehicle driven by the perpetrator, determined on the basis of available data, without appointing an expert for this purpose.

§ 3. The forfeiture of a motor vehicle and the forfeiture of the equivalent of a vehicle specified in § 2 shall not be imposed if the perpetrator drove a motor vehicle that was not their property while performing professional or official activities involving driving a vehicle for the employer. In such a case, the court awards compensation in the amount of at least PLN 5,000 to the Victims' Assistance Fund and Post-penitentiary Assistance.

§ 4. If determining the average market value of a motor vehicle corresponding to the vehicle driven by the perpetrator in the manner specified in § 2 is not possible due to the specific characteristics of this vehicle, an expert opinion is sought (Act of July 7 2022 amending the Act – Penal Code and certain other acts, Article 1 point 14).

This provision has not yet had an equivalent in the Penal Code Act of 1997, but special attention should be paid to its place in the taxonomy of the indicated criminal act. This provision will be located in Chapter Va, entitled *Forfeiture and compensatory measures* (Act of July 7 2022 amending the Act – Penal Code and certain other acts, Chapter Va). Especially at this stage, it should be clarified that forfeiture is neither a punitive nor a compensatory measure. Forfeiture is a very specific, separate type of penal reaction of the legislator aimed at perpetrators of certain crimes. The very essence of forfeiture has already been encoded in the name of this institution as it consists in the State Treasury taking over certain assets belonging to the perpetrator. This is an important issue because forfeiture, referred to as a type of penal reaction, conceptually escapes the obligation to be subject to the principle of proportionality of the penalty or penal measure to the committed act. While the penalties and penal measures specified in the Act are subject to a certain moderation, i.e. they depend on the discretion of the court, or if they are obligatory, they

can be additionally moderated in terms of their duration, forfeiture, unless its ruling is optional, always applies items obtained by crime, items used to commit a crime and items prohibited from production, distribution, shipment or sale. The purpose of forfeiture is primarily to prevent the perpetrator from using the items used to commit the crime again and from deriving further benefits from the items obtained by committing the crime (Limburska, <https://>). The above is extremely important because already at this stage it is necessary to realize that, for instance, a driver driving a motor vehicle in land traffic under the influence of alcohol will be subject to a sanction in the form of a driving ban for a specified period of time, determined by the adjudicating court. In such a case, the criminal measure, as a sanction subject to the principle of proportionality, will be equally severe for a person who drove a car worth several thousand zlotys and for a person who drove a car worth several hundred thousand zlotys. The effect of the sanction will be the inability to drive motor vehicles, and its cause will be the violation of the legal order. In the case of applying a criminal sanction in the form of forfeiture, the legislator does not focus directly on the person of the perpetrator and the effect (or the gravity of the violation), but on their material sphere, i.e. those items that he used to commit the crime or those that, as part of the committed crime, obtained the crime. For a more complete illustration, imagine a person who, under the influence of alcohol, drives a motor vehicle worth several thousand zlotys and another person who drives a motor vehicle worth several hundred thousand zlotys. If the court orders forfeiture against both of these people for the same act, the financial (economic) burden will be different for each of these people because it will result in a completely different depletion of their assets.

When analyzing the remaining provisions of the Penal Code regarding crimes against communication safety, indications are required to include those to which the legislator, as of March 14, 2024, decided to add an additional sanction in the form of forfeiture referred to in the previously presented Art. 44b.

Collectively, the legislator applied this sanction by adding it to Art. 178 of the Penal Code, implementing an additional third paragraph, which clearly indicates that in the event of a conviction, on the basis of increased punishment for selected crimes against safety in land traffic of the aggravated type, described in detail in Art. 178 of the Penal Code (§1, §1a), the court may order forfeiture referred to in Art. 44b of the Penal Code. The court obligatorily orders this forfeiture if the alcohol content in the perpetrator's body at the time of committing these acts was higher than one permille in the blood or 0.5 mg/dm<sup>3</sup> in the exhaled air or led to such a concentration (Act of June 6, 1997, Penal Code, Article 178). The above undoubtedly draws the recipient's attention to the fact that Art. 178 of the Penal Code, already in the version before March 14, 2024, contained provisions that additionally tightened the punishment for perpetrators of causing a traffic disaster or a traffic accident in a situation where the result was the death of a person, or the occurrence of injuries to many people (also in the case of property in large sizes) even if the perpetrator violated the safety rules unintentionally. In the version after March 14, 2024, the legislator decided to additionally tighten sanctions for the above-mentioned crimes by imposing forfeiture on the perpetrators. The above clearly illustrates that the legislator's goal is to maximize the criminal penalty for the most serious crimes against communication safety in order to deter potential perpetrators. This procedure actually influences the recipient's imagination, although one should definitely adhere to the unwritten rule, repeated many times in judges' chambers, that what matters most is the inevitability of a criminal sanction, which outweighs its disadvantage in terms of deterring potential perpetrators (Act of June 6, 1997, Penal Code, Article 178).

Criminal sanction in the form of forfeiture referred to in Art. 44b of the Penal Code, was also added to the fifth paragraph, Art. 178a of the Penal Code. In this way, the legislator decided to oblige the adjudicating court to order forfeiture in a situation where the perpetrator has committed an offense of driving a motor vehicle in land, water or air traffic while drunk or under the influence of a narcotic drug, and if the perpetrator has previously been legally convicted of driving a motor vehicle while drunk or under the influence of a narcotic drug or for other crimes (Article 173, Art. 174, Art. 355 § 2 of the Penal Code) committed in a state of intoxication or under the influence of a narcotic drug, or the perpetrator drove a vehicle under the same conditions during the period of driving ban, if the ban was imposed in connection with committing a crime. The obligation for the court to order forfeiture referred to in Art. 44b of the Penal Code remains valid only to the extent that the alcohol content in the perpetrator's body was not lower than 1.5 (one and a half) per mille in the blood or 0.75 mg/dm<sup>3</sup> in the exhaled air, or did not lead to such a concentration. The legislator also left the adjudicating court with an additional option, stating that the court may refrain from ordering forfeiture if there is an exceptional case justified by special circumstances (Act of June 6, 1997, Penal Code, Article 178). Adding an additional sanction for perpetrators of the crime of driving motor vehicles in land, water and air traffic in the form of forfeiture of the vehicle is undoubtedly a continuation of the previously mentioned strategy of the legislator, aimed at deterring potential drunk drivers as effectively as possible. A meaningful assessment of the Legislator's strategy in this area will only be possible in a few years, based on the statistics prepared, with the necessary consideration of how the courts will approach the application of forfeiture, and what use will be made of the loophole left to the court in the form of the possibility of waiving the forfeiture order, with attention to an exceptional case justified by special circumstances. It should also be borne in mind that even though the provisions of Art. 178a § 1 of the Penal Code, speaks directly about driving a vehicle in land, water or air traffic, then forfeiture under Art. 44b of the Penal Code only covers a motor vehicle driven by the perpetrator in land traffic (Act of June 6, 1997, Penal Code, Article 44b).

### **3. THE LEGAL NATURE OF THE REGULATION ESTABLISHING THE FORFEITURE OF A MOTOR VEHICLE OR ITS EQUIVALENT**

The provision of Art. 44b of the Penal Code introduces a form of forfeiture of an item, which is a motor vehicle driven by the perpetrator in land traffic, previously unknown to the Polish legal system. Such forfeiture may be imposed in cases strictly defined by law. These situations include:

1. conviction for the crime of causing a transport disaster (Article 173 of the Penal Code),
2. causing the risk of a communication disaster (Article 174 of the Penal Code),
3. causing a traffic accident (Article 177 § 1 and § 2 of the Penal Code),
4. sentencing the perpetrator who fled the scene of the incident while intoxicated or under the influence of a narcotic drug, or who consumed alcohol or took a narcotic drug after the event specified in Art. 173 § 1, § 2, art. 174 or 177 § 1 of the Penal Code (and before it is subjected to an examination by an authorized authority to determine the alcohol content or the presence of a narcotic drug in the body),
5. driving a motor vehicle in a state of intoxication or under the influence of intoxicants in land, water or air traffic by the perpetrator in a state of intoxication, in which the alcohol concentration in the body was not less than 1.5 per mille in the

blood or 0.75 mg/ dm<sup>3</sup> in the exhaled air or led to such a concentration, or by the perpetrator being under the influence of a narcotic drug or in the event of committing a crime of driving a motor vehicle in land, water or air traffic while under the influence of alcohol or under the influence of a narcotic drug, if the perpetrator was previously legally convicted of driving a motor vehicle under the influence of alcohol or drugs or for an offense specified in Art. 173, 174, 177 or 355 § 2 of the Penal Code committed in a state of drunkenness or under the influence of a narcotic drug, or he committed driving a motor vehicle while drunk or under the influence of a narcotic drug during the period of driving ban imposed in connection with a conviction for a crime, or he consumed alcohol or took a narcotic drug after the event and before it was subjected to testing by an authorized authority to determine the alcohol content or the presence of a narcotic drug in the body (Kulig, 2024).

As indicated in the literature on the subject (Kulig, 2024), there is a need to add Art. 44b to the Penal Code, was a kind of necessity resulting from the position of the Supreme Court, regarding the inadmissibility of ordering the forfeiture of a motor vehicle as an item used to commit a crime. It is worth mentioning here the theses of the resolution of the Supreme Court, issued by a panel of seven judges of October 30, 2008, ref. no. No. I KZP 20/08, according to which:

A motor vehicle is the subject of an enforcement action of the offense specified in Art. 178a § 1 of the Penal Code, and therefore does not belong to the category of objects that serve or are intended, within the meaning of Art. 44 § 2 of the Penal Code, to commit this crime

and As is clear from the wording of Art. 44 of the Penal Code, the forfeiture of three categories of items was regulated separately. In § 1 – obligatory, if the items come directly from a crime (*producta sceleris*), in § 2 – optional, and in the cases specified in the Act, obligatory, if they served or were intended to commit a crime (*instrumenta sceleris*) in § 6 – optional, and in the cases specified obligatory in the Act if they are items prohibited from producing, possessing, trading, transmitting, carrying or transporting, and the perpetrator has been convicted of a crime of violating such prohibitions (*obiecta sceleris*). [...] as well as:

In Art. 44 § 6 of the Penal Code forfeiture of the objects of enforcement action is provided for. This provision limits the scope of forfeiture to those types of crimes whose causative action consists in dealing with the executive object in a manner described therein, violating the statutory prohibition of their production, possession, trade, transmission, transfer or transport. About the possibility or obligation to make a ruling pursuant to Art. 44 § 6 of the Penal Code The forfeiture of items strictly defined in penal provisions is therefore determined by whether the perpetrator has performed prohibited executive actions with respect to them, thus committing a prohibited act (Resolution of the Supreme Court of October 30, 2008, I KZP 20/08, OSNKW 2008, No. 11, item 88).

The view presented by the Supreme Court directly indicates that a car – defined in the Penal Code as a motor vehicle – is not included in the group of objects used or intended to commit a crime typified by in art. 178a of the Penal Code. The Supreme Court, justifying

its position, stated that in this approach, a motor vehicle is only the subject of the enforcement action of this offense and therefore does not fall into the category of items subject to forfeiture. (It should be noted that this view was not fully appreciated by the representatives of the doctrine.)

From a legal and criminal point of view, it is also worth paying attention to the fact that the forfeiture referred to in Art. 44b of the Penal Code applies only to a motor vehicle that is the property of the perpetrator of the penalized conduct. When assessing the ownership right, the court adjudicating the case takes into account whether the perpetrator is entitled to this right during the act and during the adjudication of the case. If for some reason, at the time of committing the act by the perpetrator, the motor vehicle was not their exclusive property, or if after committing the crime the perpetrator got rid of the ownership rights to this vehicle (sold, donated, hid), instead of forfeiture, the court also orders forfeiture, but in such a situation, the subject of forfeiture is the equivalent of this vehicle (Article 44b § 2 of the Penal Code). Only for the sake of precision of the issue at hand, it should be added that the sale of a vehicle is understood by the Legislator as the transfer of ownership of the vehicle by the perpetrator to another person for a fee, while donation is understood as the free transfer of the vehicle to another person (not necessarily the closest one), and the concept of hiding a vehicle should be understood as the creation of by the perpetrator of such a situation in which the law enforcement authorities do not know where the perpetrator located the vehicle.

The diligence and comprehensiveness with which the legislator regulated the issue of determining the value of a vehicle subject to forfeiture in the event of its sale, donation or concealment should be assessed positively. It should be emphasized that forfeiture in such a situation covers the entire value of the vehicle. The equivalent of a vehicle is its value specified in the insurance policy concluded in the year in which the crime was committed, and if the vehicle does not have an insurance policy, the average market value of the vehicle corresponding to – taking into account the make, model, year of production, body type, type of drive and engine, engine capacity or power and approximate mileage – the specificity of the vehicle that was driven by the perpetrator at the time of committing the prohibited act. What is equally important, the value of the vehicle is determined on the basis of this data, without the need to appoint experts (the principle of maintaining procedural economy – at this point, according to the author – the legislator tried, by introducing an additional obligation imposed on the adjudicating court, not to excessively prolong the duration of proceedings before court of first instance). The legislator also noted a possible case in which determining the approximate value of the vehicle would be impossible in the absence of an insurance policy and in the presence of special properties of the vehicle that cannot be determined using the comparative method. Only in such a case will it be necessary and justified to appoint an expert to determine the value of the vehicle. In addition to the above-mentioned circumstances, the court conducting the proceedings will also order the forfeiture of the vehicle's value if the perpetrator was entitled to the vehicle only on the basis of co-ownership.

A case in which the court will not order the forfeiture of a motor vehicle and its equivalent is a situation in which the perpetrator of the crime was driving a motor vehicle that was not his property, while performing professional or official activities for his employer. In such a situation, the court will order the perpetrator of the crime to pay compensation specified in the lower limit, at least PLN 5,000, to the Victims' Assistance Fund and Post-penitentiary Assistance (Kulig, 2024).

Undoubtedly, according to the analyzed provision, the forfeiture of a vehicle or its equivalent is excluded if the vehicle is a wreck or the vehicle was lost by the perpetrator after committing a crime as a result of an action other than taking a specific legal action involving the perpetrator (and hiding the vehicle). It should also be emphasized that the forfeiture referred to in Art. 44b of the Penal Code applies only to motor vehicles, i.e. vehicles that have been legally permitted to participate in road traffic. Therefore, when the forfeiture of a vehicle or its equivalent is ordered, the car must be a motor vehicle under the law. A vehicle that has been damaged, e.g. as a result of an incriminated event, in such a way that it cannot be allowed to participate in road traffic becomes waste and ceases to be a motor vehicle, and therefore the sanction of forfeiture or forfeiture of its equivalent becomes obsolete. The doctrine strongly emphasizes the fact that, apart from the destruction or significant damage to the vehicle, the reason excluding the order of forfeiture is also its loss for reasons beyond the control of the perpetrator of the crime. As rightly pointed out by dr hab. Tomasz Oczkowski such a solution may encourage reports of fictitious thefts (Oczkowski, 2023).

#### 4. FORFEITURE OF A MOTOR VEHICLE OR ITS EQUIVALENT IN SELECTED EUROPEAN UNION COUNTRIES

The institution of forfeiture of a motor vehicle or its equivalent, although *a novelty* in our country, is very well known to citizens of other countries that are members of the European Union. When making only a cursory analysis of legal regulations regarding the forfeiture of a motor vehicle or its equivalent, attention should be paid in particular to:

##### **Austria**

The forfeiture of a motor vehicle may be imposed for exceeding the speed limit in conditions that adversely affect road safety (e.g. heavy rainfall, driving on sections covered by road works), exceeding the established speed limit by twice the amount, or participating in illegal races. The same sanction will also apply to Austrians who will be checked while driving despite being banned from driving for speeding or who will speed without having a driving license (as an authorization, not a document).

##### **Germany**

The forfeiture of a motor vehicle will be ordered in the absence of a valid insurance contract (it is, therefore, logical that the forfeiture will only apply to persons who drive such a vehicle and are also its owner).

##### **France**

In this case, we are dealing with a full range of forfeiture sanctions in every variety. It would not be an exaggeration to say that in Europe, France has the most stringent regulations regarding the forfeiture of motor vehicles or their equivalent. Every citizen of this country can count on the forfeiture of their car or its equivalent in EUR if they exceeded the speed limit by 50 km/h, had alcohol in excess of 0.5 per mille, caused a road collision and then fled the scene, did not enter into an obligatory civil liability insurance contract, or did not have the right to drive motor vehicles. Just like our Legislator, the French Legislature has also decided to impose forfeiture on the owners of the vehicle, and otherwise, the perpetrator will be charged with forfeiture of the value of the vehicle that violated the law.

##### **Italy**

In this country, the forfeiture of a vehicle is ordered in a situation where the driver does not have a valid civil liability insurance contract or drives the vehicle under the influence

of alcohol, and the lower concentration limit for forfeiture is as much as 3.15 per mille (in order to be able to order forfeiture, the perpetrator must be the owner of the vehicle).

#### **Luxembourg**

In Luxembourg, the regulations are relatively lenient; here, as in Italy, the cause of the loss of the vehicle is related to driving under the influence of alcohol, with the reservation, however, that the driver must have more than 0.5 per mille of alcohol and must commit such an act twice in a short period of time. intervals – only such a model of driver behavior will result in the forfeiture of the vehicle, and in order to be subject to this sanction, the drunk driver must also be the owner of the vehicle.

#### **Finland**

The Finns definitely have the most rational approach to the issue of forfeiture of motor vehicles. In this country, forfeiture may be ordered when a vehicle is used for fuel theft or other intentional crimes. The same sanction applies to drivers who do not have a valid third party liability insurance contract or who have been detained multiple times while driving a vehicle without the required license (in each case, only the person who owns the vehicle is affected by forfeiture).

#### **Switzerland**

In this case, of course, the sanctions of forfeiture cannot be applied to perpetrators violating the order. Therefore, forfeiture may be imposed against drivers who generate excessive noise, especially at night, against drivers exceeding the speed limit by 50 km/h on the highway, or against drivers who drove under the influence of alcohol (above 0.5 per mille). Each time, however, before ordering forfeiture, the purposefulness of such a decision is examined, and the forfeiture may affect the owner of the car even if he was not the perpetrator of the offenses referred to, but was at least a passive participant in them (Pokorzyński, <https://>).

### **5. EXPERTS' OPINIONS ON THE INTRODUCED PENAL REGULATIONS AND THEIR IMPACT ON PUBLIC TRANSPORT SAFETY**

Before the introduction of the regulations in question, the media often criticized the planned solutions. It is worth paying attention to the most important aspects that were raised against the introduced regulations and the *ratio legis* presented in the draft act introducing the discussed changes.

Professor Andrzej Zoll expressed an extremely negative attitude towards the regulations that will come into force from March 14, 2024, pointing out that although driving under the influence of alcohol cannot be justified in any way, the proposed *confiscation* creates a situation in which the repressive nature of the sanction applied criminal penalties depend on the brand of the car subject to forfeiture and its individual characteristics. In such a situation - according to the professor - there is an unjustified difference that arises in the severity of the punishment meted out to the perpetrator for potentially the same act. According to the former president of the Constitutional Tribunal, another effective solution would be the application of severe financial penalties, consisting in determining the minimum number of daily rates and the minimum value of one rate. In this way – according to the professor – the same effect would be achieved, i.e. the possibility of imposing fines of several hundred thousand zlotys on the perpetrators (Adamski, <https://>).



Table 1. Comments on the newly introduced changes, Article 44b of the Penal Code

No.	Body reporting the note	Note content	Position of the legislator
1	National Council of Legal Advisors; IUSTITIA	The objection concerned primarily the compliance of the proposed changes with the constitutional principle of proportionality and the constitutional standard of equality before the law. The commenters pointed out in particular the difference in sanctions for perpetrators of penalized offenses due to the value of the vehicle subject to forfeiture. In addition, attention was drawn to the significant problem of sanctions against people with different financial status using a car that was, for example, rented. The position of the person making the comment was categorically negative.	The comment was not taken into account. The legislator stated that the forfeiture of a motor vehicle or its equivalent was neither a penalty nor a punitive measure, therefore it did not have to be correlated with its financial status. The essence of the introduced regulation is to make it difficult (preventable) for the perpetrator to commit this or a similar crime in the future by depriving him of a car or funds to purchase this car in the future.
2	Pro Futuro Theologiae	The tone of the comments is strictly social, focused on the utilitarian nature of the motor vehicle. The person submitting the comment tries to emphasize that the imposed sanction may significantly affect the interests of third parties (family, relatives, sick people, elderly people requiring care) who benefit from the benefit of a car.	The comment was not taken into account. The legislator strictly refers to the person of the perpetrator and his illegal behavior. It indicates that the sanction of forfeiture of a motor vehicle or its equivalent applies only to the perpetrator, and the fact that other people use the vehicle is of no importance.
3	1. Pro Futuro Theologiae. 2. National Trade Union of Court Probation Officers	1. Indication of the lack of equal treatment of perpetrators of crimes against transport safety. The main axis of the submitted comment is the fact that the lower limit of the compensation that can be awarded is PLN 5,000.00, and in the event of ordering the forfeiture of a motor vehicle or its equivalent, the amount expressed when awarding the compensation has nothing to do (is not correlated) with average value of a motor vehicle. 2. The probation officers, in turn, pointed out that there was no solution to recover the imposed forfeiture of the vehicle's value.	1. The comment was not taken into account. The legislator indicated that the compensation is equivalent to the forfeiture of the vehicle's value. 2. The comment was not taken into account. As indicated by the Legislator, in the event of the forfeiture of the equivalent of a motor vehicle, the monetary benefit awarded pursuant to Art. 43a § 2 of the Penal Code may be set within its lower limits. When determining the amount, the court will be able to take into account the harm resulting from the forfeiture of the motor vehicle.

Source: own study based on Form No. 2024 – draft Act amending the Act – Penal Code and certain other acts.

It is also of great importance that already at the stage of developing the Act of July 7, 2022 amending the Act – Penal Code and certain other acts, the draft received many comments submitted as part of the consultations. In order to present the significance of the submitted comments and the position taken by the Legislator in relation to these comments, the author decides to present the results of the consultations in the form of a table below (the presented comments concern only the proposed Article 44b of the Penal Code).

## 6. CONCLUSIONS

The above analysis actually arouses extreme feelings since, on the one hand, the sanction introduced from March 14, 2024 in the form of forfeiture of a motor vehicle or its equivalent is nothing new among our European neighbors, but on the other hand, it raises several important questions about criminal ailment among individual perpetrators of the so-called road crimes, due to their property status, as well as the impact of new regulations on the real improvement of safety on Polish roads. Apart from the above doubts, it should undoubtedly be recognized that the new regulations regarding the forfeiture of a drunk driver's car are an important step towards increasing safety on Polish roads. This is a signal that the state treats driving under the influence of alcohol very strictly. However, it is also an appeal to all drivers not to drive under the influence of alcohol, taking care of their lives and the lives of others. It's not worth the risk – the loss of a car cannot be compared to the loss of a human life. Safe driving is our common responsibility and we must take it seriously.

When attempting to answer the question whether the discussed regulations, in force in the Polish substantive criminal law system since March 14, 2024, are consistent with the constitution, the answer should be negative. The justification of the position adopted by the author leads, first of all, to the need to draw attention to Art. 31 section 1 of the Constitution of the Republic of Poland (Constitution of the Republic of Poland of April 2, 1997, according to which „Everyone is obliged to respect the freedoms and rights of others. No one may be forced to do what the law does not require him to do” and Art. 32 section 1 of the Constitution of the Republic of Poland, according to which „Everyone is equal before the law. Everyone has the right to equal treatment by public authorities”. The above is an expression of the implementation into the Polish Basic Law of the principle of proportionality, widely approved and respected throughout the European community, which in its essence should safeguard the equal treatment of citizens, and in the scope of imposing sanctions on them for violating the law, be responsible for ensuring that these sanctions are equally painful for perpetrators committing the same act in similar circumstances. The forfeiture mechanism described in this study is contrary to one of the fundamental principles of the rule of law, which is the principle of proportionality. This contradiction is reflected primarily in the fact that this forfeiture is an extremely drastic measure used by the Legislator and may, in extreme cases, lead to the loss of the life achievements of the perpetrator himself and his family. The drastic nature of this measure, which violates the principle of proportionality, is also revealed when the Court is obliged to adjudicate the equivalent of the vehicle used by the perpetrator at the time of committing the crime, when the vehicle did not belong to him (or the perpetrator sold, hid or destroyed the vehicle). The obligation to order the forfeiture of the equivalent of a vehicle in a situation where the vehicle was only co-owned by the perpetrator also directly violates the principle of proportionality – in such a situation, the entire value of the vehicle is subject to forfeiture, not only the share he is entitled to (Łukaszewicz, [https](https://)).

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## AN ANALYSIS OF THE CHALLENGES AND OPPORTUNITIES FACING THE INTERDISCIPLINARY ENGINEER OF THE 21<sup>ST</sup> CENTURY BASED ON THE CONCEPT OF INDUSTRY 4.0

This article focuses on analyzing the challenges and opportunities that modern engineers encounter. In the context of a dynamically changing technological environment, the authors identify key areas such as the growing importance of interdisciplinarity, the need for flexibility in acquiring new skills, and ethical dilemmas related to technological progress. At the same time, they discuss the opportunities presented by the emerging technological revolution and how engineers can contribute to solving global problems through their comprehensive approach. The article is an important contribution to understanding the role of the interdisciplinary engineer in the 21<sup>st</sup> century and how to cope with new challenges and exploit opportunities in the world of science and technology.

**Keywords:** characteristics of engineers, industry 3.0, industry 4.0, industry 5.0, interdisciplinary engineer, technical challenges, non-technical challenges.

### 1. INTRODUCTION

The modern world has created a demand for the requalification of engineers. The transformation of highly qualified Engineers 3.0 into interdisciplinary Engineers 4.0 is ongoing. The knowledge and experience defining an Engineer 3.0, combined with appropriate soft skills, ensure that they will excellently meet the tasks entrusted to contemporary Engineers 4.0. In the literature, one can already find research and analysis on the Engineer 5.0, who in the near future will be considered the standard model. Every person is characterized by one predominant personality type classified based on the

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principles of Hippocrates, combined with other variants, which influence the predispositions to meet the requirements of modern Engineers (Ośmiałowska et al., 2022).

The required knowledge, skills, and characteristics of the ideal, interdisciplinary engineer have been summarized as: a strong technical base, engineering approach, professional values, but also creativity in problem-solving, strong communication skills, and readiness for flexibility in carrying out assigned tasks. It has been noted that currently, universities mainly focus on creating a technical knowledge base (Nandurkar et al., 2016).

The aim of the article is to compare the existing considerations on the profiles of Engineer 3.0, 4.0, and 5.0, along with the characteristics of the occurring industrial revolutions, and to present a subjective review of the technical and non-technical challenges facing the modern engineer, along with the opportunities that lie behind them.

## **2. BRIEF CHARACTERISTICS OF PERSONALITY TYPES ACCORDING TO HIPPOCRATES, ALONG WITH THE PRACTICE OF USING PERSONALITY TESTS IN THE PROCESS OF RECRUITING EMPLOYEES**

The ancient Greek physician and philosopher Hippocrates was the first to study human temperament. His concepts were further developed by Galen and Pavlov. Their work is illustrated by Pavlov's characterization of the nervous system, which is related to the Hippocrates-Galen temperament typology.

### **□ The Strong, Balanced, and Slow Type (Phlegmatic)**

Along with the sanguine type, this is one of the types of nervous systems adapted to life. It is a healthy and resilient type with a high density of features of the nervous system and a balance between excitatory and inhibitory processes. Both positive and inhibitory conditioned reflexes are easily formed, and their stability is high. It is difficult to induce neurosis in representatives of this type, even in supposedly difficult living conditions. Individuals of this type have difficulty adapting to rapidly changing living conditions (Strelau, 1985).

### **□ The Strong, Balanced, and Lively Type (Sanguine)**

A healthy, flexible, and efficient type of nervous system, which, along with the phlegmatic trait, possesses the so-called golden mean on the scale of temperament. Vivacious and active when stimulated by the environment, but prone to drowsiness and sleep when not feeling stimulated. Susceptible to both positive and inhibitory conditioned reflexes. It is difficult for individuals of this type to develop neurological disease, even in adverse living conditions. Pavlov considered this type to be the most perfect of all types and the one that best guarantees the maintenance of an ideal balance between the organism and the conditions in which it lives (Strelau, 1985).

### **□ The Strong, Unstable Type (Choleric)**

Prone to neurotic states, as the excitatory processes significantly outweigh the inhibitory ones. Difficulty in avoiding activity when necessary. Representatives of this type become excessively restless up to exhaustion, and this state of anxious exhaustion sometimes periodically transitions into depression and lethargy. They can also become aggressive, hostile, and uncontrollable in such situations (Strelau, 1985).

### **□ The Weak Type (Melancholic)**

Its existence requires special conditions. The onset of a positive conditioned reflex is very slow and can be easily weakened or eliminated under the influence of unknown secondary factors. They also show weak resistance to inhibitory stimuli. Behavior is

disrupted in situations where certain behaviors should be avoided. Rapid and frequent changes in the living environment also disrupt the behavior of the melancholic. This type is not adapted to life, easily becomes disoriented, and is often neurotic. Generally, this type cannot be significantly improved through training or discipline (Strelau, 1985).

It is also worth paying attention to another classification by C.G. Jung. He distinguishes two types of temperament: extraversion (Latin extra – outside; vertere – right, directive) and introversion (Latin intro – inside). The former are characterized by their main attention and activity being directed towards the external world, they easily communicate with people and adapt well to changing circumstances. Introverts, on the other hand, focus on themselves, are not interested in the external world, and are shy in expressing their feelings and thoughts (Zdrojewski, Gajewski, 2009).

In summary, it is worth noting that the personality types presented above are shown in ideal conditions, i.e., a person's personality is usually a complex of all or several personality types, with one being dominant. The complexity of human personality makes it difficult to predict human behavior or identify traits that predispose.

Tests are measurement tools and, like other tools, can yield useful results. They are objective, standardized, accurate, reliable, and normalized instruments that contain principles for calculating the value of the measured psychological trait and clearly define the scope and type of behaviors acceptable to the diagnostician. They are an excellent factor in recruitment, where personality and behavior are most important, such as in project management, sales, marketing, and communication with external or internal customers – all areas that an interdisciplinary engineer encounters. They are very effective in making choices and predicting future results in an organization. They serve as a complement to traditional job interviews and other recruitment methods, providing information that significantly improves the efficiency and objectivity of the entire selection process. They allow for the identification of even seemingly competent and reliable employees before they are employed in the organization (Szkop, 2012).

Testing is no longer a service initiated by professional psychologists. There is now a market for specialized services for companies and organizations. Today, there are firms operating in the areas of HR audit, personal consulting, recruitment, and selection. When using tests in recruitment, it is important to remember that the test should not be the only evaluation factor. It should always be supplemented with another method or at least a careful job interview (Zimnowłocka-Łożyk, 2011). We distinguish several types of tests:

- Intelligence tests – assess the ability to combine facts, analytical and logical thinking, and the most used are the Stanford-Binet and Wechsler tests.
- Achievement tests – assess knowledge and skills acquired through professional experience and include performing specific tasks required for a given position.
- Skill tests – examine the level of skills required to perform a specific job. They can be conducted in situations similar to the work environment and can be of two types: tests of learning abilities and tests of innate abilities.
- Personality tests – assess personality and work-related behaviors of the person being tested.
- Interest tests – often used as a complement to the test to identify areas of particular interest to the person being tested and assess whether the work is enjoyable for the candidate.
- Honesty tests – a specialized way of testing honesty, overt or covert, to determine the likelihood of theft (Roczniak, 2017).

What can be the implications of overusing tests?

- Misunderstanding intelligence as the sole or primary trait determining success in a very narrowly defined task

A major challenge for psychologists becomes the need to develop measurement instruments that reflect the full spectrum of educational and professional goals and do not lead to the identification of test behaviors of subjects according to only one criterion.

- Labeling in terms of intellectual status and predicting future functioning

Since labeling is a simplified form of social categorization, it has all the characteristics of a form of racism. The effect of labeling categorization is therefore to determine the future of a person, not to describe their current skills.

- Placing the psychologist in the role of controller and decider of the fate of the subjects

Instead of using the results of psychological tests as a basis for free and autonomous choices of the person tested, they can decide for them about their further education or career path. The real danger is that the results of the tests are used to reproduce old structures, instead of creating space for individual choice.

- Bureaucratic and mechanized decision-making regarding the assessment of subjects

Algorithmic forecasts allow people without specialized psychological education to use tests. This is a step towards the bureaucratization of psychological diagnosis, i.e., the detachment of algorithmic procedures from their psychological significance and importance. From this mechanistic approach to diagnosis, it is easy to imagine the development of computerized diagnostic systems.

- Rights of the subjects

The professional use of psychometric tests requires not only the application of well-developed psychometric methods and proper interpretation of results but also respect for the rights of the subjects. Taking into account the rights and interests of the subjects is the most important duty of test administrators. The main goal of developing such standards is not only to raise awareness of the rights of the subjects but also to make test administrators aware of the ethical aspects of testing (Zimnowłocka-Łozyk, 2011).

### **3. EXPLANATION OF THE TERM “COMPETENCE” ALONG WITH A SET OF KEY TRAITS DESIRED IN THE LABOR MARKET**

The Polish language dictionary defines 'competence' as the scope of someone's knowledge, skills, and responsibilities (“Kompetencja”. *Słownik języka polskiego PWN*, n.d.). The synonym dictionary states that competence also encompasses ability, knowledge, capacity, professionalism, and expertise (“Kompetencja”. *Synonimy*, n.d.). Meanwhile, a competent person is characterized as confident, reliable, authoritative, proficient, experienced, and professional (“Kompetentny”. *Synonimy*, n.d.).

The process of competence management has brought about positive outcomes, such as highly qualified, appropriately placed, and trained employees. Therefore, it is important to pay attention to and demonstrate an understanding of the significance of competence and its components. The table below presents the components of competence, according to various theories.

Many authors emphasize that it is not primarily hard competencies, such as knowledge and skills, that determine an employee's effectiveness, but also soft competencies related to personality traits, attitudes, and behaviors. In particular, the importance of skills in building competencies in interpersonal relations is highlighted.



Table 1. Table of component competences

COMPONENTS OF COMPETENCES			
M. Kocór, A. Strzebińska	D.C. McClelland	S. Borkowska	L.M, S.M Spencer
Knowledge	Knowledge	Knowledge	Motives
Skills	Abilities	skills	Traits
Attitudes	Skills	motivation	Attitudes and values
	Personality traits	Attitudes	Knowledge
			Skills
K. Padzik	R. Walkowiak	A. Sajkiewicz	T. Oleksyn
Knowledge	Knowledge	Knowledge	Capabilities
Skills	Skills	Experience	Education
Improvements	Personality traits	Abilities	Knowledge
Intrinsic motivation	Experience	An aptitude for team activities	Experience
Behavior	Attitudes	Personal culture	Practical skills
Personality traits	Behavior		Intrinsic motivation
			Attitudes
			Behavior
			Health
			Values

Source: Own elaboration based on (Górska-Rożej, 2014).

Although the core value of an engineer is technical qualifications, the advantage of individual experts, their significance, and potential are spoken of not only in terms of hard skills but also increasingly in terms of soft skills and their importance in the perspective of the coming years. According to experts from Bergman Engineering, currently, the most valued soft competencies among engineers include comprehensive problem solving, critical thinking, creativity in approaching various issues, coming up with innovative ideas in the field of product and technological innovations, the ability to manage people, self-learning and teaching others, collaboration, active learning and listening, coordination, as well as emotional intelligence, assessment skills, negotiation, and independent decision-making (Marszycki, 2021).

The engineer of the future must be able to process and analyze large amounts of data from various sources, be able to do research in electronic media, skillfully use Big Data tools, be knowledgeable in agile project management. Employers will require engineers to have technical skills, such as following trends in Industry 4.0, knowledge of the Internet of Things (IoT), and technologies such as CbM, which enables machine condition monitoring. Furthermore, candidates with experience in implementing production process automation, process and device integration, cloud computing, and 3D printing will have a market advantage. Additionally, knowledge of DCS/SCADA control and monitoring systems is gaining importance (*10 kompetencji inżyniera przyszłości*, 2021).

At the same time, one can expect a progressive loosening of the relationship between the employee and the company, where career development and planning will be carried out independently of a specific company or even industry. People will increasingly focus on acquiring a certain set of skills and experience that they can use in different companies,

independently steering their development and using career opportunities in the most flexible way possible. Working in a particular company will be an element of a personal, individualized plan, one of the stages allowing for the acquisition of desired skills, competence development, and gaining valuable experience, as well as expanding social and professional networks, whose role will grow. A pragmatic approach to such developmental added value of a company is particularly evident in the case of representatives of the younger generation, where questions about career paths, learning opportunities, etc., are among the most frequently asked by candidates during job interviews (Bajor et al., 2021).

#### 4. INDUSTRIAL REVOLUTIONS WORLDWIDE AND IN EUROPE

##### The First Industrial Revolution

This revolution took place at the turn of the 18th and 19th centuries and marked the transition from artisanal production to mechanized factory production. The invention of spinning machines, followed by the steam engine, which became the main source of power, significantly eased many previously labor-intensive jobs. These machines revolutionized work, having a huge impact on factories, mines, and transportation. A turning point was the substitution of coal with coke in metallurgy. The development of industry led to population influx into cities, which in turn led to dynamic city growth and urbanization. Cities became centers of industry, trade, and services, and inhabitants left villages to seek work in factories (Wodnicka, 2021).

##### The Second Industrial Revolution

Dated to the 1870s, the most important inventions created and widely used during this period include the internal combustion engine and electrification. Other significant inventions that changed societal life include the widespread use of railways and telephone communication. Urbanization and city development continued, and the working classes grew in strength, leading to various social and political movements. The Second Industrial Revolution contributed to the globalization of the economy, with an increase in international trade and technology exchange between countries. This was also the period when new industries, such as the automotive and chemical industries, developed and continue to play a significant role in today's global economy (Sharma et al., 2020).

##### The Third Industrial Revolution

In the late 1960s and early 1970s, engineers and scientists developed programmable controllers, which allowed for the programming and control of machines and production processes using a computer. This significant achievement marked the beginning of a revolution in the industry. Programmable controllers became the main tool for industrial automation. They replaced traditional mechanical control systems with electronic systems that could be programmed to perform various tasks. This increased production flexibility and efficiency and made it easier to adapt machines and processes to changing needs. As information technologies evolved in the 70's and 80's, the industry was able to use computers to monitor and control production processes in real-time. SCADA (Supervisory Control and Data Acquisition) systems became commonplace in plants, chemical industry, food industry, and many others. Automation and digital control of production processes contributed to increased efficiency, improved product quality, and cost reduction (Prisecaru, 2016).

#### □ The Fourth Industrial Revolution

The Fourth Industrial Revolution is a current era based on advanced digital technologies and automation. It is a continuation of the Third Industrial Revolution, but with a greater emphasis on modern IT tools, such as the Internet of Things (IoT), artificial intelligence (AI), machine learning, data analytics, as well as augmented reality (AR) and virtual reality (VR). In the Fourth Industrial Revolution, devices, machines, products, and people are connected into a global network, enabling remote monitoring, control, and real-time data analysis. Artificial intelligence plays a key role in automation, process optimization, and data-driven decision-making. Large amounts of data generated by IoT systems are analyzed to detect patterns, make forecasts, and take strategic decisions. Digital models of factories, products, and processes are created, enabling virtual testing, optimization, and problem solving. Augmented reality (AR) and virtual reality (VR) are used to improve training, product design, maintenance, and many other aspects of industry. Automation and robotics continue to evolve, and people collaborate with technology. Sustainable development is an important goal, aiming to reduce the impact on the natural environment and use resources efficiently. The Fourth Industrial Revolution aims to create intelligent, flexible, and sustainable production systems that are more competitive in the global market (Furmanek, 2018).

#### □ The Fifth Industrial Revolution

Industry 5.0 represents a new era of manufacturing characterized by the integration of advanced technologies and human creativity to create a more collaborative and flexible production environment. While Industry 4.0 focused on digitization, Industry 5.0 aims for a fuller integration of human workers into the production process, collaborating with machines to maximize productivity and quality. One of the key features of Industry 5.0 is humanization, sustainable development, and ecology. Instead of treating machines and humans as separate entities, Industry 5.0 seeks to create a production environment where workers and machines collaborate, utilizing their mutual strengths to achieve greater productivity and quality. This collaboration is made possible by advanced technologies such as collaborative robots, augmented and virtual reality, and live monitoring and feedback systems. Another important aspect of Industry 5.0 is a greater emphasis on human creativity and intuition. While Industry 4.0 introduced the concept of smart factories, Industry 5.0 goes a step further, using technology to help workers more fully express their ideas and designs. Technologies like virtual and augmented reality can help workers visualize and test new products and designs in a more immersive and interactive way, leading to greater innovation and creativity in the manufacturing process (Wolniak, 2023).

Table 2. Comparison of industrial revolutions

<b>I revolution</b>	<b>II revolution</b>	<b>III revolution</b>	<b>IV revolution</b>	<b>V revolution</b>
Steam propulsion in machinery and vehicles	The invention of assembly line electricity	Production automation using PLCs,	Information and communication technologies	<b>Developed technologies:</b> Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), <b>Internet of Things (IoT), fully integrated into processes,</b> Global digital supply chain
Human muscle work changed to machine work	<b>Inventions:</b> Gas engine, dynamite, telephone, light bulb, vacuum cleaner, electric	<b>Industrial software such as:</b> SCADA, ERP, MES, industrial robots	<b>Main pillars:</b> Internet of Things (IoT), Machine Intelligence	
Development of means of locomotion				

Source: Own elaboration based on (Wodnicka, 2021; Sharma, et al., 2020; Prisecaru, 2016; Furmanek, 2018; Wolniak, 2023).

## 5. CHARACTERISTICS OF ENGINEERS 3.0, 4.0 AND 5.0

Competence is a set of knowledge and experience, as well as appropriate personal skills and attitudes, that enable us to perform assigned functions. They show a cause-and-effect relationship with work efficiency and the results achieved while carrying out a specific task or situation. Characteristics that distinguish and define a person's competencies include self-perception, knowledge, practical skills, character traits, attitude, thought patterns (Ośmiałowska et al., 2022).

Engineer 3.0 operated according to strictly established norms and in accordance with specified procedures, felt anxious during changing situations, focused more on task execution than on the people around him, and was able to work in a team he already knew. They are meticulous individuals aiming to achieve set goals. Engineer 3.0 likes to work at their own pace and prefers independent work. In summary, they are very attentive, organized, courteous, methodical, and predictable (Pluska, 2017). According to the personality type profiling based on Hippocrates' principles, these traits best describe introverts: melancholics, who easily adapt to regulations at work and pay great attention to detail, and phlegmatics – professional and reliable in their work (Stoch, Gracel, 2017).

Engineer 4.0, like Engineer 3.0, possesses technical knowledge in their area of specialization and adheres to established norms and procedures. They are open and able to influence the people around them. They don't focus solely on their narrow specialization but understand concepts and ideas from other fields. They differ from Engineer 3.0 mainly in character traits related to communicativeness and readiness for rapid changes, and diversity in both tasks and interactions with other people. Engineer 4.0's duties are increasingly less about repetitive actions, which are replaced by machine work, and more often about optimization and ensuring safety. The ability to properly interpret facts, foresee upcoming events, and make quick decisions is very important (Stoch, Gracel, 2017).

Engineer 5.0 is a person strongly oriented towards advanced technologies and industrial innovations. They possess advanced technical knowledge and the ability to work in a dynamic digital environment. Their skills include analyzing large data sets and using technologies like the Internet of Things (IoT) and blockchain to solve complex industrial problems. Engineer 5.0 is also an expert in sustainable development and environmental care, which is crucial in an era where reducing environmental impact is a priority. Their interpersonal skills allow them to effectively collaborate in interdisciplinary teams, integrating diverse skills and knowledge. As a professional focused on innovation and creativity, Engineer 5.0 is capable of generating new ideas and approaches to industrial problems. They are flexible, ready for continuous learning, and adapting to changes in technology and industry. In the era of the Fifth Industrial Revolution, Engineer 5.0 plays a key role in shaping the technological and industrial future (Traczyk, 2021).

However, the similarities that exist between the three generations of engineers include: performing work perfectly from start to finish, adhering to norms, rules, procedures, and delivering high-quality services.

Key components of a reliable, contemporary engineer include their behavior, respect for others, and the value system they represent. Nowadays, increasing attention is paid to finding such characterized employees, despite the fact that it is becoming a more complicated process. Personality tests are increasingly used in workplaces to determine the personality types of employees, which allow for the examination of their strengths and weaknesses, predispositions, and verification of their skills. Character traits influence the

predispositions of people to find themselves in the role of Engineers 4.0, fulfilling their specific requirements, and meeting the tasks set for them.

Thanks to developed interpersonal skills, a good engineer is characterized by the ability to analyze a large amount of data from various sources, assess how significant and reliable they are, as well as readiness for change and openness to other fields and people (Gracel et al., 2017). The differences between Engineers 3.0, 4.0 and 5.0 are shown in the table below:

Table 3. The differences between Engineers 3.0, 4.0 and 5.0

Engineer 3.0	Engineer 4.0	Engineer 5.0
Hard competencies	Soft competencies	Operates according to procedures and strict standards, but pays attention primarily to social responsibility
Concentration only on your field	Ability to combine different disciplines	Its communication is no longer focused only on humans, but also on technology, which is made possible by artificial intelligence
Job stability	Work flexibility	
Lack of variety in the work performed	Variety of work performed	
A person who does not like change	Person open to new tasks, situations	In addition to combining knowledge from various fields, it is particularly focused on sustainable and flexible project implementation
Working only in a known team	Ability to work in a group of new people	
Does not engage in human relations	Able to influence others	

Source: Own elaboration based on (Płuska, 2017; Stoch, Gracel, 2016; Traczyk, 2021; Gracel et al., 2017).

## 6. A SUBJECTIVE OVERVIEW OF THE TECHNICAL CHALLENGES FACING THE MODERN ENGINEER

A challenge is called a difficult task, a new situation that requires putting in effort and dedication to its implementation, which is a test of knowledge and resilience in the broadest sense ("Wyzwanie". *Słownik języka polskiego PWN*, n.d.).

In an era of rapid technological development, the engineer of the future faces extraordinary challenges, the solution of which will be shaped by the rapidly advancing technological evolution. We will take a look at the main challenges that engineers must face in order to effectively drive technological progress and create innovative solutions. In a world where the only constant is change, the engineer of the future becomes not only a technical expert, but also a strategist, ethicist and leader, ready to meet the demands of a dynamic and unpredictable technological landscape. Engineers face numerous challenges that require innovative approaches and adaptability.

### □ Complexity of systems

The complexity of engineering systems manifests itself on many levels. Engineers must deal with a diversity of technologies, protocols and standards. For example, the growth of the Internet of Things (IoT) is making systems increasingly decentralized, consisting of distributed devices communicating with each other. The challenge is not only to communicate effectively between the various components of the system, but also to ensure

secure and reliable data transfer. As a result, engineers must not only deal with the overall complexity of engineering systems, but also with the unique challenges posed by domain-specific specifications, such as the development of IoT technologies. In pursuit of these goals, flexibility of thinking becomes a key element, allowing engineers to effectively deal with differences and collectively shape the future of technological progress. Interoperability is becoming a key challenge. System components often come from different vendors, which can result in diverse communication protocols and data formats. Engineers must implement interfaces to enable communication between these heterogeneous components. Standards such as OPC-UA (Unified Architecture) and MQTT (Message Queuing Telemetry Transport) are examples of attempts to standardize communications in industry, but their effectiveness depends on their widespread use.

The use of advanced algorithms and artificial intelligence introduces an additional layer of complexity. Engineers must not only implement these technologies, but also understand how they work, adapt them to specific applications and manage data, which is a key element for the effectiveness of many AI algorithms. In addition, ethics and data security issues are becoming increasingly important, requiring engineers to thoughtfully design systems for privacy and information protection. In terms of complexity, energy management is becoming a key challenge, especially for embedded systems such as IoT devices and sensors. Energy efficiency becomes a priority, and engineers must adapt to power constraints while maintaining high system performance (Dao et al., 2023).

Finally, cyber security is inherent in the complexity of systems. As the number of inter-device connections increases, so does the potential threat to data security. Engineers must design systems with security in mind with security in mind, using encryption, authentication and other defense mechanisms to effectively protect the system from attacks (Elgnar et al., 2022).

#### □ Rapid technological progress

Never before has the pace of technological progress been as intense as it is today. The engineer of the future must be ready to constantly improve his or her skills and quickly adopt new technologies. Keeping in mind that what is on the cutting edge today may be obsolete tomorrow, engineers must be ready to continuously learn and adapt to change. In recent decades, we have seen extremely intense technological progress, unparalleled in any historical period. In view of this, engineers of the future must be constantly engaged in the process of improving their skills and rapidly adopting new technologies. Due to the dynamic nature of this development, even today's most modern solutions can quickly become obsolete. As a result, engineers are required to be flexible, always ready to adapt immediately to evolving technological conditions. The awareness that what is now considered the latest development may be obsolete in the near future prompts engineers to keep an open mind and constant readiness for a process of continuous education to meet the demands of the accelerated pace of technological progress (Elgnar et al., 2022).

#### □ Ethics in technology

The development of technology also brings new ethical challenges. The engineer of the future must be aware of the impact of his work on society and the environment. Finding a balance between technological progress and ethical implications becomes an integral part of the work of the engineer of the future. Technological progress, despite its benefits, generates new ethical aspects that require attention. The engineer of the future is required to consciously understand the impact of his work on society and the environment. Issues

related to privacy, artificial intelligence and work automation place engineers in the role of moral decision-makers. Finding harmony between technological advances and ethical implications is becoming an integral aspect of the engineering profession of the future (Elgnar et al., 2022).

□ Sustainability

In the context of climate change, the role of engineers is becoming crucial in the search for solutions that promote sustainable development. The need to reduce the negative impact of technology on the environment challenges them to develop innovative, ecosystem-friendly solutions. The engineer of the future should pay attention not only to the functionality of his designs, but also to their impact on the planet. In the perspective of climate change, engineers are key in the search for sustainable solutions. Faced with the need to reduce the negative impact of technology on the environment, they are faced with the task of developing innovative green solutions. The engineer of the future must be aware not only of the functionality of his designs, but also of their impact on the planet. Adopting a sustainability perspective becomes an indispensable part of an engineer's profession, which seeks to minimize negative environmental effects in the process of developing technological solutions (Philbin, 2021).

□ Cyber security

With an increasing number of systems and devices integrating with the network, cyber security challenges are becoming more significant. Engineers are required to develop attack-resistant systems that not only protect data, but also ensure the security of infrastructure from potential cyber threats. The need to monitor, detect and neutralize potential attacks requires engineers to constantly update and optimize security to effectively counter increasingly sophisticated cyberattack techniques. In this context, engineers play a key role in developing solutions that not only repel current threats, but also anticipate future cyber security challenges (Gupta et al., 2019).

□ Big Data and data analytics

Large amounts of data generated by various systems and devices require advanced data analysis techniques to transform information into valuable business conclusions and decisions. There are publications in the literature devoted to the use of "Data Mining" tools for the purpose of finding not only ready-made technical and technological solutions, but also inspiration for research searches and undertaking relevant R&D work (Kaźmierczak, 2016).

□ Autonomy and Artificial Intelligence

In the quest to improve autonomous systems, engineers are faced with the task of not only implementing but also continuously improving advanced machine learning algorithms. Machine learning algorithms are a key component, allowing autonomous systems to adapt to a changing environment and make intelligent decisions. Engineers must not only create these algorithms, but also adapt them to a variety of situations, which requires constant monitoring, data analysis and software updates. In the area of artificial intelligence, engineers must explore not only traditional methods, but also modern approaches such as deep neural networks and natural language processing techniques. These advanced technologies enable autonomous systems to better understand their surroundings, resulting in more efficient operation in various situations. In addition, safety aspects are becoming a priority in the context of autonomous systems. Engineers must not only ensure the effectiveness and efficiency of the system, but also its reliability and

resistance to possible attacks or failures. Creating autonomous systems is therefore a complex challenge that requires engineers not only to be technically proficient, but also to be able to anticipate and manage potential risks (Karim et al., 2023).

#### ❑ Internet of Things (IoT)

The development of Internet of Things technology opens up new opportunities but brings with it a number of challenges. IoT enables devices to communicate and collect data in real time, significantly contributing to advances in fields such as medicine, industry, transportation and many others. Industry 4.0 engineers must effectively implement the Internet of Things, which allows real-time data collection, monitoring and control of industrial processes. In addition, scalability is becoming a key aspect, as engineers must ensure that industrial networks can support a growing number of devices. Managing and analyzing massive amounts of data poses another challenge, requiring engineers to develop efficient information processing tools. The introduction of Industry 4.0 also involves adapting to the changing regulations and standards governing the field. Industry 4.0 engineers must stay abreast of with technological innovations and adapt to the evolving industrial landscape (Gupta et al., 2019).

#### ❑ Complexity of projects

Today's engineering projects are increasingly complex, requiring an understanding of multiple technical disciplines and the ability to manage a team of experts, as engineering projects, challenging the engineer 4.0 with increasing technological complexity, require an interdisciplinary approach. The engineer of the future must effectively combine different technical disciplines, managing a team of experts with diverse competencies. A key skill is the ability to communicate and mediate, translating complex concepts into understandable language. In addition, an engineer 4.0 must be flexible, ready for continuous improvement and the rapid acquisition of new skills to meet the dynamic changes of the in technology and the market. Ultimately, the 4.0 engineer plays a key role in technological development, integrating different disciplines and creating innovative solutions (Cabała [red.], 2018).

#### ❑ Education and professional development

Engineers must invest in continuous education and development of their skills to meet the tasks presented to them. In considering the potential new directions of consideration arising from the proposed view of the engineer, who performs tasks as part of the process of meeting needs, we should undoubtedly look at the modern engineer more broadly than the traditional view associated strongly with the history of the development of technology, including so-called technical progress. Considerations so far have been limited to the relationship of the modern engineer with the world of technology. The engineer in the 21st century, for many reasons, must go beyond the standard activities in which technical progress was practically the exclusive task of his predecessors (Cabała [red.], 2018).

## **7. A SUBJECTIVE OVERVIEW OF THE NON-TECHNICAL CHALLENGES FACING THE MODERN ENGINEER**

In today's engineering world, in addition to the technical aspects, the engineer of the future must confront ever-evolving non-technical challenges. In a social, economic and ethical context, there are issues that go beyond the purely technological realm and affect the way engineers shape the world. In the most simplistic terms, analyzing the history of technology, we can assume that the first "non-technical" aspects of the development of



technology became considerations of an economic and social. Another aspect that emerged as needing to be taken into account and taken into account in engineering works, were the widely understood connections (relations) of technosphere elements with the environment. In modern reality, all of the aforementioned non-technical aspects are present, although both the perception of them and the relations linking them to engineering activities are changing (Cabała [red.], 2018).

□ Interdisciplinary communication

Modern engineering projects bring complex challenges, combining technological aspects with social sciences. The key to their success is effective communication between specialists with diverse backgrounds. The engineer of the future often referred to as "Engineer 4.0," is an expert who not only excels in technical aspects, but also easily combines them with social issues. His work requires working with a variety of specialists, understanding the interrelationships between different disciplines, and adapting projects to diverse cultural contexts. He is not only an excellent communicator, but also a mediator capable of translating intricate technical issues into a language that can be understood by different audiences. In addition, he acts as a manager of a diverse team, building bridges between theory and practice for the successful implementation of innovations. His integral figure in the engineering landscape brings a holistic view to projects, supporting social, economic and technological development. The capabilities of an engineer 4.0 should combine science with practice and incorporate diverse perspectives with the creation of coherent, interdisciplinary solutions. This combination puts him at the heart of modern technological progress. This approach not only integrates different fields of technology, but also society in a continuous process of development (Cabała [red.], 2018).

□ Managing a multicultural team

Nowadays, thanks to the possibilities of network communication, team members are often geographically and culturally dispersed, and inter-country relocations for contacts and international experience are becoming an everyday occurrence. As a result, it becomes a potential challenge to effectively manage multicultural teams, taking into account language differences, work habits and cultural expectations. The engineer of the future must excel not only in dealing with technical diversity, but also with a wealth of different perspectives and experiences. Therefore, managing a multicultural team in the context of engineering projects is becoming a key aspect of the in today's global business environment. The 4.0 engineer must excel at managing not only technical diversity, but also the wealth of different perspectives and cultural experiences in order to effectively use diversity as a source of creativity and global perspective. This is not only a challenge, but also a huge opportunity to create projects with even greater potential and relevance on a global scale (Cabała [red.], 2018).

□ Ethics and social responsibility

Engineer 4.0, as technology becomes an integral part of society, must incorporate ethics, social, environmental and economic aspects into projects. He must take care ethics of projects, minimize negative impacts on people and the environment, and take responsibility for his actions. In addition, engineers must take into account the needs of society, engage in dialogue with various stakeholder groups and balance the benefits and costs of projects. Environmental aspects are becoming increasingly important, so sustainable design and production are key. Engineers should promote environmentally friendly technologies and minimize consumption of natural resources. The economic value

of projects is also important, so engineers must balance short-term profit with long-term sustainability. In addition, continuous development and the ability to work in interdisciplinary teams are key. As a result, an engineer 4.0 integrates these aspects to create effective, responsible and sustainable solutions, promoting technological progress and social progress (Cabała [red.], 2018).

□ Adaptability and self-education

The engineer of the future must have the ability to continuously self-educate and adapt. This is crucial in a dynamic engineering environment where technological change is inevitable. The ability to be flexible and ready to quickly learn new skills and adapt in the face of changing situations both within the company and in the marketplace is becoming crucial. But equally important is dealing with the uncertainty that accompanies innovation. An engineer must be willing to experiment, solve problems and take risks in the process of developing new technologies. Self-learning is a process that never ends, making Engineer 4.0 always strive to improve and update his knowledge. This is a key element for success in the modern engineering environment (Michael Page Poland, 2022).

## **8. CHANGING ENGINEERING COMPETENCIES AND EMERGING ENGINEERING POSITIONS IN THE INDUSTRY 4.0**

With the rapid development of technology, the industry is evolving, going through various stages of transformation. We are now in the era of Industry 4.0, characterized by the full integration of digital technologies, the Internet of Things (IoT) and other innovative solutions. This phenomenon brings new challenges, especially for engineers who must adapt to increasingly advanced technologies. This chapter focuses attention on the changing competencies of engineers and the new engineering positions that are emigrating in the face of industrial change. Traditional engineering skills, such as knowledge of materials, construction and knowledge of manufacturing processes, are the foundation of the engineer's 3.0 competencies. Taking a percentage perspective, it can be said that these traditional competencies accounted for about 70% of engineering skills in the Industry 3.0 era. In the Industry 4.0 era, these traditional competencies are still key, but their percentage is decreasing in favor of new requirements. Knowledge of materials, design and manufacturing processes now make up about 50% of an engineer 4.0's competencies, with the remaining 50% comprising skills in information technology, data analysis and project management. Engineers 4.0 must be more oriented toward interdisciplinarity and flexibility in adapting to rapidly changing technologies. The Industry 4.0 era has seen the emergence of new specialized engineering positions, some of which had no equivalent in previous eras. "Data Engineer" (Data Engineer) and "Internet of Things Engineer" (Internet of Things Engineer) are examples of new professions that are shaping up as technology advances. The Data Engineer, dealing with the management of large amounts of data, represents about 15% of the new engineering ethos in the era of Industry 4.0. Internet of Things Engineers, specializing in the design of IoT-based systems, represent another 15% of the new competence structure. "Artificial Intelligence Engineer" (AI) shapes the remaining 20%, while serving as a link between traditional and new engineering skills (Piwowar-Sulej, 2022; Furmanek, 2018).

The charts below show the proportions of competencies that 3.0 engineers have in various positions:

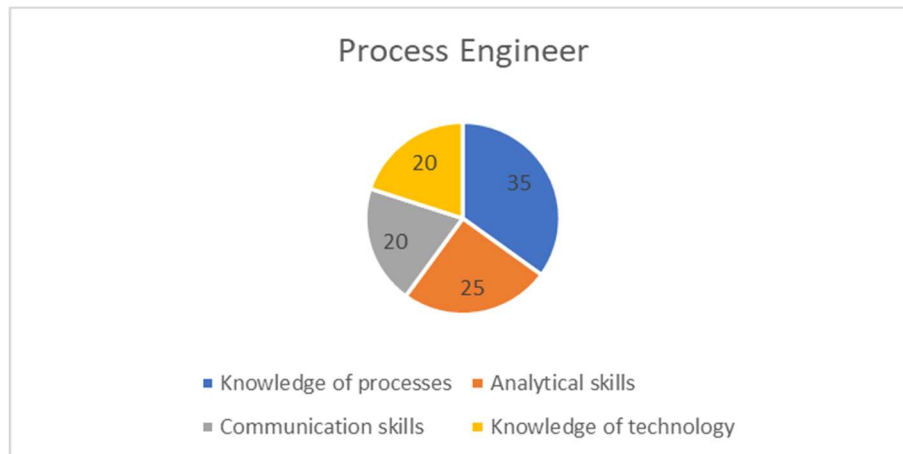


Figure 1. Process engineer skills

Source: Own elaboration based on (Piwowar-Sulej, 2022; Furmanek, 2018).

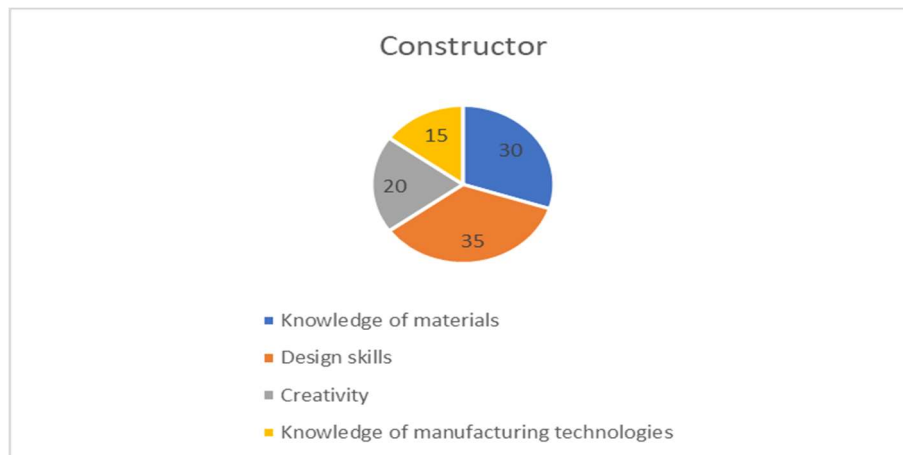


Figure 2. Constructor skills

Source: Own elaboration based on (Piwowar-Sulej, 2022; Furmanek, 2018).

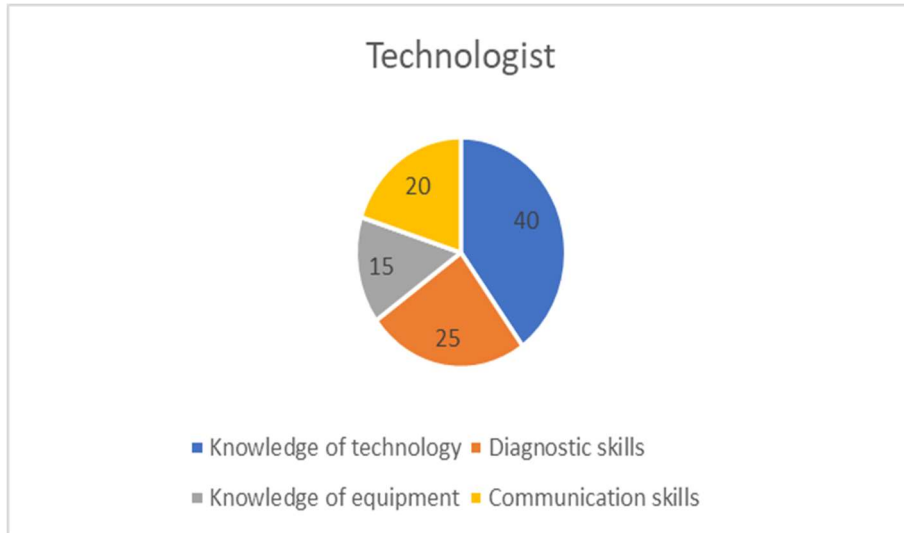


Figure 3. Technologist skills

Source: Own elaboration based on (Piwowar-Sulej, 2022; Furmanek, 2018).

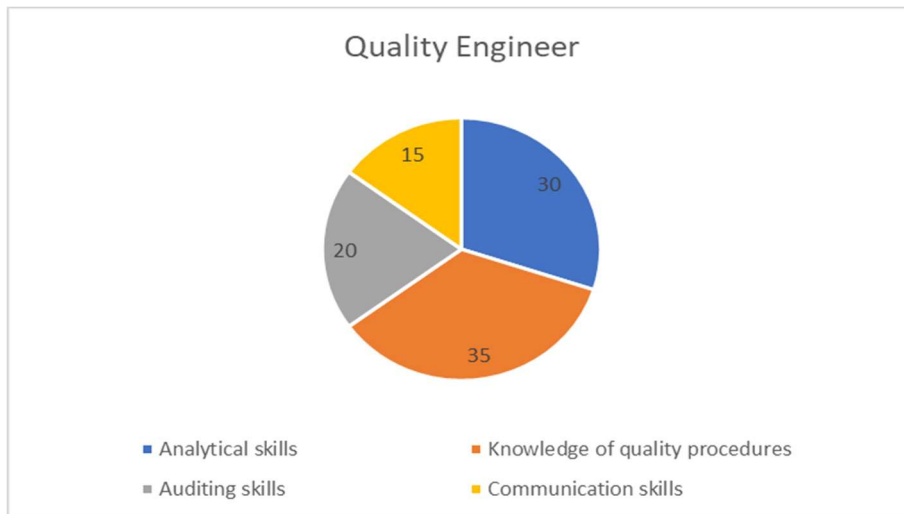


Figure 4. Quality engineer skills

Source: Own elaboration based on (Piwowar-Sulej, 2022; Furmanek, 2018).

The charts below show the proportions of competencies that 4.0 engineers have in various positions:

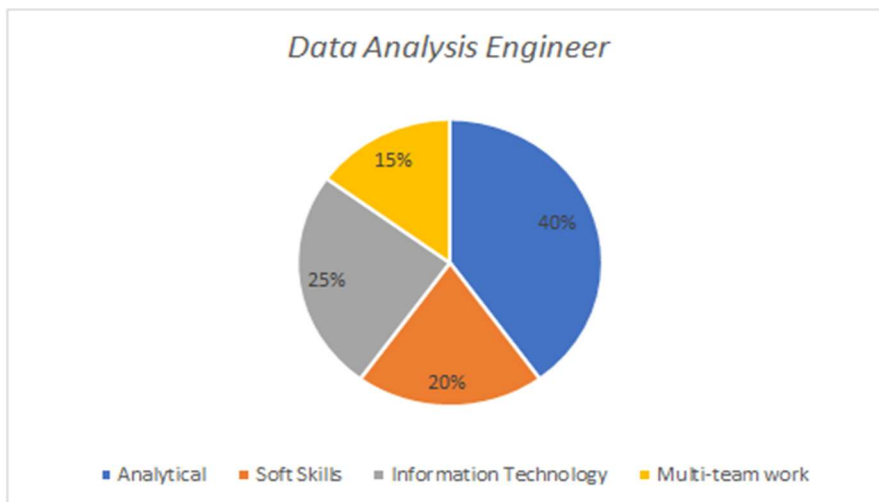


Figure 5. Data analysis engineer skills

Source: Own elaboration based on (Piwowar-Sulej, 2022; Furmanek, 2018).

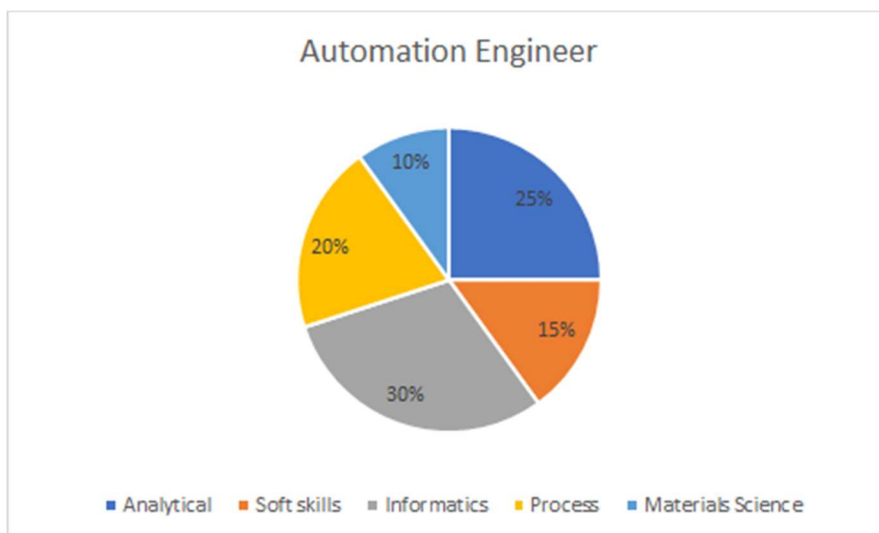


Figure 6. Automation engineer skills

Source: Own elaboration based on (Piwowar-Sulej, 2022; Furmanek, 2018).

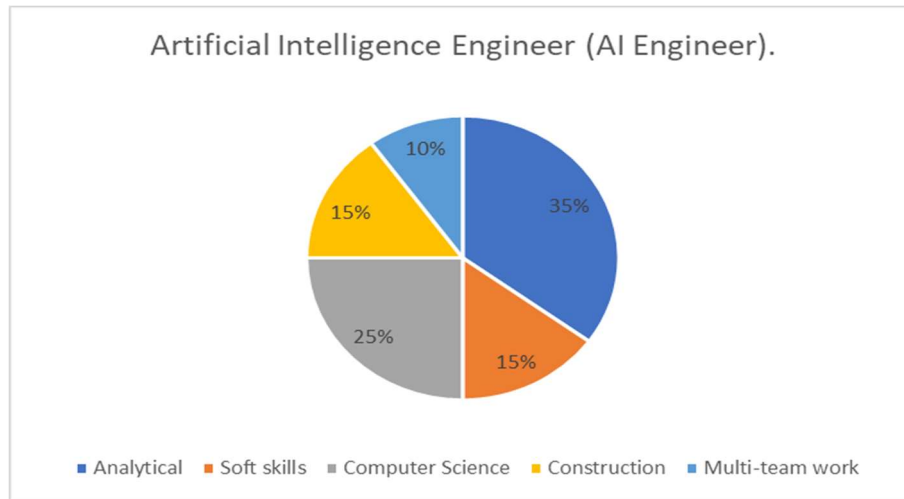


Figure 7. Artificial Intelligence (AI) engineer skills

Source: Own elaboration based on (Piwowar-Sulej, 2022; Furmanek, 2018).

The changing competencies of engineers and emerging new positions are a natural consequence of technological advances. In the era of Industry 4.0, engineers must continually develop their skills to meet the challenges of this dynamic space. Traditional engineering skills, such as knowledge of materials, construction and manufacturing processes, were the foundation of the engineer 3.0 competencies. However, on the road to Industry 4.0, the proportion of these traditional competencies has changed. Technical knowledge remains important but is no longer sufficient. The changing competencies of Engineers 4.0 can be traced by analyzing the new skill proportions. In an era where data analytics and artificial intelligence are becoming integral parts of an engineer's job, analytical and IT skills are gaining a dominant role. Today's Data Engineer, who manages massive amounts of information, or Artificial Intelligence Engineer, who designs and implements machine learning algorithms, are the new faces of Engineering 4.0. The skill proportions for these professionals reflect a shift in priorities, where analytical skills are outpacing traditional technical areas. Understanding the social, economic and ethical aspects of new technologies is becoming as important as technical expertise itself. Engineers 4.0 must not only be specialists in their fields, but also leaders, able to lead change and adapt to new challenges. Ultimately, their ability to adapt and innovative thinking is the key to success in the era of Industry 4.0, where innovation is becoming a key component of industrial development (Furmanek, 2018).

## 9. SUMMARY

In conclusion, this article sheds light on the need for an evolution in thinking about engineering and engineers. This requires changes in theory and practice to prepare professionals capable of working in a rapidly changing, technologically advanced world, while maintaining the social and ethical responsibility necessary in the era of Industry 4.0. It should be emphasized that the dynamic technological changes occurring within the framework of rapidly developing technologies imply significant transformations in the role

of the engineer. The challenges posed by the modern era require not only a continuous expansion of technical competence, but also adaptability, interdisciplinarity and the ability to solve complex problems. The engineer of the future must be prepared to work in a constantly advancing and changing technological environment, which involves the need for continuous learning and improvement. In addition, the ethical and social aspects of technological development are becoming as important as engineering progress itself. In the face of these changes, engineers must demonstrate not only expertise, but also soft skills such as teamwork, communication and creativity. These are key competencies that allow them to function effectively in the complex engineering systems that are characteristic of Industry 4.0. Consequently, an interdisciplinary engineer is a figure who not only reacts to change, but actively participates in shaping the technological future, contributing to innovation and creating responsible solutions to global challenges.

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## CITIZEN BUDGET AS A COMPONENT OF LOCAL POLICY: A CASE STUDY OF TOWNS IN THE PODKARPACKIE VOIVODESHIP<sup>4</sup>

One of the most important instruments for engaging residents in local affairs and building social awareness is the citizen budget. It is a form of involving residents in the planning of public spending, which has been delegated by local authorities at their discretion. The aim of the article is to assess the use of the citizen budget as a component of local policy in towns in the Podkarpackie Voivodeship during the years 2018–2022. The research method employed is desk research based on public data and interviews conducted with city office employees. Within the citizen budget of the towns studied the number of projects submitted by residents increased, as did the turnout of voters. This is a signal of community engagement in the life of individual towns. There is a growing social awareness as well as a need for organization and cooperation. By encouraging participation in public life and collective decision-making related to the allocation of public funds, the overarching goal of citizen engagement has been achieved. Most projects chosen by residents are related to the construction or modernization of technical infrastructure, although in recent years, soft projects have also begun to appear more frequently. They reflect changing social needs, with cultural, sports, and recreational projects being the most dominant.

**Keywords:** citizen budget, local policy, social participation, urban district.

### 1. INTRODUCTION

The challenges facing contemporary local government are leading to an increasing use of various methods and tools for social participation. Social participation is most commonly defined as the involvement of various groups from local communities in the creation of public policies through their participation in decision-making and the

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implementation of tasks formulated jointly with local authorities (Błaszak, 2019; Grzebyk et al., 2019). A manifestation of building social dialogue and ensuring active citizen participation in decision-making and management processes is the citizen budget. It is often described as the direct involvement of residents of cities (municipalities) in the decision-making process regarding the allocation of a portion of the budgetary resources of local government units. This strengthens civil society and the trust of residents in local government and its representatives (Grzebyk, Pierścieniak, 2021).

The aim of the article is to assess the utilization of the citizen budget as a component of local policy in urban municipalities in the Podkarpackie Voivodeship during the years 2018–2022. Achieving this goal required answering the following questions:

- In which urban municipality was the citizen budget first implemented?
- How many projects were submitted and how many were accepted for implementation in each edition of the citizen budget?
- Did the tasks accepted for implementation include „hard or soft” projects?
- What thematic areas did the selected projects for implementation cover?
- What was the structure of the votes cast?
- What was the participation rate of voters compared to the total number of eligible voters?
- How much financial resources were utilized within the examined editions of the citizen budget?
- What was the proportion of the citizen budget in the city budget expenditures during the studied years?
- How much financial resources allocated in the individual editions of the citizen budget per inhabitant of urban municipalities?

All four urban municipalities in the Podkarpackie Voivodeship were selected for the research, namely Krosno, Przemyśl, Rzeszów, and Tarnobrzeg. They served as separate provincial capitals in the administrative division of Poland in force between 1975 and 1998.

In order to achieve the goals of the article, one of the basic research methods was applied, namely the desk research method. This method utilizes public data obtained directly from the surveyed city offices and published on the websites of the offices. In order to obtain additional information, interviews were conducted with city office employees responsible for gathering and processing information regarding the citizen budget. The proposed approach allowed for the diagnosis of the utilization of citizen budgets in the studied years in urban municipalities.

## 2. LITERATURE REVIEW

Local policy, or rather local development policy as indicated by Jastrzębska (2003), is “conscious, purposeful, and organized action of local government and its organizational units consisting in setting goals for the local community and selecting methods and instruments to achieve these goals”.

A similar approach to local policy is presented by Markowski (1999), indicating that it is

planned and organized action of territorial self-government bodies and other public entities subordinate to these bodies, which directly exercise power (e.g., coordination, compulsion, control, repression, etc.), consisting in selecting goals

serving the interests of the local community and choosing means to achieve these goals.

Feltynowski (2015) adds that “local development policy is the art of governance with the rational use of local resources”.

Thus, it can be assumed that “local policy is the activity of local authorities in the social, economic, and cultural fields in conditions of constant competition for resources and ways of their redistribution” (Masik, 2010).

The assessment of conducted local policy is a derivative of adopted goals and value systems and is characterized by a high openness to the concerns of residents (Nowakowska, 2016). The goal of local policy from a social perspective is to meet the needs of the community, solve local problems, and ensure the highest possible standard of living for residents (Makulska, 2004).

According to Markowski (1999), the problems of local communities include living conditions, issues of economic units, and service problems. General social values and ideas influence the selection and implementation of general tasks and the way of solving local community problems.

An important element of local policy in Poland is social participation and the state of civil society. These elements are indicated as a source for building local policies in accordance with the idea of co-governance, allowing for the establishment of a so-called “citizen municipality” where residents are not objects but subjects of public policy (Feltynowski, 2015). Social participation primarily promotes the building of relations between local government and citizens based on the principle of partnership and participation in local decision-making processes (Ostalkiewicz, 2015).

One of the tools of social participation used to engage residents in local affairs is the citizen budget. It is also referred to as participatory, as it provides residents with the opportunity for public discussion on the allocation of a portion of funds earmarked from the municipality's budget for initiatives and projects proposed by the local community (Musiał-Malago, 2022). However, there is no single prevailing definition in the literature on this subject.

According to the Budgetary Lexicon, it is a designated portion of the local government budget (most commonly the city budget), within which a predetermined amount of expenditure is allocated for initiatives and investment projects directly proposed by the local community (individually or through appropriate organizations).

The citizen budget is a form of invitation extended by local authorities to residents to participate in the decision-making process regarding the allocation of local budgetary resources. It is thus a tool of civic dialogue – a process that is increasingly common both in social science analyses and in political actions (Sobol, 2017).

Citizen budgets align with new trends in public management, particularly the concept of public governance, through the mechanisms they contain that promote efficiency and rationalization of public expenditures by enabling social oversight of the use of public funds and the associated accountability of local government leaders (Górka, 2017).

The introduction of the citizen budget brings hope for overcoming the crisis of civil society in Poland. It is a promising form of activating residents in local affairs, which should become a permanent and widespread element of local democracy in Poland (Sobol, 2017).

### 3. ANALYSIS OF RESEARCH RESULTS

The idea of the citizen budget was first implemented in Brazil, in the city of Porto Alegre (Poniatowicz, 2014), in 1989. Engaging the local community was intended to contribute, among other things, to improve the functioning of local government structures and enhancing the living conditions of the city's poorest residents (Musiał-Malago, 2022). In subsequent years, the citizen budget spread to other cities in Brazil and then extended its reach to countries in Latin America, North America and Asia. In Europe, its introduction began in 2000 in countries such as France, Germany, Italy and the United Kingdom (Czarnecki, 2014).

In Poland, however, this form of social participation was first implemented in 2011 in Sopot. Since then, many cities have begun to use it as a means of engaging residents in local affairs (Leśniewska-Napierała, 2017; Łukomska-Szarek, 2014; Musiał-Malago, 2022). Rachwał (2018) argues that providing an exact list of local government units that use the citizen budget is practically impossible because new places of its implementation are constantly being recorded.

Analyzing the data presented in Table 1, it can be observed that the first urban municipality in the Podkarpackie Voivodeship to implement the citizen budget was Przemyśl in 2013. Subsequently, Rzeszów joined in 2014, Tarnobrzeg in 2016 and finally Krosno in 2018. Consequently, the number of editions of the citizen budget varies depending on the city (with the smallest number of editions being in Krosno). It should also be noted that Krosno is the only city where further utilization of the citizen budget has been suspended. In June 2022, the City Council of Krosno adopted a resolution not to conduct public consultations in the two subsequent editions of the citizen budget, for the years 2023 and 2024, citing the city's difficult financial situation.

Table 1. First year of citizen budget implementation and number of editions in urban municipalities in the Podkarpackie Voivodeship

City	First year of citizen budget implementation	Number of editions of the citizen budget
Krosno	2018	4
Przemyśl	2013	10
Rzeszów	2014	9
Tarnobrzeg	2016	7

Source: prepared based on own research.

Although social participation has been gaining increasing importance in public policy in Poland in recent years, the utilization of this phenomenon's potential by local governments seems to be inadequate (Radziszewski, 2018). Practically every analyzed city has several years of experience in conducting the citizen budget. However, the experience gained does not translate into high voter turnout for budget projects in all urban municipalities.

Table 2 shows the number of votes cast and the percentage participation of voters compared to the total number of eligible voters in individual urban municipalities.

Table 2. Total votes cast and percentage participation of voters compared to the total eligible voters in the surveyed urban municipalities

City	Krosno	Przemyśl	Rzeszów	Tarnobrzeg
<b>2018</b>				
Total votes cast	3865	No data	15066	796
Percentage participation of voters compared to the total eligible	8,3	No data	7,86	1,69
<b>2019</b>				
Total votes cast	6608	10955	19712	6531
Percentage participation of voters compared to the total eligible	14,3	17,9	10,05	13,9
<b>2020</b>				
Total votes cast	4828	19612	77550	6207
Percentage participation of voters compared to the total eligible	10,7	33,5	39,9	13,8
<b>2021</b>				
Total votes cast	6167	21132	60945	6537
Percentage participation of voters compared to the total eligible	13,8	36,7	31,03	14,7
<b>2022</b>				
Total votes cast	-	20595	70902	6133
Percentage participation of voters compared to the total eligible	-	36,13	36,17	13,94

Source: prepared based on own research.

As can be observed, since 2018, there has been a systematic increase in the number of people participating in voting in each analyzed urban municipality. The increasing voter turnout indicates a growing interest among residents in shaping the urban space and a desire to co-decide on the directions of public spending, and importantly, local awareness is systematically being built.

The highest voter turnout in 2022 is characterized by the city of Rzeszów (36.17%) and Przemyśl (36.13%). The fewest residents in the surveyed years voted on the citizen budget in Krosno. The research also shows that the participation of residents in Tarnobrzeg in the voting in 2018 was only 1.69% - the lowest among all urban municipalities in the Podkarpackie Voivodeship. This was the result of ineffective promotion of this particular participatory instrument.

However, after conducting interviews with city office employees, it is noted that officials are aware of how important it is to inform residents about matters concerning them, as it determines the level of difficulty of democratic dialogue and political debate. They also emphasize that the use of participatory budgeting has brought many benefits to both the offices and the cities. Above all, there has been an improvement in the image of local public administration, an increase in trust in the activities of local administration and the fostering of civic attitudes among residents.

The voting process for individual tasks took place through an electronic system or traditionally at consultation points located in the surveyed cities. Table 3 presents the total number of votes cast, invalid votes, and votes cast online.

Table 3. Number of votes cast, including invalid and online, in county-status cities between 2018-2022

Years	The votes cast	Krosno	Przemyśl	Rzeszów	Tarnobrzeg
2018	total	3865	No data	15066	796
	invalid	8	No data	922	4
	online	3824	No data	9320	-*
2019	total	6608	10955	19712	6531
	invalid	0	No data	1790	35
	online	6519	-*	10975	-*
2020	total	4828	19612	77550	6207
	invalid	1	1332	40	58
	online	4782	9766	73194	-*
2021	total	6167	21132	60945	6537
	invalid	0	1332	5	14
	online	5911	5977	60668	2455
2022	total	-	20595	70902	6133
	invalid	-	1158	19	12
	online	-	4673	70370	3292

\* – Online voting was not utilized during these years

Source: prepared based on own research.

Detailed data on voting were not collected in some years. In 2020, due to the pandemic, the number of votes cast online in urban municipalities was significantly highest, accounting for over half of all votes cast.

Each city may have its own rules for submitting projects to the budget as well as methods for consulting and selecting them. However, the following stages can be distinguished in the entire procedure: – submission of projects by residents; – verification of projects; – submitted projects undergoing formal and substantive verification (i.e., correctness of completed forms, cost estimates, and compliance with local plans). Then, among the proposals that have successfully passed the verification process, the reviewing team publishes the results of the project verification; – social consultations, during which city residents have the right to vote for the projects they choose.

Between 2018 and 2022, the total number of projects submitted to the surveyed city offices underwent changes. The highest number of projects was submitted in 2020 in Przemyśl, Rzeszów, and Tarnobrzeg, while in Krosno, the highest number was in the first year of the citizen budget, which was 2018. On the other hand, among the four urban municipalities, Tarnobrzeg had the smallest number of tasks submitted (Table 4).

Despite a fairly large overall number of projects submitted in individual cities, only a specific portion of them were subjected to voting. The rejection of applications by verification committees resulted from formal and substantive errors, lack of feasibility of project implementation due to technical or financial reasons (underestimation of the task) or cases of submission after the designated deadline.

The number of tasks transferred for implementation varies in cities and is usually lower than the number of projects put to a vote. In each of the analyzed editions of the citizen budget, the number of tasks accepted for implementation depends on the amount allocated for this purpose by the City Council. Additionally conducted interviews with city office



employees showed that the COVID-19 epidemic situation did not significantly affect the implementation of tasks submitted under the citizen budget in individual cities. Only in a few cases in Przemyśl was the deadline for their completion postponed.

Table 4. Projects submitted under the participatory budget in cities with county rights in the years 2018–2022

Years	The votes cast"	Krosno	Przemyśl	Rzeszów	Tarnobrzeg
2018	total submitted	73	35	109	28
	subjected to voting	49	34	87	26
	selected for implementation *	15	32	36	16
2019	total submitted	43	58	106	30
	subjected to voting	19	50	74	28
	selected for implementation*	151	37	47	11
2020	total submitted	45	105	122	40
	subjected to voting	27	75	107	31
	selected for implementation*	12	37	36	11
2021	total submitted	58	85	93	33
	subjected to voting	42	60	92	21
	selected for implementation*	13	32	37	16
2022	total submitted	-	73	102	30
	subjected to voting	-	58	102	24
	selected for implementation *	-	41	36	18

\* – Projects to be implemented in the following year

Source: prepared based on own research.

The article divides the projects transferred for implementation into categories (Table 5). Projects for the citizen budget of the surveyed cities could be submitted in three (I–III) categories:

- Category I – construction and modernization of municipal infrastructure. This category includes projects that, due to their nature and scope of impact, satisfy the needs of city residents regardless of their place of residence.
- Category II – construction and modernization of neighborhood infrastructure.
- Category III – activities of a pro-social, cultural, educational, or sports nature. Analyzing the data provided in Tables 5 and 6, it can be observed that the fewest tasks were related to Category I. Their number ranged from a few to several (depending on the city), involving the development or modernization of technical infrastructure. At the same time, these are very costly tasks, which allocate the largest portion of financial resources within the citizen budget.

The highest number of projects submitted by residents of all urban cities (except Rzeszów – in 2021 and 2022) pertained to neighborhood tasks aimed at both technical and social infrastructure development – Category II. Analyzing the data presented in Table 6, it is observed that in Category II, there is a predominance of hard projects in Przemyśl and Krosno, i.e., those related to the development of technical infrastructure. These projects mainly involved the reconstruction and modernization of main traffic routes, including pedestrian and bicycle paths in cities, public utility facilities, as well as the construction

and expansion of parking lots, recreational areas, and lighting. Tasks related to social infrastructure, predominant in Rzeszów and Tarnobrzeg, mostly encompassed the construction and equipping of playgrounds, outdoor gyms, or the modernization and enhancement of city parks.

Table 5. Division of projects selected for implementation by categories within the participatory budget of urban municipalities

Years	Projects	Krosno	Przemyśl	Rzeszów	Tarnobrzeg
2018	selected for implementation total	15	32	36	16
	Category I	2	0	5	11
	Category II	11	32	18	5
	Category III	2	2	13	0
2019	selected for implementation total	15	37	47	11
	Category I	1	3	5	1
	Category II	11	22	21	9
	Category III	3	12	21	1
2020	selected for implementation total	12	37	36	11
	Category I	1	4	4	1
	Category II	11	21	16	10
	Category III	0	12	16	0
2021	selected for implementation total	13	33	37	16
	Category I	1	2	4	1
	Category II	12	18	16	14
	Category III	0	13	17	1
2022	selected for implementation total	-	41	36	18
	Category I	-	6	1	1
	Category II	-	21	15	17
	Category III	-	14	20	0

Source: prepared based on own research.

Category III includes activities other than investment-related (so-called soft projects), such as pro-social, cultural, educational, and sports and recreational initiatives. It is noted that the number of projects belonging to this category in all urban cities increases from year to year. The most frequently chosen activities by city residents were those of a cultural nature (including theater outings, movie screenings, picnics, organizing concerts) and sports and recreational activities, although to a lesser extent than before (cycling competitions, sports tournaments, sports days, and promoting a healthy lifestyle). Tasks related to integrating residents through education or activating socially excluded groups were sporadically implemented.

Analyzing the „winning” tasks within each category in detail allows us to infer residents' preferences regarding the type of projects chosen and changes in these preferences in each edition of the participatory budget.

Table 6. Division of projects within respective categories into so-called „hard and soft projects” in urban cities

<b>KROSNO</b>					
<b>Years</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Years Projects selected for implementation – total	15	15	12	13	-
1. Category I	2	1	1	1	-
2. Category II, including:	11	11	10	12	-
– technical infrastructure	4	4	5	5	-
– social infrastructure	7	7	5	7	-
3. Category III, including:	2	3	1	0	-
– actions of a pro-social nature	1	0	1	0	-
– cultural activities	1	1	0	0	-
– educational and educational activities	0	1	0	0	-
– sports and recreational activities	0	1	0	0	-
<b>PRZEMYŚL</b>					
<b>Years</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Years Projects selected for implementation – total	32	37	37	32	41
1. Category I	0	3	4	2	6
2. Category II, including:	32	22	21	16	21
– technical infrastructure	20	13	13	8	14
– social infrastructure	10	9	8	8	7
3. Category III, including:	2	12	12	13	14
– actions of a pro-social nature	1	2	1	1	0
– cultural activities	1	4	5	7	10
– educational and educational activities	0	2	2	2	1
– sports and recreational activities	0	4	4	3	3
<b>RZESZÓW</b>					
<b>Years</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Years Projects selected for implementation – total	36	47	36	37	36
1. Category I	5	5	4	4	1
2. Category II, including:	18	21	16	16	15
– technical infrastructure	5	11	5	5	7
– social infrastructure	13	10	11	11	8
3. Category III, including:	13	21	16	17	20
– actions of a pro-social nature	0	2	1	3	2
– cultural activities	8	10	8	8	7
– educational and educational activities	3	5	4	3	7
– sports and recreational activities	2	4	3	3	4
<b>TARNOBRZEG</b>					
<b>Years</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Years Projects selected for implementation – total	16	11	11	16	18
1. Category I	1	1	1	1	1
2. Category II, including:	15	10	10	14	16
– technical infrastructure	8	3	5	4	6
– social infrastructure	7	6	5	10	10
3. Category III, including:	0	1	0	1	1
– actions of a pro-social nature	0	1	0	1	1
– cultural activities	0	0	0	0	0
– educational and educational activities	0	0	0	0	0
– sports and recreational activities	0	0	0	0	0

Source: prepared based on own research.

Citizen budgets in Poland are financed from the budget of a given municipality, which carries out this initiative. The structure of the citizen budget does not allow for contributions from project initiators or funds from other sources. In 2019, the citizen budget was introduced as mandatory for cities with county rights under the Act on Local Government (Journal of Laws of 1990 No. 16, item 95). Polish law does not provide for a maximum amount allocated to this initiative, but it specifies the minimum amount of this budget at least 0.5% of the municipality's expenditures, as presented in the last financial report on budget execution (Act of March 8, 1990, on Local Government, Article 5). Tasks selected within the citizen budget are included in the city's budget resolution. During the work on the draft budget resolution, the City Council cannot remove or significantly change tasks selected within the citizen budget. Thanks to the citizen budget, residents of the city are entrusted with the right to decide on the allocation of part of the municipal budget funds for purposes they consider most important (Musiał-Malago, 2022).

The amount of funds allocated to the citizen budget in the three examined urban municipalities is increasing (Krosno, Przemyśl, Rzeszów), comparing 2022 to 2018 – as shown in Table 7. An exception here is Tarnobrzeg – the financial resources pool decreases in these years. It is also worth noting that the least financial resources were allocated in the years 2020–2021 in all urban municipalities, influenced by the pandemic situation in Poland. Although Polish law established a minimum amount at least 0.5% of the municipality's expenditures presented in the last submitted financial report on budget execution, this did not occur in most editions of the citizen budget of urban municipalities in the Podkarpackie Voivodeship. The best situation in terms of the percentage share of the citizen budget in the city's budget expenditures characterizes Tarnobrzeg (from 0.76% in 2018 to 0.54% in 2022) and Rzeszów (from 0.55% in 2018 to 0.47% in 2022), despite the decline in the examined indicator in subsequent years. Conversely, in Krosno, expenditures on the citizen budget only begin in 2019 and constitute 0.54% of the total budget expenditures of the city, to reach the highest level of all cities in 2022 at 0.91%. Przemyśl is in the worst situation. In this city, expenditures on the citizen budget in the years 2018–2022 do not exceed 0.5% of total expenditures (Figure 1).

Table 7. The amount of the participatory budget (in PLN) and its share in the expenditures of the surveyed urban municipalities (in %)

Years	The amount of the participatory budget actually spent on tasks in a given year (in PLN)				The share of the participatory budget in the city budget expenditures (%)			
	Krosno	Przemyśl	Rzeszów	Tarnobrzeg	Krosno	Przemyśl	Rzeszów	Tarnobrzeg
2018	-	1 630 256	7650000	2000000	-	0,16	0,55	0,76
2019	1768726	1 895 048	7571600	1600000	0,54	0,48	0,49	0,55
2020	1726265	1 731 836	4592197	<b>1511394</b>	0,38	0,41	0,28	0,44
2021	2755312	1 046 147	8264180	1595381	0,62	0,23	0,47	0,46
2022	4315631	1 816 856	8961870	1883443	0,91	0,36	0,47	0,54

Source: prepared based on own research.

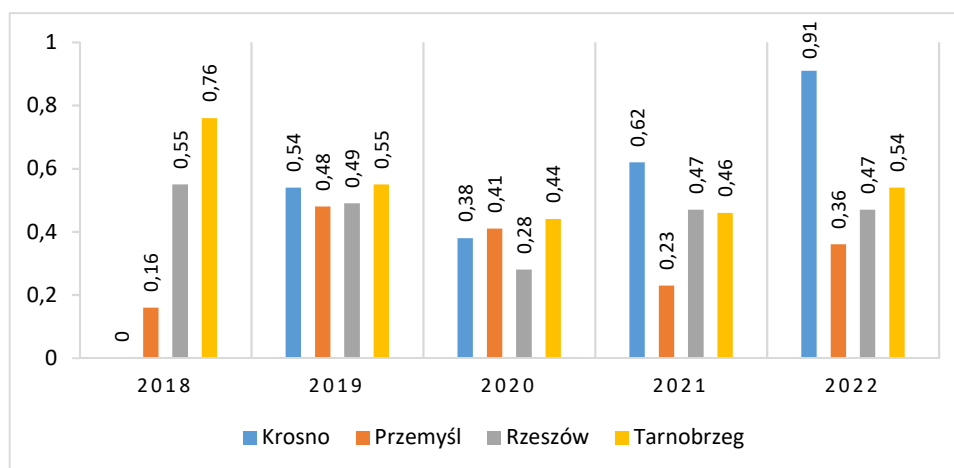


Figure 1. The share of the participatory budget in the city budget expenditures (%)

Source: prepared based on own research.

The completion of the conducted analysis in the article is to show how much financial resources allocated to the participatory budget per inhabitant of a given city. From the data presented in Table 8 and Figure 2, it can be observed that the best situation applies to Tarnobrzeg and Rzeszów. In 2018, Tarnobrzeg allocated 42.51 PLN *per capita*, and Rzeszów allocated 39.93 PLN *per capita*. In 2022, the situation remained unchanged in Tarnobrzeg (42.32 PLN), while in Rzeszów, this amount increased to 45.36 PLN, representing a 13.6% increase. The highest amount of financial resources *per capita* in the participatory budget in 2022 was allocated by Krosno, as much as 98.08 PLN, indicating a 156.7% increase compared to 2019. However, it should be noted that in Krosno, voting on the participatory budget was suspended in 2022 and 2023. This means that in the following years (2023–2024), no new tasks will be implemented, including investments in civic projects.

Table 8. Amount of participatory budget *per capita* in the urban city (in PLN)

Years	The amount of participatory budget <i>per capita</i> in the city (in PLN)			
	Krosno	Przemyśl	Rzeszów	Tarnobrzeg
2018	-	26,62	39,93	42,51
2019	38,21	31,23	38,59	34,23
2020	38,22	29,55	23,63	33,55
2021	61,66	18,17	42,08	35,83
2022	98,08	31,87	45,36	42,32

Source: prepared based on own research.

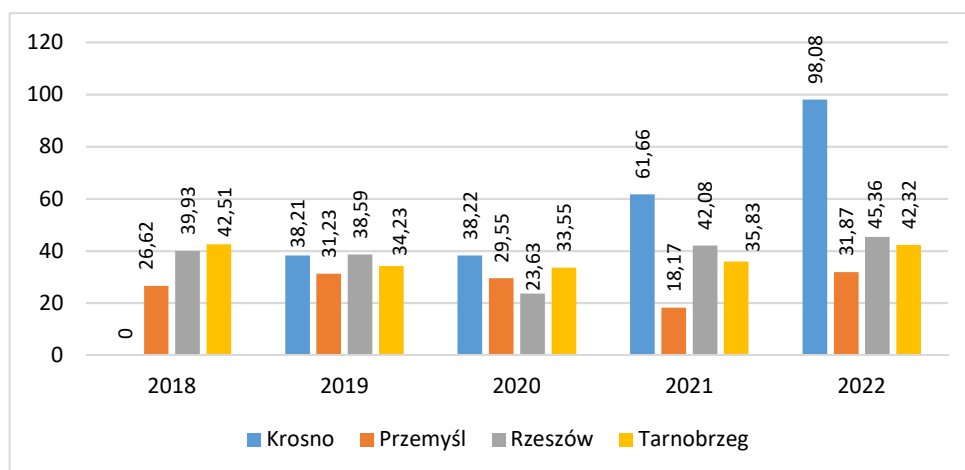


Figure 2. The amount of participatory budget *per capita* in the city (in PLN)

Source: compiled based on own research.

#### 4. SUMMARY

Engaging citizens in public affairs at the local level has been neglected in Poland for years. Currently, providing residents with the opportunity to actively participate in decision-making processes is becoming increasingly timely. At the same time values such as social dialogue at the local level or good local governance are becoming fundamental to public management (Ostałkiewicz, 2015).

A key instrument for engaging citizens in local politics and building social awareness is the participatory budget. Within the participatory budget of the examined urban municipalities in the years 2018–2022 the number of projects submitted by residents increased together with turnout of voters. the turnout of voters also increased. This is a sign of the community's involvement in the life of individual cities. There is a growing social awareness, a need for organization, and cooperation. The overarching goal of activating citizens by encouraging them to participate in public life and jointly deciding on the allocation of public funds has been achieved.

The majority of projects chosen by residents concerned the construction or modernization of technical infrastructure, although in recent years, soft projects have also begun to appear more frequently. They is a reflection of changing social needs. Among them, projects of a cultural nature and those related to sports and recreation predominated.

The research findings can have practical applications by improving the functioning and management of the surveyed city offices. This could involve, e.g. selecting appropriate forms and tools for social participation, introducing organizational activities or even enforcing certain changes, including institutional ones. This information can translate into conducting appropriate public policy, including the preparation of proper strategic programs and actions. It is important for the participatory budget to become a real form of participation in the decision-making process for both residents and local authorities, facilitating the recognition of the most important needs of residents and strengthening their sense of responsibility for the common living space.

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Conflict of Interest Statement The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## STRATEGIES OF LOGISTICS PROJECT MANAGEMENT IN DIFFICULT TIMES, INCLUDING THE BROWN PAPER METHOD

The purpose of the paper is to present the issues relating to methods of transport and commercial process management and support in logistics. Moreover, it will describe shipping actions in relation to the conflicts in Europe and worldwide. The study follows the work plan described as follows: The first chapter comprises an overview, logistics function, and classification of strategies in a logistics project. The second chapter includes information about the review and selection of methods of logistics project management. The third chapter pertains to the application of solutions restoring an old form of value stream mapping, known as the brown book exercise or the brown paper method. The fourth chapter refers to the aspects and solutions used in logistics project management in the hard times of logistic service market operations. Finally, the fifth chapter specifies the forms of trust management as the methods supporting logistics project management.

**Keywords:** logistics project management, brown paper method, logistics function, methods of logistics project management, trust management.

### 1. INTRODUCTION

The challenges of the new logistics are related to the introduction of novel solutions regarding logistics project management, notably in the difficult times of logistics market operation. The latter comprise periods of logistics overcrowding, i.e. excessive numbers of collective or commercial processes which constitute a given logistics unit, as well as the periods of military actions, including the times of war and armed conflicts. The ability to apply methods of project management to the solving of logistics tasks as part of company operations, particularly challenging in difficult times, requires the use of relevant tools and methods deriving from project management. The paper is rounded up with a summary comprising conclusions and impressions of the author regarding the search for the strategies in logistics project management in difficult times and seeking answers to the research questions posed in the article. The basic sources of data have become a review of the subject literature and webography of selected issues, above all, those related to the application of the brown paper method. The presented examples have been taken directly from companies applying the said methods of logistics project management in practice.

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## **2. CHARACTERISTIC FEATURES, LOGISTIC FUNCTIONS AND CLASSIFICATION OF LOGISTICS PROJECT STRATEGIES**

Project describes it as a sequence of “unrepeatable, complex and interrelated tasks which have a common goal and which are destined to be completed within a specific time period and within a predefined budget, in accordance with assumed requirements”. Claims that the commonly accepted definition of a project describes (Wysocki, 2013).

By way of illustration, the determination and selection of management methods has a material impact on the development of a competitive advantage, both in terms of manufactures, packaging producers for instance, and entities using the packaging for their products. And thus, a suitable selection of packages to fit various types of products becomes the basic marketing instrument. It also plays specific roles and has certain functions, such as the protection of product’s utility value, streamlining of its distribution, protection of consumer interests, product promotion, identification and brand differentiation. One should pay attention to the fact that a good package has an effect of a five-second commercial since it attracts attention to product’s features, inspires confidence, and makes a positive impression. This regards not only consumer and trade goods, but also innovative transport packages, above all, the environment-friendly ones. A number of market successes is a consequence of the application of suitable methods, in this case, the selection of packaging (Daszkiewicz, Dobiegała-Korona, 1998).

According to A. Daszkiewicz, packaging means, in most general terms, a product used to protect the material it contains against damage and harmful impact of external factors and, conversely, to protect the environment against the harmful impact of packaged hazardous materials. The functions performed by packaging start to be dominated by those playing the role of a sales tool and product relocation tool so that the good reaches its final recipient untouched. The differentiation of package sizes and types, also referred to as diversification, allows for the satisfaction of diverse customer needs. One of the most crucial information packaging provides is the name and type of a given product. The remaining data that should be included on a packaging is the name of the manufacturer, the size of the packaging unit, trademark, product’s ownership, its application and method of use, as well as the condition of storage. However, it would be difficult to prioritize one of the said functions over another.

The formal definition supplemented by the Institute of Project Management is that project management is “the application of knowledge, skills, tools and techniques of anticipating actions allowing to reach the goals set as part of a given project”. A more accurate definition of a project defines it as “a sequence of finished and related actions the successful completion of which involves the delivery of expected business value, which provides a justification for its completion.” According to R. Wysocki, project management may also signify “an orderly and sound approach which delivers results in line with customer expectations and generates expected additional business values”. R.K. Wysocki also provides a somewhat broader definition of project management, referring to it as “a set of tools, schemes, and processes designed with the search for logistics’ answers in mind”.

## **3. OVERVIEW AND SELECTION OF MANAGEMENT METHODS IN LOGISTICS**

In response to the needs of the logistics industry, which has complained of a limited impact of the methods of management on its development, a sequence of actions depending

on technical requirements has been initiated. For the sequence to be correctly determined, one must think in terms of inputs and outputs, which means finding answers to the questions:

1. What inputs are needed to start an action?
2. What outputs will an action generate?

A. Korzeniowski and M. Skrzypek believe that the dynamics of changes in the transport industry has been caused by the developmental tendencies in the packaging of goods, which refer to the current environment-related issues in logistics. The development of green awareness in logistics project management also exerts a profound impact, for instance through the advantages generated by the logistics of recycling and the application of control rights and informatization, the quality of raw material flow, related to recycling in delivery networks.

The major methods of logistics process management followed as part of the national recycling system comprise:

- raw materials and packaging waste flow processes,
- records related to the above flow processes,
- packaging information flow processes,
- funds and product fees and environmental fees flow processes,
- applied modifications in logistic flow processes as part of delivery networks. The above applications increase effectiveness of operations of recycling logistics and the flow and life cycle of packaging use, including e-commerce packaging (Korzeniowski, Skrzypek, Szyszka, 2001).

The method of logistics management must be a function of graphic symbols and signs which appear on packaging, above all:

- signs related to environmental protection requirements,
- signs identifying packaging materials,
- signs confirming compliance with certain criteria and requirements with respect to environment protection,
- signs of packaging recyclability,
- signs of multiple-use packaging,
- signs confirming the content of renewable raw materials, carbon dioxide reduction, and packaging waste management. Signs determining how to proceed with packaging or membership to a specific legal and organizational system linked to packaging waste management, other signs used by producers (Rakowski, 2015).

The earned value method considers the following components when evaluating project's progress: the scope, cost, and third dimension that is the earned value (received value) which represents a planned value of the actually performed scope of works. The combination of the three elements of the project, i.e. the scope, schedule, and cost, allows not only for the evaluation of what has been done but also for the analysis of the tendencies of project realization efficiency and a forecast of future outcomes of company logistics operations ([https://mfiles.pl/pl/index.php/Earned\\_Value](https://mfiles.pl/pl/index.php/Earned_Value)).

Among other methods of management in logistics, for example those related to stock and material flow management, there is the ABC method. It consists in the division of stock into three main groups. The division is based on the assumption that there is a stock which holds a large share of the total stock when it comes to quantity, but which at the same time is small in terms of value. And the other way round, there is a stock with large value share but small quantity share.

Group A – the precious stock (the vital few) which constitute 5 to 20% of stock assortment quantity but which has a significant, 75–80%, share in the value. The group of high value and large share in the total material costs must be treated with utmost attention with respect to:

- market, price and cost structure analysis,
- detailed preparation of commercial orders,
- precise disposal procedures in the company,
- sound management of stock levels,
- exact assessment of safety stock levels.

Group B – the stock which has a 15 to 20% share both in terms of assortment numbers and in terms of value. Group C – the stock of mass nature (the trivial many) which is largest in terms of assortment numbers (60–80%) and lowest in terms of value (approximately 5%). The XYZ analysis supplements the ABC method, where the stock is considered in accordance with the regularity of demand and accuracy of forecasting. When the XYZ method is applied, the individual types of materials are divided on the basis of their demand regularity into three groups:

- group X which consists of materials characterized by regular demand (if it is assumed that some insignificant fluctuations may occur), there is also high accuracy of forecasting the demand levels (level of use),
- group Y, i.e. materials which feature seasonal fluctuations and trend-specific demand and average accuracy of forecasting,
- group Z which comprises materials of highly irregular demand and low demand forecasting accuracy (Bril, Łukasik, 2013).

#### **4. APPLICATION OF SOLUTIONS IN THE FORM OF VALUE STREAM MAPPING, KNOWN AS THE BROWN BOOK EXERCISE OR THE BROWN PAPER METHOD**

The old form of value stream mapping referred to as the brown book exercise has been restored in logistics. Long time before the invention of computers, value stream mapping had only been possible on paper. The use of paper allows one to create maps which are not limited by the size of a monitor or a screen.

The brown book method is an interactive, playful tool which may be conducted through a hybrid personal and virtual model. The Brown Paper method is a crucial tool used daily in the reengineering process. It constitutes a part of our value stream mapping process. It provides many (virtual and personal) process owners and their internal suppliers and customers with an engaging and non-threatening manner of devoting time to a visual discussion about the effectiveness of work streaming; where it fails, where it could be improved, how to improve it, and where the technology fails. Most process failures typically ends with failure when forwarding functional group and their technology interfaces. With every project made, we hear people speaking: “I’ve had no idea you needed this” or “We may fix it now”. Oftentimes, during the first few meetings, multiple process-related problems are solved, sometimes paying for the entire project on the first day. There are several reasons for which the brown book methods works so well: 1. About 65% of the population are visual learners; 2. The brain processes visual information 60 000 times faster than text; 3. 90% of the information reaching the brain is of a visual nature; 4. 40% of all nerve fibers connected with the brain is connected with retina; 5. The ability to read and write is the ability to code (create a visual language) and decode (understand

the visual language). 6. Visual aids facilitate learning by as much as 400%. 7. Employees do not require any special skills (<https://www.group50.com>).

#### **5. ASPECTS AND SOLUTIONS APPLIED TO LOGISTICS PROJECT MANAGEMENT DURING DIFFICULT TIMES OF LOGISTIC SERVICE MARKET OPERATIONS**

It should be highlighted that the uniqueness of action results from the fact that a given project has never existed before and will not be repeated under the same circumstances. Activities pursued as part of the project are complex, and their complexity results from the variability of elements which form a given action and the relations amongst them

These, above all, involve the stocks of materials having the following features which:

- are critical to maintain production,
- have short shelf-lives,
- have long delivery times (the period between order and delivery),
- are theft-prone,
- are big or bulk.

#### **6. FORMS ON TRUST MANAGEMENT AS ONE OF THE METHODS SUPPORTING THE MANAGEMENT OF A LOGISTICS PROJECT**

Trust may be defined through a process approach, wherein it is both a product and a process. Trust management reinforces the processes of knowledge sharing because it reduces the level of fear of losing employee's individual values, such as the position or post within an organization. Trust should be shaped from the onset of cooperation, and the process of trust development will largely depend on the quality of knowledge and the speed of its exchange (Bugdol, 2010).

The process of gaining trust which plays such a significant role in the processes of knowledge management favors acquisition of quiet knowledge based on employees' experience. Express knowledge included in pictures and words is, without a doubt, easier to disseminate. The process of knowledge sharing depends on the participation of employees in trainings, open communication within the company and management's support. The effect of the exchange of knowledge is further subject to parties' reliability and remuneration. It is true that a motivated employee is open to knowledge sharing, whereas a controlled employee tends to shut oneself away. The greater the motivation, the bigger the chances of information sharing. The impact of external factors is also considerable. The level of trust shifts along with the level of motivation.

New trust-based tendencies in logistics project management will be applied to enterprises which behave dynamically against their competition and background. The factor differentiating the organization is the attitude of their boards or owners to external events. We may distinguish three types of behaviors: active or proactive, passive, and reactive ones. Such behaviors shape the environment of company operations and develop the methods of competing and gaining market advantages (Nogalski, 2004).

New opportunities for effective management of a logistic project based on trust management in contemporary enterprises are provided by an open attitude of organizations and the rejection of the myth of an ideal company. The open nature comprises cooperation with buyers and treating them as members of the organization itself. This is the result of the tendencies imposed by globalization processes, the development of technology, the

increase of the speed of innovation and promotion of products on the market (Kwiatkowski, 2003).

## 7. SUMMARY

The aspects and solutions which the application of the brown paper method include may be summarized as follows:

1. It is a visual method which proves to be more effective in the case of over 65% of employees,
2. It engages process owners in its creation, boosting work involvement and satisfaction,
3. It is an educational tool for all organizations, which is four times more effective than any other tool,
4. People who help create it, identify problems and are the owners of solutions,
5. The team becomes responsible for recommendations regarding any improvements,
6. It is a great fun,
7. It is a key part of the process of change management,
8. It makes the senior managerial staff support the recommended human, process and technology modifications,
9. It significantly increases the probability of succeeding.

What will the future be like? The global tendencies and the analysis of the international market of logistics will definitely remain related to the adoption of more and more innovations in the field of project management. The fast growth in the field will be focused mostly on the processes of production. The problems which affect organizations in relation to the above management are associated with new legal regulations, including the guidelines set by the European Union as regards packaging and waste packages management. They include, amongst other things, the EC Directive, the CEN standard and the harmonized standards. Innovations in logistics project management, the present-day market situation and the tendencies related, above all, to all consumption products designed for fast marketing development of the market of recycled material products. The development of the methods of logistics project management and other systems, including those for the production of biomaterial goods and materials for fast marketing, have led the international legal framework to focus even more on sustainable development and environment protection (<https://www.group50.com>).

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## COVID-19 PANDEMIC AS AN IMPULSE FOR COMMUNICATION ACTIVITIES OF THE CATHOLIC CHURCH IN POLAND: THE EXAMPLE OF THE DIOCESE OF RZESZÓW

The epidemic of the SARS-CoV-2 virus announced in Poland was connected with huge restrictions and limitations for individual citizens, society as a whole, and many industries. The restrictions also affected the faithful and members of religious communities, who were unable to directly participate in religious services due to the limits for participants. The situation also posed a challenge for Catholic priests, who had to take measures to reach the faithful with religious services in cases of limitations placed on direct contact. The paper analyses the communication activities undertaken by priests of the Diocese of Rzeszów, implemented as a consequence of the outbreak of the COVID-19 pandemic. The research work assumes that the pandemic provided the impetus for greater use of tools from the field of new technologies in relation to the faithful.

**Keywords:** Catholic Church, Diocese of Rzeszów, communication in the church, COVID-19, new media.

### 1. INTRODUCTION

The outbreak of the COVID-19 pandemic in Poland in early 2020 caused many changes in the functioning of the state and citizens. Fear of contracting the virus, the lockdown introduced by the state, restrictions in the number of citizens gathering in one place, had serious consequences not only on the economy, but also affected various spheres of life. The consequences of COVID-19 also impacted churches and the communities of faithful, which had to look for other tools for maintaining relations with the faithful due to restrictions on gatherings of the faithful in religious buildings, during masses and services. The subject of the paper analyses communication activities of parishes in the Diocese of Rzeszów, which were addressed to the faithful as a consequence of the outbreak of the COVID-19 pandemic. The research was predominantly quantitative and concerns a diocese that ranks among the top in Poland in terms of the level of religious involvement of the

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faithful. The authors focused on priests' use of IT tools since the pandemic caused fundamental difficulties in face-to-face contacts. The aim of the study was to observe how IT technologies were used in parishes to maintain ongoing relations with the faithful, with the general research assumption that the COVID-19 pandemic provided the impulse to expand the catalogue of communication tools used by parishes. It is worth noting that the topic of the communication activities of the Catholic Church in Poland in the context of the COVID-19 pandemic has been the subject of academic research. However, the study focused on the analysis of cross-sectional data with a nationwide dimension (Przywara, Adamski, Kicinski, Jupowicz-Ginalska, Szewczyk, 2021) or paid attention to other aspects concerning communication in this area, such as the analysis of media discourse, the public perception of Church communication during the pandemic (Chmielewski, Nowak, Stanis, Szulich-Kałuza, Wadowski, 2022) it also touched upon a topic of religious communication (Pastwa, 2020). There were also studies, which topic of concern were cases of parishes online activities in the COVID-19 pandemic (Kloch, 2021).

## **2. THE IMPACT OF THE COVID-19 PANDEMIC ON THE CHURCH'S COMMUNICATION WITH THE FAITHFUL**

The importance and necessity of the Church's use of new technologies, social media and the Internet for communicating with the public, contact with the faithful, evangelization activities, and image-building was the subject of scholarly reflection well before the COVID-19 pandemic (Marcynski, 2011; Przybysz, Kloch, 2012; Kloch, 2013; Przybysz, 2014; Przybysz 2018). However, the outbreak of the pandemic in 2020 and the restrictions on interactions imposed as a result have faced the Church in Poland with new challenges.

The state of epidemic in Poland due to SARS-CoV-2 virus infections was declared by the Minister of Health as of March 20, 2020. Based on the minister's decree, numerous restrictions and limitations were imposed on the functioning of citizens, various industries, the cultural sector, etc. These included the temporary closure of restaurants, cinemas, museums, libraries, archives, spas, prohibition of fairs, exhibitions, congresses. Significant restrictions also applied to the operation of commerce (Decree of the Minister of Health, 2020). Restrictions related to the epidemic condition also significantly affected the operation of churches, parishes and impacted the way religious practices were carried out. The decree of the Minister of Health stipulated that in connection with the epidemic of the SARS CoV-2 virus, restrictions are imposed on the performance of religious worship in public places, and they also apply to buildings and other religious facilities. In practice, the restrictions consisted of a limit on worshippers during religious services and a limit of 50 on the number of people who could participate in religious worship. This number applied to people who were indoors and outdoors, and included not only participants in worship services, but also the priests leading them (Decree of the Minister of Health, 2020).

In subsequent periods of the pandemic, the scope of the restrictions changed, however they were maintained as such. As late as March 2020, due to the increasing number of the infected and fatalities, a rule was introduced that only 5 people could be in a church during mass. As of April 2020, the limit of worshippers in churches was increased, there had to be 15 square metres of space per person, and in May the limit was reduced to 10 square metres. During the summer, the restrictions were reduced, but they returned to a lesser extent from October 2020, with the second wave of the pandemic. At the end of December 2020, the limit of 15 sqm of space per person in a church was reintroduced (Mikołajczak,

2021). The faithful present in churches during the service, had to use masks covering their faces.

It should be noted that the church authorities, on their part, also responded to the situation by issuing appropriate canonical orders. These interventions were mainly of a local nature, i.e., orders issued by episcopal conferences or their bodies, as well as orders issued by the governments of individual dioceses. The Board of the Polish Bishops' Conference, issued Guidelines for Bishops on the Conduct of Liturgical Activities in the Coming Weeks (Acts of the Polish Bishops' Conference, 2020) on March 21, 2020, while the Bishop of Rzeszow on March 26, 2020 issued Ordinance on the conduct of pastoral activities during the epidemic period (Bishop of Rzeszow, 2020). On more serious matters referring to the essence of the liturgy or Catholic morals, ordinances were also issued by the Holy See. A number of these regulations addressed, at least indirectly, the issue of intra-church communication. Thus, in the above-mentioned Ordinance of the Bishop of Rzeszow, priests were obliged to „make available the contact with the church and parish to the faithful via the Internet wherever possible, conducting online broadcasts of services and providing information on an ongoing basis through websites or appropriate applications” (Bishop of Rzeszow, 2020). In turn, the Presidium of the Board of the Polish Bishops' Conference, in its document, concluded that „it is not possible to hear confessions through electronic means of communication” (Acts of the Polish Bishops' Conference, 2020). At the same time, the document indicated that the faithful, who are spiritually connected with the community of the Church during the celebration of the Eucharist via radio, television or the Internet, can receive Holy Communion in church at the appropriate time (Acts of the Polish Bishops' Conference, 2020). Such canonical regulations were intended, on the one hand, to enable pastors to take the necessary measures to maintain parish ties, and, on the other hand, to protect the Church community from possible serious abuses in the use of media that could result in misleading the faithful about the canonically valid and morally decent celebration and enjoyment of the sacraments.

As noted, the degree of restrictions on the faithful varied in intensity, but all the rules introduced during the pandemic amounted to a situation in which a significant portion of the faithful could not directly practise religious worship, attend mass or other services, or directly participate in meetings of religious groups that functioned at parishes. This pandemic reality had two dimensions. For believers, participation in religious services and rituals has a spiritual dimension, but it is also a part of maintaining internal balance. As Lucjan Świto notes, in a situation of pandemic, forced quarantine, restriction of various activities, lack of access to religious practices for believers also meant lack of access to methods that reduce stress and anxiety (Świto, 2021).

This situation also had a very significant impact on the functioning of parishes and other church institutions. Large restrictions on the number of faithful during services forced priests to look for other ways to communicate with the faithful and reach them with religious services. IT and social media tools were applied here. The small number of the faithful at masses and services, and restrictions on face-to-face contacts also affected the day-to-day operation of the parish, including the amounts of offerings. This issue was also focused during the activities carried out in parishes. Detailed data for the Diocese of Rzeszow are presented in the subsequent sections.

### 3. RESEARCH METHODOLOGY

The study concerns the parishes of the Diocese of Rzeszow which was created in 1992 from parts of Przemyśl and Tarnów dioceses. At the time of its creation, the diocese was divided into 201 parishes and 19 deaneries. At the time of the study, there were 245 parishes in the diocese. As compared to Poland, the Rzeszow diocese is one of those with a high level of religious involvement of the faithful. Research by the Institute of Catholic Church Statistics shows that in 2021, when the COVID-19 pandemic prevailed, 49.7 percent of the faithful in the Rzeszow diocese attended Sunday Mass. This was the second highest score in Poland, after the Diocese of Tarnow (59.1 percent) (*Annuario Statisticum Ecclesiae in Polonia*, 2022).

The survey was conducted in 2021 by means of anonymous survey interviews. Questionnaires through the Diocesan Curia in Rzeszow were distributed to all parishes in the diocese. Responses were received from 62 parishes, representing 25.3 percent of all parishes in the diocese. The response rate obtained was considered sufficient for analysis, but due to the number of respondents who took part in the survey (less than 100), the authors based the analysis of the results on numerical indications rather than percentages.

Representatives of rural parishes predominated in the study group (43 respondents). The study also included 18 priests working in urban parishes (8 of them worked in Rzeszow parishes). Looking in terms of parish functions, 47 pastors and 14 vicars participated in the survey. One survey did not record respondent data. The respondents' age ranged from 28 to 70.

The research questionnaire included 7 questions. These were single-choice and multiple-choice questions in which respondents indicated i.e. IT tools that were used in parishes before and after the outbreak of the COVID-19 pandemic to maintain relations with the faithful. The survey also included one open-ended question. Several questions used a Likert scale from „very often” to „never”, as well as from „definitely yes” to „definitely no”.

### 4. RESULTS

The background for the research conducted in 2021 were two previous research projects that dealt with information policy in the parishes of the Diocese of Rzeszow. The first was conducted in late 2012 and early 2013 (Chmielewski, Kuca, 2013), and the second based on similar methodological assumptions was repeated in 2018 (Kuca, Chmielewski, 2019). The studies that are analyzed within the framework of the presented study partially used the questionnaire used in those projects. They analyzed i.e. the catalogue of information policy tools that were used by priests for communication activities addressed to parishioners.

Both surveys showed that the catalogue of information tools was dominated by those that can be described as traditional. In both 2013 and 2018, the most popular tools that priests counted among the components of a parish's information policy were parish announcements at Mass and the bulletin board at the church. In 2013, in third place was pastoral visitation, also considered an information tool. In the catalogue of communication tools, there were few instruments based on new technologies. The most popular of these was the parish website. In 2013, it was in fourth place in terms of popularity (59 responses out of 81 respondents) as a component of the parish's information policy, five years later it moved up to third place (72 responses out of 85 respondents). Thus, it can be concluded that parish websites were among the popular and standard tools of the parish's information

policy in its relations with the faithful. The importance of social media could be assessed quite differently. In 2013, the parish social media profile as a component of its information policy was indicated by only 13 surveyed priests (ranking 12th out of 13 tools surveyed). In 2018, the importance of this tool increased. It was indicated by 32 priests (increase to 8th place out of 13 tools). Private profiles of priests on social media were of marginal importance in the opinion of respondents (in 2013 – 4 responses as a component of parish information policy, in 2018 – 7 indications) (Chmielewski, Kuca, 2013; Kuca, Chmielewski, 2019).

Table 1. Components of parish information policy in the opinion of priests of the Diocese of Rzeszow in 2012/2013 and in 2018

No.	Components of a parish's information policy	Number of responses	
		2012/2013 (N=81)	2018 (N=85)
1	Parish announcements at Mass	80	84
2	Bulletin board at the church	75	81
3	Pastoral visitation	64	69
4	<b>Parish website</b>	<b>59</b>	<b>72</b>
5	Parish magazine	46	39
6	Meetings organized by the parish	44	42
7	Individual meetings with parishioners	41	40
8	Preaching	37	27
9	Pilgrimages and excursions organized by the parish	37	28
10	Informing the media about events in the parish	36	28
11	Letters to parishioners	17	12
12	Parish social media profile	<b>13</b>	<b>32</b>
13	Private profiles of priests on social media	<b>4</b>	<b>7</b>

Source: (Chmielewski, Kuca, 2013; Kuca, Chmielewski, 2019).

The 2021 survey offers a slightly different picture of the situation when it comes to the communication activities of parishes in the Diocese of Rzeszow and the use of modern technologies. The research questionnaire included a question about which tools related to new technologies were used in parishes to maintain relations with the faithful before the outbreak of the COVID-19 pandemic, and which were launched after the outbreak. The answers make it possible to see an increase in the importance of tools based on new technologies. Once again, the importance of parish websites in communicating with parishioners was confirmed (a tool present before the pandemic in 58 parishes). In the catalogue of tools, one can also note some importance of parish profiles in social networks (25 responses before the pandemic). But importantly, priests declared that even before the outbreak of the pandemic in some parishes, the faithful were able to handle various matters at the parish office online (18 responses), to make a donation to the church online (21 responses). In a few cases, parishioners were also able to attend Masses broadcast

online – on Youtube (7 responses) or on the parish's profile on a social networking site (6 responses).

In this context, it seems interesting to answer the question of what tools from the area of new technologies, priests of the Diocese of Rzeszow launched in their parishes after the outbreak of the COVID-19 pandemic. Detailed information is provided in Table 2. However, it is worth noting that the most common initiatives in this area concerned three spheres. First, it was about enabling parishioners to attend Mass and other services. In 17 parishes, the possibility of broadcasting Mass on Youtube was created, and in 13 parishes on the parish's social networking account. The second area had to do with the functioning of parish groups and the possibility of online meetings (15 indications). The third referred to organising parish retreats in an online format (8 indications). It is also worth noting that there was an increase in the number of parishes in which administrative matters at the chancery could be handled online (8 responses), as well as those in which parishioners could deposit offerings online (6 responses).

Table 2. Tools related to new technologies that were used by surveyed priests to maintain relationships with the faithful before and after the outbreak of the COVID-19 pandemic

No.	Tool	Before the outbreak of the Covid-19 pandemic	After the outbreak of the Covid-19 pandemic
1	Parish website	58	1
2	Parish social media profile	25	4
3	Private profiles of priests on social media	13	3
4	Broadcasting Mass on the parish's Youtube channel	7	17
5	Broadcasting masses on the parish's social media profile	6	13
6	Administrative matters at the chancery could be handled online	18	8
7	Deposit offerings online (ordering masses)	21	6
8	Possibility for the faithful to deposit their offerings into the deposit machine located in the church	1	2
9	Online meetings of the priest with the parish group	1	15
10	Organising parish retreats in an online form	4	8
11	Broadcasts of masses on neighbourhood cable TV	-	1

Source: own research.

The survey also included a question on the likelihood of parishes retaining modern tools for maintaining relations with the faithful after the COVID-19 pandemic. Priests most often indicated in this area the parish website (56 responses „definitely yes”), which shows that

this tool can be counted among the standards for communication with the faithful. In second place, but with significantly lower response rate was the parish's profile on the social networking site (23 responses „definitely yes”, 4 indications „rather yes”). Among the tools which maintenance in post-pandemic parishes can be assessed as relatively high were also the possibility to make online donations both for masses and for the maintenance of the parish (a total of 22 responses „definitely yes” and „rather yes”), as well as the possibility to deal online with various types of issues at the parish office (a total of 19 responses „definitely yes” and „rather yes”). Interestingly, priests were relatively cautious about maintaining online broadcasts of Mass. On the one hand, there were few responses to the question about such possibilities. On the other hand, among the 15 priests who commented on the possibility of maintaining Mass broadcasts in the parish social network profile, 7 indicated that such a probability was rather or definitely low. As for broadcasts of Mass on Youtube, out of 22 responses, 14 priests assessed that „rather” or „definitely” such an option could be maintained.

Table 3. Likelihood of parishes retaining specific tools for maintaining relationships with the faithful after the COVID-19 pandemic

Tool	Likelihood of retaining specific tools for maintaining relationships with the faithful after the COVID-19 pandemic					Total
	definitely yes	rather yes	hard to say	rather no	definitely no	
Parish website	56	2	0	0	0	58
Parish social media profile	23	4	1	1	0	29
Private profiles of priests on social media	9	5	0	2	0	16
Broadcasting Mass on the parish's Youtube channel	8	6	3	3	2	22
Broadcasting masses on the parish's social media profile	4	4	0	5	2	15
Administrative matters at the chancery could be handled online	8	11	1	3	1	24

Table 3 (cont.). Likelihood of parishes retaining specific tools for maintaining relationships with the faithful after the COVID-19 pandemic

Tool	Likelihood of retaining specific tools for maintaining relationships with the faithful after the COVID-19 pandemic					Total
	definitely yes	rather yes	hard to say	rather no	definitely no	
Deposit offerings online (ordering masses)	10	12	3	1	0	26
Possibility for the faithful to deposit their offerings into the deposit machine located in the church	0	1	1	0	1	3
Online meetings of the priest with the parish group	1	2	3	3	4	13
Organizing parish retreats in an online form	2	4	1	3	1	11

Source: own research.

Participating priests in the survey were also asked whether there were any tools for maintaining relationships with the faithful during the COVID-19 pandemic that parishes wanted to activate, but for some reason were unable to do so. Only some of the respondents answered this question. However, the responses show that the range of communication tools used during the pandemic was considered sufficient by priests. The largest group of respondents (24 responses) felt that there were no tools that were desired, but it was not possible to put them into operation. In the rest of the responses, there were such situations, but not many. In several parishes (3 responses each), despite the desire, it was not possible to launch what was generally referred to as online broadcasting of Mass and other services, or what was explicitly called online broadcasting of Mass on Youtube. In two cases, such a situation involved the broadcast of Mass on the parish's profile on a social networking site. Also in two parishes, the desired tool for maintaining relations with the faithful was local radio. In individual cases, there were indications of various tools that could have had an impact on relations with the faithful, but these did not come to fruition. On the one hand was the possibility of organising retreats in an online format, as well as handling administrative matters at the parish office in an online version. On the other hand, it was



about solutions that would affect the practical functioning of the parish: the placement of a deposit machine in the church that would allow the faithful to make donations, as well as the ability to make offerings or order Masses via the Internet. In one case, the idea was to create a parish profile on a social networking site.

Table 4. Tools for maintaining relationships with the faithful, which during the COVID-19 pandemic the surveyed priests would have liked to launch in their parishes, but for some reason this was not possible

No.	Tool	Number of responses
1	No	24
2	Broadcasting of masses, services	3
3	Broadcasting Mass on the parish's Youtube channel	3
4	Broadcasting masses on the parish's social media profile	2
5	Radio (internet/traditional)	2
6	Possibility for the faithful to deposit their offerings into the deposit machine located in the church	1
7	Deposit offerings online (ordering masses)	1
8	Parish social media profile	1
9	Organising parish retreats in an online form	1
10	Administrative matters at the chancery could be handled online	1

Source: own research.

Table 5. Barriers that cause priests to be unable to launch the indicated tools in the parish

Barriers that cause priests to be unable to launch the indicated tools in the parish	Presence of barrier:					Total
	definitely yes	rather yes	hard to say	rather no	definitely no	
Lack of money	10	5	8	8	1	32
Lack of qualified people to handle	10	11	3	3	3	30
Insufficient equipment and technology	10	11	3	4	3	31
Lack of interest from parishioners	4	9	9	7	0	29
Inability to make an independent decision on the use of a particular tool	1	0	0	0	0	1
Legal regulations	1	0	0	0	0	1

Source: own research.

If the study indicated that during the COVID-19 pandemic there was, admittedly, a small group of tools for maintaining relationships with the faithful that priests would have liked to activate, but for some reason did not, it seems important to know the obstacles that hindered such actions. Priests participating in the survey identified three main obstacles. At the same level, it was both the lack of qualified people to operate the new tools, as well as insufficient parish equipment and technology (10 responses „definitely yes” and 11

responses „rather yes” each). Such results indicate the importance and need for training in some parishes to professionalise activities in the communications area. The third main barrier to the development of new information policy tools was the lack of money. Economic aspects were indicated as a barrier by 15 priests (10 „definitely yes”, 5 „rather yes”).

## 5. CONCLUSION

In conclusion, several points are worth noting. When evaluating the results, it is important to take into account the number of respondents who took part in the survey. Despite the limited number of respondents, it can be said that the survey provided a basis for confirming the general research assumption that the COVID-19 pandemic provided the impetus for expanding the catalogue of communication tools used by parishes. The research showed that parishes are increasingly using tools from the area of new technologies in their communication activities. Restrictions on direct contact with the faithful, which was one of the consequences of the pandemic, led to the development of various tools to maintain relations with parishioners. These involved two areas. The first involved activating tools that gave the faithful a chance to attend Mass, other services, and meetings of a religious nature. The second area, of lesser importance, concerned the development of tools that allowed parishioners to handle online matters at parish offices during the pandemics, or allowed online donations for parish needs, which had an impact on parish operations.

Finally, it should be noted that the study was conducted in a diocese with some of the highest rates of religious commitment among the faithful in Poland. The Catholic Church plays an important role there. It would be worthwhile to confront the results from the Rzeszow diocese with dioceses that are more strongly secularised and residents' ties to the Church more loose. This would provide an answer to the question of whether the level of religious commitment of the faithful had an impact on the inventiveness and involvement of priests in communication activities and nurturing relationships with the faithful. This opens the field for further research in this area.

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## TRANSFER MARKET IN FOOTBALL: ANALYZING THE TOP 100 MOST EXPENSIVE PLAYERS

Football is a massive business that has a global impact and involves significant financial transactions. The economic aspects related to player transfers have garnered substantial attention from scholars, analysts, and fans alike due to the substantial amounts of money involved in these transactions. The primary objective of this article is to expound upon the influential factors within the football transfer market, focusing on the top 100 most expensive players. Through the analysis of player positions, age, nationalities, leagues, and the clubs involved in these transfers, this study aims to highlight the significant factors that contribute to the valuation process and the overall dynamics of the market. The study highlights the significance of offensive players, as well as young players up to 25 years of age, who demonstrate a higher representation among the top 100 players. The global nature of the sport is reflected in the nationally diverse representation of players.

**Keywords:** football, transfer market, market value, sport finances, transfer fees.

### 1. INTRODUCTION

The transfer market in football plays a pivotal role in shaping the landscape of the sport, both on and off the field. With larger and larger sums being exchanged for the services of players (Fűrész, Rappai, 2020; Transfermarkt, 2023), it has become a fascinating subject of study for researchers, analysts, and enthusiasts alike (Franceschi et al., 2023). This article aims to delve into the intricacies of the transfer market, focusing specifically on the 100 most expensive players in the world. Football has witnessed an unprecedented surge in financial investments over the past decades, resulting in exponential growth in player transfer fees (Fűrész, Rappai, 2020). The escalating amounts involved in these transactions have raised questions about the factors influencing transfer valuations, the impact on club finances, and the broader implications for the sport as a whole (Poli et al., 2022). By focusing on the 100 most expensive players, this study aims to provide a comprehensive analysis of the trends, patterns, and dynamics within the transfer market. It examines the key variables that contribute to a player's valuation, such as age, nationality, position, and the financial status of the acquiring club. Understanding the mechanics of the transfer market is essential for football clubs, agents, and stakeholders seeking to optimize their investments, maximize their revenues, and improve their sporting performance.

Football is a thriving part of a global sports industry with large financial stakes (Deloitte, 2023; Kutwa, Rafał, 2019). In the past two decades, also significant structural

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changes have occurred in the landscape of club ownership, financial incentives, and objectives (Pastore, 2018). Notably, there has been a notable influx of private investors into the top clubs of Europe (Rohde, Breuer, 2016). The economic dynamics surrounding player transfers are multifaceted (Fűrész, Rappai, 2020). Notably, the transfer fee exchanged between the buying and selling clubs stands out as a prominent economic factor, representing a substantial financial transaction. This fee is influenced by several variables, including the player's age, performance, potential, and the financial prowess of the acquiring club (Franceschi et al., 2023; Metelski, 2021a). The players commanding the highest transfer fees in the world distinguish themselves through exceptional skills, talent, and on-field performance. Their technical abilities, encompassing dribbling, passing, and shooting prowess, along with physical attributes like speed, strength, and agility, set them apart. Furthermore, players commanding high transfer fees typically boast a proven track record of success at the highest echelons of competition, such as the Champions League or World Cup.

Furthermore, player transfers have far-reaching implications for the economic performance of both clubs involved. High-profile signings can bolster revenue streams through increased ticket sales, merchandise purchases, and heightened media exposure, like for example recent transfers of Messi and Ronaldo (Doyle, 2019; Norton, 2021). Beyond their on-field prowess, top players often possess significant off-field appeal, including a substantial social media following, role model status, or an established personal brand (Leszczyński et al., 2022; Leszczyński, Metelski, 2021). Conversely, the selling club may experience a decline in revenue following the departure of a star player, but they can still benefit from the windfall generated by the transfer fee. In conclusion, player transfers in football are a testament to their exceptional skills, marketability, and established track record of success.

## 2. THEORETICAL FRAMEWORK OF THE RESEARCH

The valuation of football players holds significant importance for all stakeholders involved in professional football clubs, including clubs themselves, players, and intermediaries. Properly assessing the value of players is essential for efficient engagement in the transfer market, where players are the primary assets. The significance of player valuation has grown parallel to the expansion of the transfer market, spurred by the Bosman ruling by the Court of Justice of the European Union in 1995 (Franceschi et al., 2023). This ruling granted players freedom of movement upon the expiration of their fixed-term contracts, relieving them of obligations towards their clubs. Combined with the liberalization of broadcasting markets in various countries, which injected substantial funds into the system, it resulted in an increased number of players under contract being transferred, leading to the payment of fees by buying clubs to compensate former employers.

In 2002, an agreement was reached between the European Commission and FIFA, the governing body of football worldwide, to establish regulations governing the labor market of European football players (European Commission, 2002). Known as the “transfer system”, this regulation binds a player to their temporary employment contract with a club, unless a rival club or the player themselves pays a release clause, often exceeding the economic value of the remaining contract term. To justify the system, two arguments have been put forth (Hoey et al., 2021). The first argument emphasizes the need for transfer fees to compensate clubs for training and nurturing young talent. Without the system, clubs would lack incentives to invest in the education and discovery of young players, as they

would not fully benefit from their efforts. The second argument suggests that the transfer system helps address economic disparities among European football clubs, contributing to a more competitive and engaging on-field environment. If players predominantly transfer from financially weaker clubs to wealthier ones, the monetary flows resulting from these transactions could benefit smaller clubs, mitigating revenue inequality. However, it is important to note that while this redistribution of revenues occurs, there is also a simultaneous redistribution of talented players in the opposite direction (Hoey et al., 2021).

In contrast to the United States, where professional athletes are often traded for other athletes or future draft picks, European football players are typically traded for cash settlements known as transfer fees (Frick, 2007). Player transfers have a significant impact on a club's success, prompting researchers from various disciplines to study the factors influencing transfer fees (Pawlowski et al., 2010). There are a few common indicators of market value, that can be grouped into three categories: player characteristics, player performance, and player popularity (Müller et al., 2017). Age is a significant indicator, reflecting experience and potential (Carmichael, Thomas, 1993), with studies incorporating quadratic age terms to capture non-linear relationships. Generally, players' values increase until their mid-twenties and decline thereafter. The player's position (goalkeeper, defender, midfielder, or forward) also influences market value, as it reflects their specialization and drawing power (Metelski, 2021a). In summary age and position are among the key indicators impacting market value, highlighting the importance of experience, potential, and specialization in player valuation.

Nonetheless, acquiring a player entails a risky investment with uncertain outcomes. The productivity of a player is prone to fluctuation over time and is influenced by various factors, including the team's overall quality and the strength of their opponents. Additionally, the relationship between sporting success and financial returns is complex, subject to variables such as the economic climate, the performance of the national team, and the popularity of other sports. It is commonly held that there exists a strong positive correlation between football salaries, transfer fees, and player productivity, as supported by Ruijg and van Ophem (2015).

Recently, particular attention has been given to players' market values, which estimate the amount for which a player's contract can be sold to another team (Müller et al., 2017). While transfer fees represent actual market prices, market values play a crucial role in transfer negotiations. Traditionally, football experts and crowdsourcing websites like Transfermarkt publish estimated market values. Transfermarkt employs crowdsourcing to estimate market values, utilizing a selective approach called the "judge principle" to address challenges associated with social influence, manipulation attempts, and lack of experience and knowledge. Despite these challenges, Transfermarkt has achieved remarkable accuracy in estimating market values (Franceschi et al., 2023).

Transfer fees are determined through negotiations conducted by market participants, often spanning several weeks or even months. These negotiations involve representatives from both the purchasing and selling teams, usually including club owners, CEOs, sports directors, and football intermediaries, commonly known as football agents (Poli et al., 2022). Football agents may represent both the player and the clubs involved and may be entitled to a portion of the negotiated transfer fee when representing the clubs. The expiration date of a player's contract has also emerged as a crucial factor in determining the transfer fee, particularly for players within 12 months of becoming free agents (Poli et al., 2022). It is important to note that transfer fees are only applicable to players with valid contracts, serving as compensation for the breach of the contract.

### 3. RESEACH METHODOLOGY

Data on the transfer fees of players was collected from the Transfermarkt portal. Transfermarkt is a German based website that compiles football information, such as scores, results, statistics, transfer news, and fixtures. One of the features of Transfermarkt is its player valuation system, which estimates the market value of each player. The market value of a player is determined by a number of factors, including their age, position, playing statistics, contract status, and international experience. The market value of a player can fluctuate over time based on their performance, injuries, and other factors. However, Transfermarkt is a very useful tool for clubs, agents, and fans to get an idea of the approximate value of a player in the transfer market.

The following 4 hypotheses were formulated for the study: 1) Among the top 100 most expensive players, there is a higher proportion of players occupying offensive positions on the field; 2) Young football players are more valuable in the transfer market; 3) Among the top 100 most expensive players, the majority represent Europe; 4) Among the top 100 most expensive players, the majority were transferred to the English Premier League. The study employed descriptive statistics and conducted statistical tests, including the Chi-square test and the Pearson correlation coefficient ( $r$ ). Data analysis for the quantitative variables was performed using both Microsoft Excel and IBM SPSS Statistics 27.

### 4. RESULTS

The table below presents the top 10 most expensive football players in the history of the sport. Transfer records continue to be broken, and paying 100 million EUR for a top player no longer shocks anyone. Interestingly, the two most expensive transfers were conducted by a single club – Paris Saint Germain.

Table 1. Top 10 most expensive players in football

No.	Name	Position	Born	Nationality	Club Buing	Value (m EUR)
1	Neymar	Midfielder	1992	Brazil	Paris Saint-Germain	222.0
2	Kylian Mbappé	Forward	1998	France / Cameroon	Paris Saint-Germain	180.0
3	Ousmane Dembélé	Midfielder	1997	France	FC Barcelona	140.0
4	Philippe Coutinho	Midfielder	1992	Brazil / Portugal	FC Barcelona	135.0
5	João Félix	Forward	1999	Portugal	Atlético de Madrid	127.2
6	Enzo Fernández	Midfielder	2001	Argentina	Chelsea FC	121.0
7	Antoine Griezmann	Forward	1991	France	FC Barcelona	120.0
8	Jack Grealish	Midfielder	1995	England / Ireland	Manchester City	117.5
9	Cristiano Ronaldo	Forward	1985	Portugal	Juventus FC	117.0
10	Eden Hazard	Midfielder	1991	Belgium	Real Madrid	115.0

Source: own elaboration.



Analyzing the data on the most expensive football players, several key observations can be made. Neymar stands out as the most expensive player in the world, surpassing the competition by a significant transfer fee. It is worth noting that the majority of players in the top ten are midfielders and forwards, highlighting their importance of attracting in football. The presence of various nationalities in the top ten illustrates the global nature of football and the diversity of talent in the transfer market. These data also demonstrate that transfer values not only reflect players' skills but also reveal trends and preferences among clubs on the international stage.

**Hypothesis 1)** Among the top 100 most expensive players, there is a higher proportion of players occupying offensive positions on the field

Football players can be categorized into four main positions on the field: 1) goalkeeper – this position is responsible for defending the goal and preventing the opposing team from scoring; 2) defenders – are tasked with protecting the goal and stopping the opposing team's attacks, they include center-backs, full-backs, and wing-backs; 3) midfielders – operate in the central area of the field and play a crucial role in both defense and offense, they can be further classified as defensive midfielders, central midfielders, attacking midfielders, or wide midfielders; 4) forwards – also known as strikers, are primarily responsible for scoring goals, they lead the team's attacking line and aim to breach the opposition's defense. It was assumed that since scoring goals is crucial in football, the top 100 most valuable players would predominantly consist of offensive players. In football, the game is played with 11 players on one team, and the most popular formation is 1-4-4-2. In this formation, there is 1 goalkeeper, 4 defenders, 4 midfielders, and 2 forwards on the field.

Table 2. Top 100 players divided by their position on the field

Position	Average value (m EUR)	No. of players	Standard deviation
Goalkeeper	65.13	3	13.74
Defender	63.04	22	13.17
Midfielder	81.08	34	35.58
Forward	71.78	41	26.49

Source: own elaboration.

In analyzing the data presented in the above table, which divides the top 100 players by position, several observations can be made. On average, midfielders have the highest value among the positions, with an average transfer value of 81.08 million euros and a relatively high standard deviation of 35.58 million euros, indicating a wide range of values within this position. Forward players follow closely behind, with an average value of 71.78 million euros. Goalkeepers have an average value of 65.13 million euros, while defenders have the lowest average value at 63.04 million euros. It is noteworthy that the number of players varies significantly across positions, with the highest representation in forward (41 players) position. These findings suggest that forwards are generally considered more valuable in the transfer market, as evidenced by their larger representation among the top 100 players. Furthermore, the obtained chi-square statistic value was found to be statistically significant:  $\chi^2(3, N = 100) = 11.60; p < 0.01$ . There is a higher representation of forwards among the players than would be expected from a random frequency distribution (1-4-4-2).

**Hypothesis 2)** Young football players are more valuable in the transfer market

The data indicates that players aged 20 commanded the highest average transfer fee of 107.45 million euros. Conversely, players aged 30 had the lowest average fee at 61.62 million euros. Out of the top 100 most expensive football transfers, 92 players were sold up to the age of 28, inclusive, while only 1 player was sold after the age of 30. The average age of players in the top 100 is 24.62 years, with a median age of 24.00. These findings highlight the varying valuations of players at different stages of their careers, with younger players often attracting higher fees, potentially due to their potential and longer potential career spans. The detailed distribution of results is presented in the table below.

Table 3. The age of the top 100 most expensive players during transfers

Player age at transfer	Number of players	Average fee (m EUR)	Standard deviation
20	6	107.45	50.04
21	5	68.54	14.05
22	13	75.20	18.94
23	14	69.57	13.78
24	14	65.03	15.66
25	11	69.95	50.90
26	11	75.04	27.54
27	12	59.66	12.90
28	6	87.82	31.60
29	3	77.10	13.04
30	4	61.62	6.36
33	1	117.00	-

Source: own elaboration.

The r-Pearson correlation coefficient between the player's value and its age was calculated:  $r = -0.66$ ;  $p < 0.01$ . The correlation turned out to be statistically significant. There is a strong negative relationship between both variables. High values of one variable are accompanied by low values of the other: the greater the value of the player, the lower his age. It is worth to add that professional athletes at the highest level tend to conclude their sports careers at around the age of 35, while commencing them at approximately 18 years of age (Metelski, 2021b). The younger the player, the more years of playing they have ahead of them, which undoubtedly affects their higher value in the transfer market.

**Hypothesis 3)** Among the top 100 most expensive players, the majority represent Europe

Football players originate from various continents. The main continents from which top football players come are Europe, South America, and Africa. Europe is known for its strong football leagues and rich traditions. South America, particularly Brazil and Argentina, produces notable talents and has a storied history in the sport. North and Central America, including countries like the United States and Mexico, are developing football leagues with an increasing number of talented players. African players are gaining international recognition and represent diverse countries on the global stage. The table below presents the 10 most prevalent nationalities among the top 100 most expensive players.

Table 4. Nationality of the top 100 most expensive players

No.	Nationality	Number of players	Average fee (m EUR)	Standard deviation
1	Brazil	16	76.29	44.47
2	France	15	84.36	37.31
3	England	10	67.42	22.21
4	Spain	9	63.09	9.18
5	Argentina	7	71.46	26.28
6	Portugal	7	79.11	30.21
7	Belgium	4	87.62	32.76
8	Germany	4	58.00	14.90
9	Netherlands	3	85.40	0.65
10	Uruguay	3	75.40	9.48

Source: own elaboration.

The data reveals that Brazilian players are the most prevalent in this elite group, with 16 representatives. They also have a relatively high average transfer fee of 76.29 million euros. France closely follows with 15 players, commanding a slightly higher average fee of 84.36 million euros. English players are also well-represented with 10 players, having an average fee of 67.42 million euros. Spain, Argentina, and Portugal each have a notable presence with 9, 7, and 7 players, respectively, showcasing the talent from these nations. It is interesting to note that Belgium, Germany, the Netherlands, and Uruguay also have multiple representatives in the top 100, with varying average fees and standard deviations. These findings highlight the international diversity within the elite group of expensive players and the varying valuations placed on players from different nationalities. It was also decided to aggregate nationalities to examine the representation of players from different continents, and the results are presented in the table below.

Table 5. From which continents do the 100 most expensive football players come

Continent	Number of players	Average fee (m EUR)	Standard deviation
Europe	63	73.56	26.06
South America	28	73.90	35.93
Africa	8	64.32	10.79
North America	1	64.00	-

Source: own elaboration.

The majority of players, 63 in total, come from Europe. These European players have an average transfer fee of 73.56 million euros. South America is the second most represented continent, with 28 players, and they have a slightly higher average fee of 73.90 million euros. Eight players from Africa are among the top 100, commanding an average fee of 64.32 million euros and exhibiting a relatively low standard deviation of 10.79 million euros. Only one player from North America is featured in the top 100, with a transfer fee of 64.00 million euros. Football is played all around the world, and Brazilians (e.g., Pele) and Argentinians (e.g., Maradona and Messi) are often considered the best players in the world. In light of this, it was decided to compare the distribution of the top 100 players by dividing them into European players and the rest of the world. The chi-

square statistic value was found to be statistically significant:  $\chi^2(1, N = 100) = 6.76$ ;  $p < 0.01$ . There is a higher proportion of players representing Europe than would be expected from a random frequency distribution between Europe and rest of the world (50:50). These statistics demonstrate the dominance of European players in terms of quantity. Despite football being played worldwide, players from Europe achieve the highest value.

**Hypothesis 4)** Among the top 100 most expensive players, the majority were transferred to the English Premier League

The below table showcases the clubs that have made the most purchases from the top 100 most expensive players. Manchester City leads the pack with 15 players, highlighting their ambition and financial strength in the transfer market. The average fee for Manchester City's acquisitions is 64.89 million euros. Chelsea FC closely follows with 13 players, commanding a slightly higher average fee of 73.72 million euros. Manchester United also makes a strong showing with 11 players, having an average fee of 73.83 million euros. FC Barcelona and Real Madrid, both from Spain, have purchased 10 players each, with average fees of 85.52 million euros and 73.65 million euros, respectively. Arsenal FC, Juventus FC, Liverpool FC, and Paris Saint-Germain each feature in the list with six players, with varying average fees and standard deviations. These statistics underline the financial prowess and ambition of these clubs in assembling highly valued squads from the top echelons of football talent.

Table 6. The clubs that have purchased the top 100 most expensive players

No.	Club	Country	No. of players	Average fee (m EUR)	Standard deviation
1	Manchester City	England	15	64.89	16.75
2	Chelsea FC	England	13	73.72	21.67
3	Manchester United	England	11	73.83	16.98
4	FC Barcelona	Spain	10	85.52	34.12
5	Real Madrid	Spain	10	73.65	21.28
6	Arsenal FC	England	7	57.79	11.26
7	Juventus FC	Italy	6	83.83	20.80
8	Liverpool FC	England	6	63.45	16.10
9	Paris Saint-Germain	France	6	105.67	75.40

Source: own elaboration.

The so-called Big 5 leagues in Europe refer to the top five professional football leagues known for their competitiveness, popularity, and overall quality of play. These leagues include the English Premier League, the Spanish La Liga, the German Bundesliga, the Italian Serie A, and the French Ligue 1. These leagues are considered the elite due to several factors, including the financial strength of clubs, the presence of renowned teams with rich histories, the ability to attract top players from around the world, and the high level of competition displayed on the pitch. The big five leagues also boast a large fanbase, extensive media coverage, and lucrative television deals, further cementing their status as the most prominent and influential football leagues in Europe. When we look at the most

popular football clubs in the world, which are those with the largest fan bases, Spanish club Real Madrid takes the first place, followed by FC Barcelona, also from Spain. It's not until the third position that we find a representative from the English Premier League, Manchester United. In addition to the English clubs, the top 10 also includes Paris Saint-Germain from France, Juventus FC from Italy, and Bayern Munich from Germany (Chaudhary, 2020). In the study, it was decided to examine the leagues to which the most expensive players were transferred, and a summary of the results is presented in the table below.

Table 7. The leagues to which the top 100 most expensive players were purchased

League	UEFA ranking	No. of players	Average fee (m EUR)	Standard deviation
English Premier League	1	57	66.96	17.48
Spanish La Liga	2	23	80.47	28.56
Italian Serie A	4	9	75.87	21.46
French Ligue 1	5	6	105.67	75.40
Chinese Super League	-	3	55.27	5.02
German Bundesliga	3	2	66.00	19.80

Source: own elaboration.

The English Premier League leads the way with 57 players, showcasing its financial strength and attractiveness to top talent. These figures reveal the financial power and global appeal of the English Premier League. The study aimed to investigate whether the English Premier League conducts the highest number of valuable transfers, and it has been found that it indeed does. The obtained chi-square statistic value was found to be statistically significant:  $\chi^2(4, N = 97) = 103.98; p < 0.001$ . There is a higher proportion of players transferred to the English Premier League than would be expected from a random frequency distribution among Big5 leagues. So, in reality, we shouldn't really talk about the Big 5 leagues in football. At most, we can refer to the Premier League as the equivalent of the NBA in football, and perhaps mention the Big 4 as the second tier of top leagues.

## 5. DISCUSSION

The analysis of the transfer market based on the 100 most expensive players has provided valuable insights into the intricate workings of the football industry. Throughout this study, we have explored various factors that contribute to the valuation of players, including age, nationality, position, and the financial status of clubs (strength of the league). By examining these variables, we have gained a deeper understanding of the trends and patterns within the transfer market. The findings of this research emphasize the increasing commercialization of football, as evidenced by the large sums involved in player transfers. The transfer market has become a crucial avenue for clubs to strengthen their squads and compete at the highest level. The insights gained from analyzing the transfer market can inform the decision-making processes of football clubs, agents, and other stakeholders involved in player acquisitions. By understanding the factors that contribute to a player's valuation, clubs can make more informed investments, mitigate financial risks, and improve their overall sporting performance. The transfer market is a dynamic and ever-evolving landscape, influenced by various factors such as changes in regulations,

player development methodologies, and global economic trends. Continued research in this area will be crucial in understanding the evolving dynamics and identifying potential strategies for enhancing transparency, fairness, and sustainability within the transfer market.

In conclusion, the transfer market based on the 100 most expensive players offers a lens through which to study the world of football. It serves as a microcosm of the broader industry, reflecting its complexities, challenges, and opportunities. The analysis of player transfer data reveals several noteworthy trends in football. Firstly, the substantial transfer fees paid for the top 100 players highlight the growing commercialization of the sport and the financial power of clubs. These investments underscore the intense competition in the transfer market as clubs aim to secure top talent to enhance their performance. The following hypotheses were formulated for the study: 1) Among the top 100 most expensive players, there is a higher proportion of players occupying offensive positions on the field; 2) Young football players are more valuable in the transfer market; 3) Among the top 100 most expensive players, the majority represent Europe; 4) Among the top 100 most expensive players, the majority were transferred to the English Premier League.

The first hypothesis has been confirmed, as there is a higher representation of forwards among the players than would be expected from a random frequency distribution. The second hypothesis has also been confirmed, as young players achieve higher values. The third hypothesis has also been confirmed, as in the top 100, a whopping 63 players represent Europe. But overall, the representation of players from various nationalities and continents reflects the global nature of football, fostering cultural exchanges and uniting fans worldwide. Furthermore, the findings of this study confirm the fourth hypothesis, revealing a notable trend where a significant number of players (57 out of the top 100) have been transferred to a single league, namely the English Premier League. However, it also highlights the financial disparities between leagues and clubs, with a few wealthy teams dominating player acquisitions. This raises questions about competitive balance and the potential implications for domestic and international competitions. The data invites discussions on the commercialization of the sport, financial inequalities, and the need for regulations to ensure fairness and sustainability in the transfer market. Striking a balance between financial power and competitive parity will be crucial for the future of football. Overall, the analysis underscores the dynamic and complex nature of the transfer market, highlighting both the opportunities and challenges faced by football stakeholders.

## 6. CONCLUSION

Throughout this study, an examination of various factors that contribute to player valuation has been conducted, including age, nationality, position, and the financial status of clubs (reflected also in the strength of the league). By analyzing these variables, a deeper understanding of the trends and patterns within the transfer market has been achieved. First and foremost, the significant transfer fees paid for the top 100 players underscore the increasing commercialization of the sport and the financial might of clubs. Furthermore, the forward players were more frequently represented in the top 100, emphasizing the importance placed on attacking prowess play in modern football. The preference for younger players indicates clubs' willingness to invest in potential and long-term success. The representation of players from diverse nationalities and continents reflects the global nature of football, fostering cultural exchanges and uniting fans worldwide (however, players from Europe continue to dominate). The study also brings attention to the financial

disparities that exist between leagues and clubs, with a select few affluent teams dominating player acquisitions. This raises concerns about competitive balance and potential implications for both domestic and international competitions. The conclusions should prompt discussions on the commercialization of the sport, financial inequalities, and the necessity for regulations to ensure fairness and sustainability in the transfer market. Overall, the article highlights the dynamic and intricate nature of the transfer market, presenting opportunities and challenges for all stakeholders involved in football.

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## **ABOUT THE ATTRACTIVENESS OF THE PLACE OF RESIDENCE: THE CASE OF RZESZÓW**

The phenomenon called “return to the city” has intensified in Rzeszów. After a clear decline in the number of inhabitants at the beginning of the present century, for several years there has been a steady increase in population, which is not related to incorporating more towns into the city. The paper presents the analysis of data collected during the study carried out in the city. Residents of the city declared satisfaction with their place of residence. The main reasons for satisfaction were the cleanliness of the city, aesthetics, work, noticeable city development, developed infrastructure, and a high level of security and peace.

**Keywords:** Rzeszów, development, attractiveness, place of residence, urban sociology, city.

### **1. INTRODUCTION**

The development and recession of cities depend on the processes of urbanization. Urbanization has many terms in the literature on the subject. However, several basic meanings of this term can be distinguished, which appear in most works devoted to theoretical issues of urbanization. The concept of urbanization is defined as three types of processes:

1. diffusion – the spread of urban values to rural areas,
2. movement of people from rural areas to cities,
3. changes in behavior patterns in such a way that they are consistent with the patterns characteristic of city dwellers (Węgleński, 1983).

Changes in space as a result of the impact and changes in society as a result of the space it has processed are the most general processes that can be described as urbanization. These transformations are simultaneously progressing towards an ever greater complexity of relations between society and space and an ever greater degree of organization. In other words, urbanized areas are densely populated, densely built-up areas, in which there is both an intense impact of society on space and the reverse impact of this space on society. M. Malikowski defines urbanization as a set of processes of spatial concentration of people and centralization of activities as well as the accompanying processes of intensive transformation of space, as a result of which spatial units (systems) of extended reproduction of social life arise or develop (Malikowski, 1992).

It is assumed that the processes of urbanization take place in the following order: 1st phase of urbanization, 2nd phase of suburbanization and 3rd phase of deurbanization. Some

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authors add one more phase-re-urbanization. According to L. Klassen 's concept of the urban life cycle, the development of cities consists of the following phases: urbanization, suburbanization, deurbanization and relative re-urbanization (Jałowicki, Szczepański, 2006). The urbanization phase is the concentration of the population in cities. It is the result of the industrial revolution. Its characteristic feature is population growth in the center and surrounding neighborhoods, and a rapid decline in population on the outskirts of the city. The spatial development of the city takes place at the stage of suburbanization. There is a decrease in the population in the city center and an increase in the suburban area. At the stage of deurbanization, the spatial structure of the population reaches a state in which the number of inhabitants of central districts decreases to such an extent that the total population of the entire urban region decreases. The central city and its suburbs are declining, while the number of inhabitants continues to increase in the areas around the functional urban region. The activities of the authorities aimed at reviving and reconstructing the central areas of the city are defined as the reurbanization phase (Słodczyk, 2003). The reasons for re-urbanization are sought in:

1. Economic changes leading to industrial restructuring. Production is replaced by services.
2. Household demographic changes. One-person households, childless married couples and households of older people constitute an increasing percentage.
3. Changing assumptions of urban spatial policy aimed at saving space and planning local economic development (Lever, 1993).

The presented concepts assume that the last phase of urban development is characterized by a re-flourishing of the central city. At the turn of the century, a change in development trends was observed in the areas of most metropolises. Despite the constant predominance of urban decentralization processes, it has been noticed that the number of inhabitants of the centers is gradually increasing. In the 1990s, 75% of US metropolises experienced population growth in city centers. The reasons for this were two reasons: demographic trends (an increase in the number of small households, whose representatives prefer living in the city center) and the objective advantages of city centers (proximity to work, culture, entertainment). These processes were explained by the reversal of the previous trends. There has been an intensification of the phenomenon known as "return to the city" (Lee, Leigh, 2005).

Scientists name three reasons for "going back to the city":

1. Improvement of housing conditions in cities.
2. The intensification of negative factors accompanying the phenomenon of urban sprawl. These include the increase in car traffic and air pollution in suburban settlements.
3. Demographic changes (change in the structure of households) and cultural changes in society (perception of the city center as a more attractive place to live) (Lee, Leigh, 2005).

"Return to the city" was to a large extent caused by the actions of municipal authorities aimed at revitalizing city centers and by the intensification of gentrification processes. The term "gentrification" is derived from American sociology and partially corresponds to the term revitalization. It involves people with a higher material and social status settling in poorer neighborhoods, usually located in city centers, which in turn leads to people with lower status leaving these places (Majer, 2010).

There are three types of gentrification: economic, social and symbolic (cultural). Economic gentrification consists in increasing the attractiveness of a given place, e.g. by

placing an important investment in it or introducing greenery. Social gentrification is sometimes a derivative of economic gentrification and consists in changing the social composition of a given area. Symbolic gentrification consists in increasing the symbolic value of the estate (Karwińska, 2008).

Table 1. The change in the number of inhabitants of voivodship capital cities in 2016-2030, forecast by the Central Statistical Office

City	2016	2030	Change	Percent
Warsaw	1,753,977	1 843 946	+89 969	105.1
Cracow	765,320	779 104	+13 784	101.8
Łódź	696 503	620 704	-75 799	89.1
Wroclaw	637 683	649 093	+11 410	101.8
Poznan	540 372	503 768	-36 604	93.2
Gdansk	463 754	472 415	+8 661	101.9
Szczecin	404 878	386 720	-18 158	95.5
Bydgoszcz	353 938	324 648	-29 290	91.7
Lublin	340 466	322 618	-17 848	94.7
Katowice	298 111	263 423	-34 688	88.4
Białystok	296 628	293 079	-3 549	98.8
Toruń	202 521	193 028	-9 493	95.3
Kielce	197 704	181 239	-16 465	91.7
Rzeszów	187 422	200 815	+13 393	107.1
Olsztyn	172 993	169 063	-3 930	97.7
Zielona Góra	139 330	140 331	+1 001	100.7
Gorzów Wielkopolski	123 995	118 269	-5 726	95.4
Opole	118 722	111 232	-7,490	93.7

Source: Own calculations based on data from the Central Statistical Office (<http://stat.gov.pl/obszary-tematyczne/ludnosc/prognoza-ludnosci/prognoza-ludnosci-gminna-lata-2017-2030-opracowanie-eksperymentalne,10,1.html>).

The authorities of many Polish cities are taking actions aimed at revitalizing dilapidated housing estates. Despite these efforts, in most cases, instead of “returning to the city”, there is a further decline in the population of the central cities. The processes of suburbanization and deurbanization still dominate in the areas of the largest Polish cities. According to the forecast of the Central Statistical Office. By 2030, the number of inhabitants in most provincial cities will decline. The highest percentage of depopulation awaits Katowice (decrease by 11.6%), Łódź (10.9%) and Kielce (8.3%). Population growth is forecast only in the case of Warsaw, Cracow, Wroclaw, Gdansk, Zielona Góra and Rzeszów. It is worth noting that analysts predict a significant increase in population only in the case of Warsaw (5.1%) and Rzeszów (7.1%). The projected development of the largest Polish metropolis should come as no surprise. The largest percentage increase in the number of inhabitants of Rzeszów in the country is a big surprise.

In Rzeszów, after a significant loss of inhabitants at the beginning of the present century, a steady increase in the number of people has been observed for several years, which is not related to the incorporation of other towns into the city. The text presents an analysis of the data collected during the study “Rzeszowska Diagnoza Społeczna 2015”.

The survey was carried out in 2015 on a randomly selected sample of 800 inhabitants of Rzeszów. Among other things, the following issues were investigated: the quality of life of the city's inhabitants, satisfaction with living, time of living, the origin of the inhabitants, noticing changes in the city, and happiness. The aim of the article is to: determine where the real and forecast increase in the number of inhabitants of the city comes from and what factors influence the attractiveness of Rzeszów as a place of residence. It is also important to determine whether in this case it is really possible to talk about the phenomenon of returning to the city?

## 2. RZESZÓW AS A PLACE OF RESIDENCE

A strong indicator of the attractiveness of a place of residence is satisfaction with it. When asked about satisfaction, the vast majority of respondents answered “definitely satisfied” (46.3%) and “rather satisfied” (36%). When summed up, a very high (over 80%) level of satisfaction is obtained. There was no correlation between the level of satisfaction and the socio-demographic characteristics of the respondents. Only in the case of the variable age, there was a weak positive correlation ( $r = 0.13$ ).

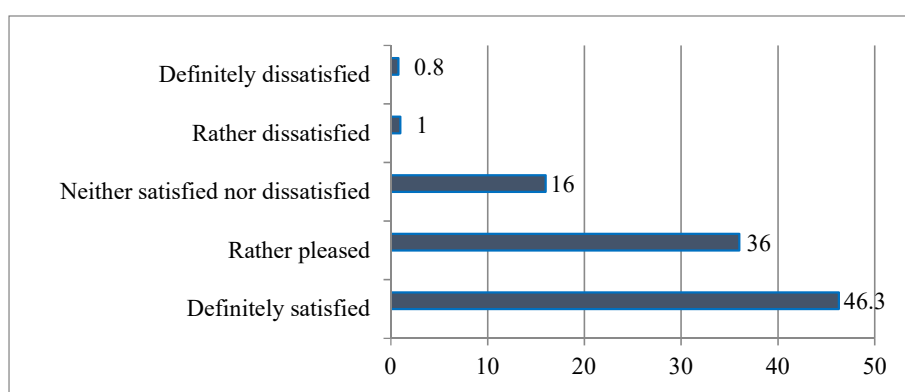


Chart 1. Please tell me if you are generally satisfied with the fact that you live in Rzeszów (in %)?

Source: Own calculations.

The reasons for the satisfaction of the inhabitants of Rzeszów indicated in the answer to the open question are very diverse. They have been categorized into several dozen categories (Kotarski, Malicki, Palak, Piróg, 2016). The most common reasons for satisfaction were the city's cleanliness and aesthetics. Another group of indications was related to the family, inhabitants and neighbors. An important reason for satisfaction was having a job, being close to the workplace and being easy to find. The development of the city as well as good infrastructure and security were also noticed. The actions of municipal authorities certainly contributed to the reasons for satisfaction. For many years, the priority of the authorities have been the issues mentioned in the first place by the respondents.

The inhabitants of Rzeszów noticed the changes taking place in the city. To the question: Has anything changed in the last five years in Rzeszów, the vast majority of respondents (68.9%) answered: “yes, there have been very big changes”. 20.6% of the respondents noticed slight changes and only less than 3% said that nothing had changed.

7.7% could not make an assessment. The assessment of the changes that took place depended on the declared financial situation of the respondents. People declaring a good and average situation more often indicated large and certain changes. On the other hand, the worse off did not notice any changes or claimed that nothing had changed. The age of the respondents also influenced the perception of changes. Older residents of the city noticed changes in Rzeszów more often than younger residents. Respondents aged up to 35 more often stated that nothing had changed and were not able to notice these changes (answer “I don't know” “hard to say”).

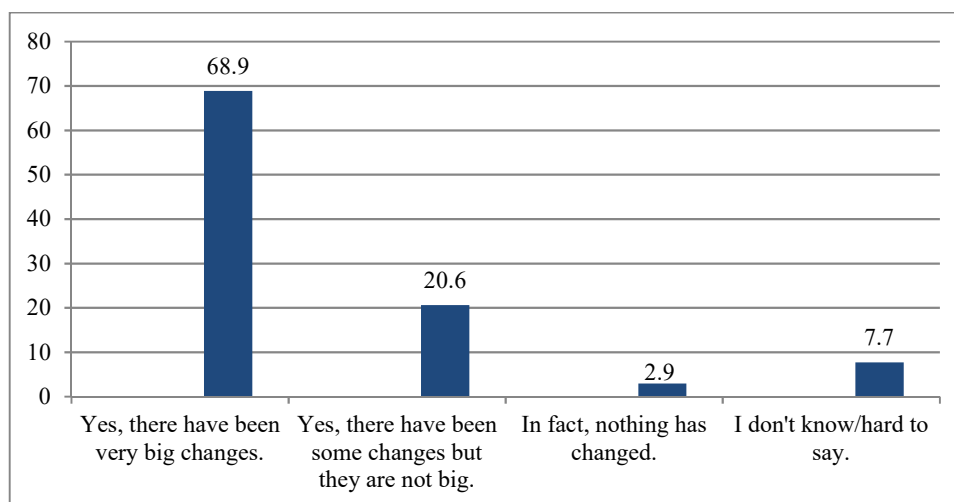


Chart 2. Has anything changed in Rzeszów in the last five years (in %)?

Source: Own calculations.

Opinions on the direction of the observed changes were definitely positive. Over 88% of residents claimed that the changes in the city were “definitely for the better” and “rather for the better”. Only about 10% of the respondents had a neutral opinion on this subject. People who assessed the changes negatively accounted for a negligible percentage. The socio-demographic characteristics of the respondents did not affect their responses.

The changes taking place in Rzeszów were noticed and well assessed by most of the respondents. First of all, the increase in the quality of life and the possibility of satisfying needs was appreciated. The inhabitants also had a positive attitude to the quality of communal services, city management and the functioning of offices. Most of the negative opinions were related to material matters.

The quality of life in the city affects the attractiveness of the place of residence. The quality of life was measured using 7 features. The respondents had the opportunity to assess the aesthetics, greenery, quality of streets and sidewalks, safety, functioning of offices, wealth and the possibility of finding a job. All features measured on the scale from -2 to 2 obtained values higher than 0. This indicates a positive assessment of the quality of life in Rzeszów.

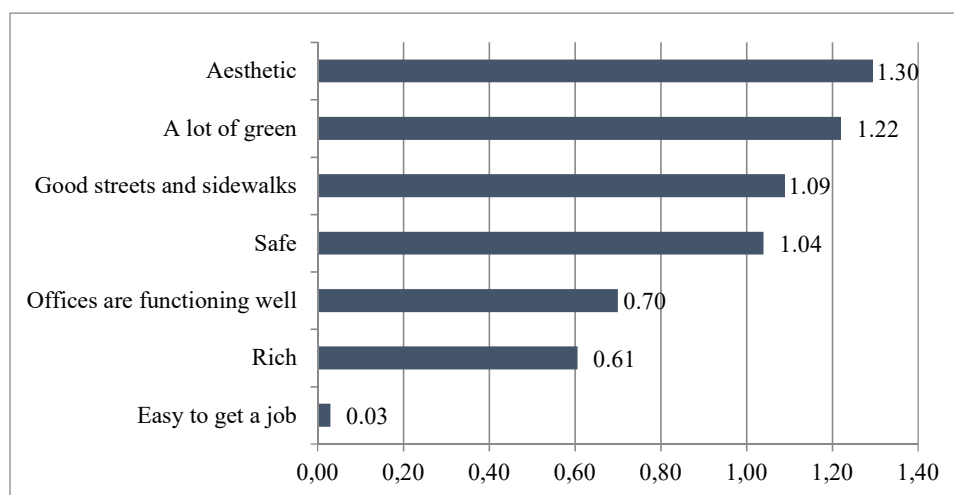


Chart 3. Assessment of the features that make up the quality of life (mean - range -2 to 2)

Source: Own calculations.

Aesthetics (1.30) and greenery in the city (1.22) were rated the highest. The quality of streets and pavements was next (1.09). Safety received a good score (1.04). The functioning of offices has a lower average (0.7). Wealth (0.61) and the possibility of finding a job (0.03) were definitely the lowest. The quality of the city consists of two groups of features. The first, better assessed, is related to the broadly understood aesthetics, quality of infrastructure and safety. The second, less rated, concerns material issues.

Research shows that over 45% of respondents have not lived in the city since birth. Therefore, Rzeszów is a city where people willingly settle. The most common reason for moving was work (30.8%). Over 21% of respondents moved with their parents as a child. A common reason for migrating to Rzeszów was also a wedding (17.2%). For almost 17% of the respondents, the reason for the move was to study at school or university. Reasons such as moving with a partner and others received a lower percentage of responses. The declared motives for the move bring a lot of information about the city. It seems that there are good chances of finding a job or taking up studies in Rzeszów. For years, Rzeszów has had one of the lowest unemployment rate in the region. Universities operating in the city are an important factor attracting people to the city.

If we analyze the previous place of residence, Rzeszów mainly attracts people from the Podkarpackie Province (59.2%). The city is also an attractive place for people from other voivodships (27.2%). 12.2% of the respondents came to the city from its vicinity and only 1.5% from abroad. The development of the city, combined with stagnation in many localities of the voivodeship, may result in increased migration to Rzeszów in the future. It is worth noting that the region has the lowest urbanization rate in Poland. Therefore, for many potential migrants, Rzeszów will be the first choice.

The willingness to change the place of residence is an indicator of the city's attractiveness. The situation of Rzeszów is well evidenced by the low percentage of people declaring plans to move out of the city. Only 5.6% of the respondents said they wanted to move to another place. 73.3% of the inhabitants do not plan to change their place of residence. The answer "it's hard to say" was chosen by 21.1% of the respondents. It can

therefore be concluded that the city attracts more than repels. This is confirmed by the steady growth in the number of inhabitants which has been sustained for several years.

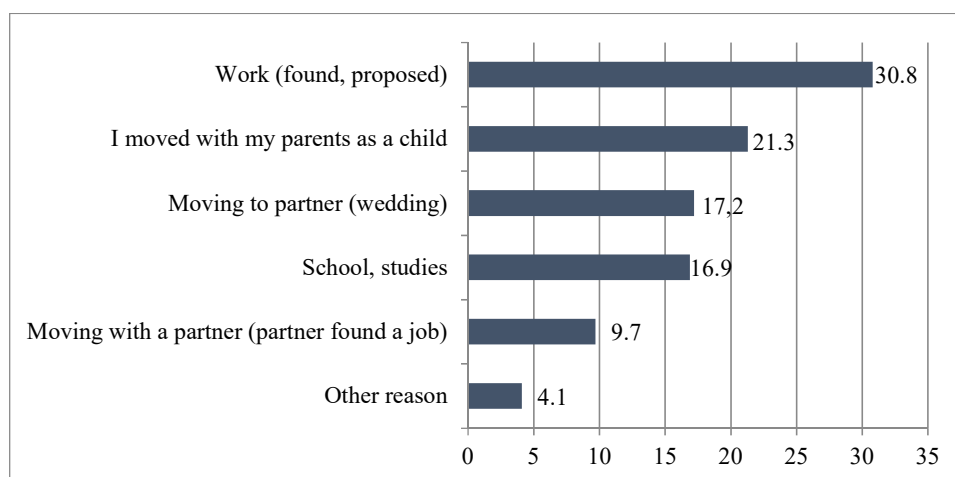


Chart 4. Reasons for moving to the city (in %)

Source: Own calculations.

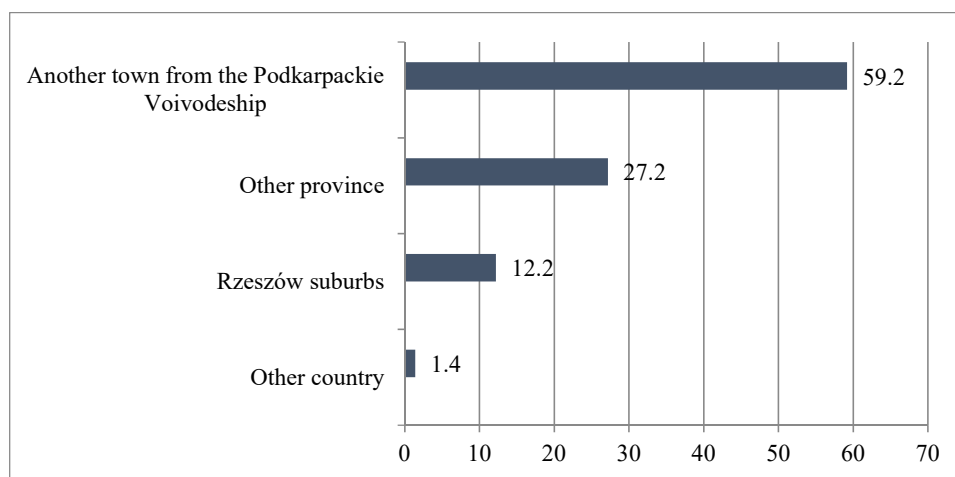


Chart 5. Earlier place of residence

Source: Own calculations.

In the opinion of the respondents, Rzeszów is not a poor city. Most of the inhabitants considered the capital of Podkarpacie to be a commune with an average level of wealth (47.3%). According to almost 36%, Rzeszów is a “rather rich” city and 2.1% considered the city to be a very rich commune. The answers “rather poor” and “very poor” obtained together only 5.1% of responses. A good assessment of the commune's affluence probably contributes to the low proportion of people planning to leave the city.

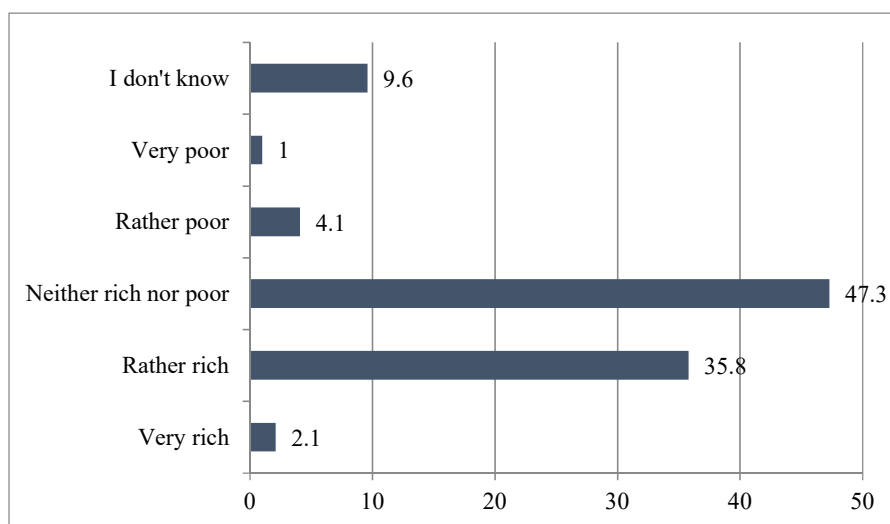


Chart 6. Some communes are poor and others are rich. What is the municipality of Rzeszów?

Source: Own calculations.

According to the respondents, Rzeszów is well perceived in Poland. Over 56% of the respondents believed that residents of other cities in the country assessed the city positively. Only 2.4% had the opposite opinion. Some residents agreed with the opinion that in other cities of Rzeszów they “praise a little, criticize a little” (21.4%). It can therefore be concluded that the inhabitants of the capital of Podkarpacie have a positive and uncompromised opinion on the perception of the city in Poland.

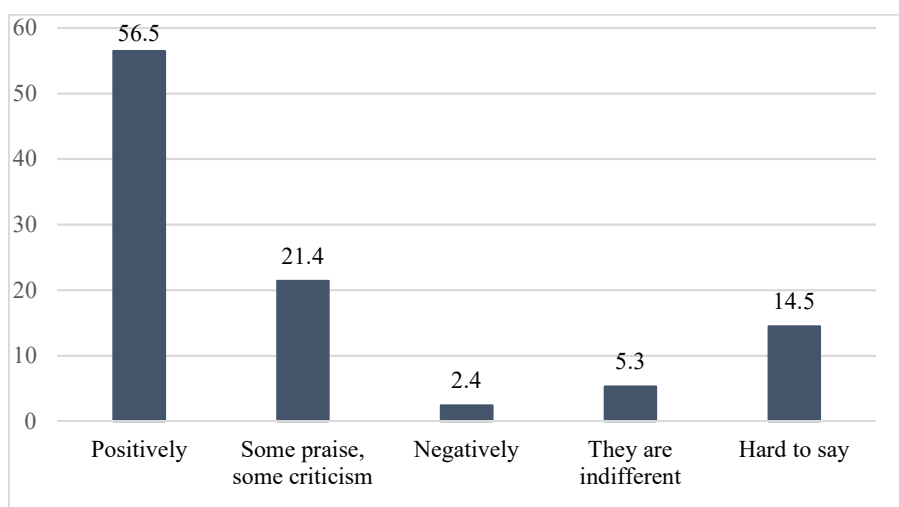


Chart 7. How is Rzeszów perceived by the inhabitants of other cities?

Source: Own calculations.



The inhabitants of Rzeszów considered themselves happy people. This is confirmed by the value of the happiness index constructed by using the following question: Some people in general are very happy regardless of their circumstances, they enjoy life a lot. To what extent does this statement describe you? The value of the index for city residents was 4.88 on a scale from 1 to 7. The feeling of happiness was influenced by the value of the quality of life index ( $r = 0.24$ ). The higher the perceived quality of life, the greater the level of happiness. The index was built using the previously discussed variables: aesthetics, the amount of greenery, the quality of streets and sidewalks, safety, the functioning of offices, wealth and the possibility of finding a job.

City residents declared they were satisfied with their place of residence. The main reasons for satisfaction were: cleanliness of the city, aesthetics, work, noticeable city development, developed infrastructure, high level of security and peace. The respondents noticed the changes that took place in Rzeszów. Most importantly, most of the changes were assessed positively. Moreover, Rzeszów has a good quality of life and the city's inhabitants consider themselves happy.

### 3. SUMMARY

There are objective and subjective indicators of the attractiveness of the place of residence. An objective indicator may be an increase or decrease in the number of inhabitants. Subjective indicators are residents' perceptions and opinions about the city. Rzeszów is an attractive place to live as the number of inhabitants is increasing. Moreover, the inhabitants generally assess most of the city's features very positively. Therefore, the image of the city is positive. The view of Rzeszów in the imaginations of the surveyed residents is based to the greatest extent on the aesthetics and development of the city. The reasons for a good image are effective promotional activities of the city authorities and, most importantly, the actual development of the city (Palak, 2016).

The reasons for modern development can be found even in the communist period. Due to the inefficient central planning economy, there were no funds to expand the city from the deep provinces. People from suburban towns did not move to the city, but only commuted to work. As a result, few housing estates were built in the city, which today could be strongly degraded spatially and socially.

The urbanization processes suppressed before 1989 significantly accelerated at the beginning of the 21st century. Currently, urbanization and suburbanization occur simultaneously in the city space. A lot of new block housing estates and single-family houses are being built in the outer zone. The phenomenon of building blocks of free spaces in the city center is also observed. The decrease in the number of people migrating to other cities or suburbs compensates for the settling of new residents in the city, mainly from the poorly urbanized Podkarpackie Province. In recent years, many Ukrainians have settled in the city. Universities also play an important role in the development of Rzeszów. Graduates from outside Rzeszów often associate their future with the city.

The increase in the attractiveness of Rzeszów as a place of residence is still weakly related to the return to the city of people who previously moved to the suburbs. This is due to the fact that there was no mass escape from the city in Rzeszów. Suburbanization is still being observed. However, the return from the suburbs to the central city is hampered by high housing prices. Returning to the city can also be understood as increasing interest in living in downtown estates. The phenomenon of returning to the city understood in this way is present in the space of Rzeszów, as evidenced by, inter alia, the increase in the

number of inhabitants in the city and the construction of new housing estates. A very important factor influencing the development of Rzeszów was the incorporation of neighboring towns into the city. Thanks to them, many people returned to the city without physically changing their place of residence, and suburbanization changed its character from external to internal. Rzeszów's attractiveness was influenced by the measures taken by the city authorities, mainly to improve the infrastructure and aesthetics of the city. The favorable demographic situation of the region and its peripheral location are also important. The closest thing to potential migrants is to move to Rzeszów.

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**Marta POMYKAŁA<sup>1</sup>**

## **THE CENTRAL CYBERCRIME BUREAU AS A NEW POLICE SERVICE ESTABLISHED TO COMBAT CYBERCRIME**

In 2022, a new police service, namely, the crime-fighting service, was created. The Central Cybercrime Bureau was also established as an organizational unit of the police, which is responsible for recognizing and combating crimes committed using IT systems, ICT systems, or ICT networks and preventing such crimes, as well as detecting and prosecuting their perpetrators. The aim of this paper is to assess the validity of separating the cyber police in the structure of the Polish Police and to analyze its place and role in the cyber security system. Subjects under consideration include the tasks and powers of the new service, problems related to the selection of qualified officers with specialized IT knowledge, and the problem of providing infrastructure enabling the effective implementation of the entrusted tasks. The research methods used in the paper are the dogmatic-legal method and the theoretical-legal method.

**Keywords:** cybersecurity, cyber police, The Central Cybercrime Bureau, operational and reconnaissance activities, service in the Police.

### **1. CYBERSECURITY AS AN ELEMENT OF MODERN STATE SECURITY**

The intensive development of information technology, which has been taking place since the last decades of the 20th century, brings enormous changes in all spheres of life in modern society. Modern technologies influence business, and by providing completely new tools for managing operations and data analysis, streamline and facilitate commercial or manufacturing activities, they are the basis for quick communication between people located in different places around the world, enable wide access to information, and at the same time form the basis of modern education and entertainment. Today it would be difficult to find areas where such changes do not take place at all. All this has a huge impact on the life of modern man.

However, new technologies bring previously unknown threats and challenges to state security and the safety of individuals. Attacks against IT infrastructure, attacks using malware, data leaks and breaches of confidentiality, internet fraud, identity theft and cyber espionage are becoming an increasingly serious problem in today's society. Over recent years, the number of this type of threats has been systematically increasing and is related

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to the constant increase in the level of digitalization in modern society (Enisa threat landscape 2023, <https://www.enisa.europa.eu...>).

These phenomena quickly became known as cyber threats, and their specificity is noticed both in science and in practice. Cyber threat is a phenomenon in which a malicious attack occurs via the Internet or other information technologies on a single entity or organization (Lakomy, 2015; Wasilewski, 2023; Oleksiewicz 2017). This is a set of activities aimed at intercepting data, extorting money or passwords, as well as destroying information stored on the computer's hard drive. According to the current Cybersecurity Strategy of the Republic of Poland, a cyber threat should be understood as any potential circumstances, event or action that may cause damage, disruption or otherwise adversely affect ICT networks and systems, users of such systems and other people (Resolution on the Cybersecurity Strategy...; Pomykała, 2021). In the light of this document, increasing the level of resistance to cyber threats and increasing the level of information protection in the public, military and private sectors and promoting knowledge and good practices enabling citizens to better protect their information is the main goal of ensuring state cybersecurity (Pomykała, Polinceusz, 2015).

In the modern world, where technology plays an increasingly important role, cybersecurity is systematically becoming one of the most important areas of state security. The concept of cybersecurity in a narrow sense only covers the protection of computer systems, networks and data against digital attacks, and is also included in the Act on the National Cybersecurity System of 2018 (Act on the National System...). In art. 2 point 4 of this Act, cybersecurity is defined as the resistance of information systems to activities that violate the confidentiality, integrity, availability and authenticity of processed data or related services offered by these systems. The Act implements Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 on measures for a high common level of security of network and information systems within the territory of the Union (Directive on measures...).

Nowadays, when more and more aspects of our lives are moving to the digital space (commonly referred to as cyberspace), cybersecurity is no longer only a technical issue, but also a social and economic one. The digitization of all areas of modern life, universal access to the Internet, and unlimited range of communication networks facilitate various criminal activities, especially property, economic, drug and pedophile crimes. New technologies provide new tools for committing crimes, although they can also be targets of crime themselves (Kamuda, 2018). Without adequate protection in this area, both individuals and organizations may suffer serious financial and reputational losses. The understanding of cybersecurity is constantly evolving and expanding. It is undoubtedly a key element of state security and requires constant commitment and special attention from many entities (Żywucka-Kozłowska, Dziembowski, 2023).

Every modern state has institutions and services specialized in appropriate tools and means to combat security threats. However, combating cyber threats seems to be a completely new challenge, requiring additional skills, including good knowledge of the digital environment, specialized knowledge in IT and the ability to efficiently navigate in these areas. Today's cyber threats have long not constituted a uniform group of challenges, and specialized entities are created to combat them. Cybercrime, as a type of crime carried out using computer techniques and involving computer systems or networks, is a constantly growing and dangerous phenomenon. The perpetrators of cybercrime very often remain anonymous, the number of traces they leave, compared to traditional forms of crime, is negligible, which makes their detection very difficult. At the same time, it is worth

remembering that, given the global reach of cyberspace, cybercrime quite easily goes beyond traditional boundaries, and its effective combating increasingly requires extensive cooperation between law enforcement agencies of many countries.

## **2. ESTABLISHMENT OF A NEW POLICE SERVICE RESPONSIBLE FOR COMBATING CYBERCRIME**

Combating crime has been the domain of the Police. Therefore, a natural consequence of the constantly increasing threat of cybercrime was the emergence of the idea of establishing a cyber police as a separate structure within the Police, prepared in technical, human and organizational terms to combat cyber threats, and at the same time focused on effective cooperation with similar entities in other countries. Since cybercrime is not, in principle, a separate type of crime, and its specificity is the emergence of new methods and means of committing crimes, the creation of a new entity responsible for cybersecurity protection was considered pointless (Justification for the government draft act..., <https://www.europol.eu>). Entrusting tasks related to identifying threats in cyberspace and combating cybercrime to the Police allows one to benefit from the previous experience of this formation in combating criminal crime and organized crime, as well as to maintain consistency in the scope of tasks performed, competences granted and the means and forms of action used.

Established in 2022, the Central Cybercrime Bureau (hereinafter: CCB) is an organizational unit of the Police used to combat cybercrime, which is responsible for recognizing and combating crimes committed using IT systems, ICT systems or ICT networks, and preventing such crimes, as well as for detecting and prosecuting their perpetrators. It also supports other organizational units of the Police in recognizing, preventing and combating specified crimes, as well as in detecting and prosecuting their perpetrators.

It should be emphasized, however, that this is not the first police unit established to combat cybercrime. Already in 2016, the Bureau was established within the structure of the Police Headquarters, which was entrusted with carrying out activities related to detecting perpetrators of crimes committed using modern ICT technologies. Appropriate organizational units were established at the provincial police headquarters and at the Metropolitan Police Headquarters and were subordinated to the relevant provincial police commanders (Capital Police Commander), who organized activities in this area within their resources. The Office for Combating Cybercrime acted as a coordinator of tasks carried out in training units. In practice, these units remained largely independent, and the implementation of tasks assigned by the Office was limited by the forces and resources available as well as locally set priorities (Michalecki, 2023). Such Police structures operated until the end of 2021, and the scope of their tasks regularly increased.

A special period was certainly the time of the Covid-19 pandemic, the first stage of which occurred in 2020–2021, when, due to the introduction of widespread isolation, greater social activity than before was concentrated online, significantly increasing the level of cybercrime threat (IOCTA Report 2020, <https://www.europol.europa.eu/>). However, the detection rate of such events remains at the current, not very high level (Statistics for 2022, <https://instytutcyber.pl/>). Greater activity in cyberspace and the resulting greater number of adverse events were an important driver of organizational changes in the Police that took place at the beginning of 2022.

On January 12, 2022, the act establishing the CCB (Act on amending certain acts...) entered into force, as a result of which the management of the new unit was appointed in May 2022, and in July 2022 the first policemen started serving in it. First of all, the CCB received police officers who had transferred from the existing units for combating cybercrime at the Police Headquarters and provincial police headquarters. In the next stage, the recruitment of new officers began.

### **3. TASKS AND ORGANIZATION OF THE CENTRAL BUREAU FOR COMBATING CYBERCRIME**

The Central Cybercrime Bureau is a specialized unit of the Police, which is an organizational unit of a new type of service, defined as the service for combating cybercrime (Act on the Police..., Article 4(1)(6), Article 5d(1)), whose task is to fight cybercrime throughout the country.

The organizational changes in the Police that were introduced with the establishment of the Bureau are an example of deconcentration of the administration that occurs in centralized administration, as a result of which a larger number of entities are separated at one administrative level and assigned to them to carry out specific types of matters. The most important goal of deconcentration is to make everything work better, faster and more efficiently (Niczyporuk, 2006). It is worth noting that over recent years, such organizational changes have been made several times in the Police, e.g. the separation of the Central Police Investigation Bureau, the Police Internal Affairs Bureau, the Central Police Forensic Laboratory, or the Central Bureau for Combating Cybercrime. These changes consisted in separating specific structures from the Police Headquarters and provincial headquarters and transforming them into organizational units that were auxiliary units of the newly created Police bodies. The effect of these processes was the dispersion of tasks and competences at one level, but maintaining the existing hierarchy in relations between Police authorities (Jaworski, 2023). As B. Jaworski emphasizes, such an organizational structure “better reflects the division of labor used in it, shows the connections between various functions and activities, highlights the degree of work specialization, and clearly presents the system of responsibilities” (Jaworski, 2023). The advantage of this solution is high specialization, which allows focusing on combating a specific group of threats. Equally important is the ability to concentrate resources in the form of specialized equipment and well-trained staff, which significantly contributes to increasing the effectiveness of tasks.

Pursuant to Art. 5d section 1 of the Police Act, The Bureau is responsible for the implementation of tasks throughout the country in the field of:

- recognizing and combating crimes committed using an IT system, ICT system or ICT network and preventing these crimes, as well as detecting and prosecuting the perpetrators of these crimes,
- supporting organizational units of the Police to the necessary extent in recognizing, preventing and combating these crimes.

Therefore, the tasks of The Bureau include preventing crimes committed using modern ICT technologies, recognizing and combating such crimes, but also supporting other Police units in conducting cases of this type. Therefore, The Bureau's interests include threats caused by ransomware attacks, DDoS attacks, malware, and threats resulting from defeating system security. The Bureaus has the power to take action in the face of crimes committed in cyberspace, and the group of these crimes has been systematically expanding

for several years. Currently, such criminal activities include: phishing, cyberstalking, spoofing, crimes on sales platforms, fake online stores, and fake payment gateways. The share of these crimes in the total number of crimes grows in proportion to the increasing degree of digitalization of society. Given the transnational nature of the Internet, it must be prepared to take action on both domestic and international issues. Therefore, an important task is also to combat crime against minors (sexual abuse, pedophilia) and to dismantle international criminal groups and detain their organizers as well as neutralize the technical infrastructure of these groups.

The management of the new Police unit was entrusted to the Commander of The Bureau. He is the direct superior of The Bureau police officers, and in the performance of his tasks he reports directly to the Chief Commander of the Police. The Commander is appointed from among Police officers and dismissed by the minister responsible for internal affairs at the request of the Commander-in-Chief of the Police, while the deputy Commanders of the CBZC are appointed from among Police officers and dismissed by the Commander-in-Chief of the Police at the request of the Commander of The Bureau. The seat of The Bureau Commander is the capital city of Warsaw (Police Act..., Article 5d, sections 2-5).

Following the example of the Central Police Investigation Bureau, an analogous organizational structure was introduced. The following organizational units have been established in The Bureau (Management regarding the temporary..., §6):

- 1) Special Board,
- 2) Criminal Intelligence Department,
- 3) Logistics Support Department,
- 4) General Department, Personnel and Training,
- 5) Department of Supervision and Coordination,
- 6) Division of Classified Information Protection,
- 7) International Police Cooperation Team,
- 8) Support Team,
- 9) Press Team,
- 10) Legal Team,
- 11) Psychological Support Team,
- 12) Control Team,
- 13) Occupational Health and Safety Team,
- 14) Boards and departments in all provincial cities.

The Commander of The Bureau has full personnel and training powers in relation to police officers of all organizational units of The Bureau (Police Act..., Article 5d(2)). This is a fundamental change compared to the previous situation, as before the establishment of The Bureau, the departments of the provincial and capital police headquarters were subordinated to the provincial commanders, and the directors of the Police HQ were not superiors of police officers in these units, so they could only coordinate their activities. Currently, after separating The Bureaus as a separate organizational division of the Police, it will be more effective to introduce uniform standards of case management throughout the country, coordinate proceedings, manage human and equipment resources, as well as set priorities in terms of categories of crimes that the office should investigate.

In order to carry out his tasks, the Commander of The Bureau is obliged to cooperate with other organizational units of the Police and relevant bodies and institutions, also from other countries (Police Act..., Article 5d(7)). Focus on broad international cooperation is a particularly important element in the work of The Bureau. Cybercrime knows no formal

borders and, like cyberspace, it is transnational. For the officers of The Bureau, the ability to maintain cooperation, training and exchange information with representatives of other countries, benefit from the experience of Europol and Interpol, as well as access to the latest software and technology will be of particular importance.

#### 4. SERVICE IN THE CENTRAL CYBERCRIME BUREAU

The establishment of The Central Cybercrime Bureau is the first stage in the creation of the cyber police in Poland, and it will gain its full power only in the coming years. It only initiated the process of increasing police staff related to combating cybercrime. Ultimately, there are to be 1,800 of them. In 2025, each field unit (one in each voivodeship) should have at least 65 police posts, and the largest units – in Warsaw and Katowice – up to 140 posts (Justification for the government's bill..., <https://orka.sejm.gov.pl/>...). In the initial period in July 2022, 72% of the officers of the previous cyber department were transferred to the CBZC, and almost 80% of the ongoing cases were taken over. The remaining cases, due to their thematic scope, remained in the provincial headquarters (Sitek, 2022).

It was assumed that The Bureau would employ primarily people with knowledge and skills in the field of IT and modern ICT technologies. This resulted in a modification of the selection procedure for Police service by making it possible to profile the procedure towards candidates with specialized qualifications, education, authorizations or skills required due to the personnel needs of the Police. In the qualification procedure for a person applying for admission to CBZC, a very important stage was added in the form of checking knowledge and skills in the field of IT, the functioning of IT systems, ICT systems, ICT networks and knowledge of a foreign language in this area, and the possibility of extending the proceedings for conducting a psychophysiological examination (Police Act, Article 25(12)). At the same time, however, the obligation to conduct a knowledge test and a physical fitness test, as well as mandatory service adaptation in the Police prevention department or an independent Police prevention subunit, was waived.

New solutions are also provided for the remuneration of The Bureau officers. The existing rules for remunerating officers prosecuting cybercrimes did not seem particularly financially attractive for people with specialized IT education. For many years, there has been considerable competition in the IT industry, and the financial opportunities that can be achieved in the private sector are much greater than in public entities. Therefore, in recent years, the Police has also been struggling with the problem of outflow of qualified staff. The actions taken with the establishment of The Bureau were, therefore, aimed at reversing this tendency and encouraging IT specialists to take up service in the Police. Work in the Police related to combating cybercrime is to become financially attractive and bring earnings twice as high as in other Police services (New officers in The Bureau service, <https://cyberdefence24.pl/>...). Since the launch of recruitment for The Bureau, over 400 people have shown interest in the service, and 15 people have been accepted, however, the recruitment process is multi-stage and subsequent proceedings are still ongoing (Two years of The Bureau existence. There will be more positions, <https://cyberdefence24.pl/>...).

In art. 120b of the Police Act provides for the so-called ICT benefit, paid to police officers performing cybersecurity tasks. It is paid on the basis of the Act of December 2, 2021 on special rules for remunerating persons performing cybersecurity tasks (Act on special rules...). The decision on the payment of the benefit is issued by the police officer's



superior no later than 30 days after starting the performance of cybersecurity tasks, after conducting the official review process (Regulation on the amount of the ICT benefit...).

In art. 120c of the Police Act introduced an additional benefit related to serving in the CBZC. It is awarded to a police officer serving in a position related to the direct identification and combating of crimes committed using an IT system, ICT system or ICT network and the prevention of these crimes, as well as detecting and prosecuting the perpetrators of these crimes in The Bureau and to the policeman supervising these activities in The Bureau on a monthly basis. an amount not lower than 70% and not higher than 130% of the average remuneration of police officers. The amount of the benefit depends on the assessment of the fulfillment of duties and the implementation of the tasks and activities entrusted to the policeman. The decision on granting this benefit and its amount, for a period of one year, is issued by the Commander of The Bureau, and in the case of the Commander of The Bureau and his deputies – by the Chief Commander of the Police.

## **5. POWERS OF OFFICERS OF THE CENTRAL CYBERCRIME BUREAU**

As already emphasized above, cybercrime is not a new type of crime, but it is carried out in a different space than previously known crime – in cyberspace. It uses completely new methods and means of operation, based on modern information technologies and computer networks. Therefore, all this requires an appropriate approach to recognizing the Internet environment, identifying new threats emerging there, and effectively responding to phenomena that are still at the forefront of prohibited acts (Pawelec, 2022).

When establishing The Central Cybercrime Bureau, no special powers of a different nature than those of the existing Police services already known from practice were provided for the new service. The powers of The Bureau are regulated by the same provisions that apply to the entire Police (Police Act, Articles 15–22), although when The Bureau was established, they were changed and extended to adapt them to law enforcement fighting crime in cyberspace. Today, The Bureau officers have the same powers as police officers of other units, so they can undertake operational and reconnaissance, investigation and administrative and order activities (Police Act..., Article 19).

Operational and reconnaissance activities are of key importance for combating crime. These are non-procedural technical and tactical activities developed by the practice of criminal law enforcement agencies, serving the preventive fight against crime (Taracha, 2006). It is worth noting that nowadays the scope of these activities is constantly expanding, especially in view of the need to combat increasingly sophisticated crime, such as organized crime or cybercrime, and the methods of prosecution require high activity and increasingly specialized knowledge of officers appointed to combat it and ongoing cooperation with the court or prosecutor's office (Momot, <https://www.kryminalistika.org.pl...>). The legal nature of operational and reconnaissance activities has long been considered ambiguous, due to the fact that they are not based on the provisions of the Code of Criminal Procedure (or the Code of Procedure in Petty Offenses), nor do they constitute administrative legal activities. This fact was emphasized for a long time by the lack of statutory regulation of this issue and the secrecy of lower-level legal acts regulating this activity. Currently, the legal basis for undertaking and carrying out operational and reconnaissance activities is specified in Chapter Three of the Police Act, which deals with the powers of the Police.

Operational and reconnaissance activities are classified activities that include information collection, data analysis, trace tracking, infiltration and other intelligence

techniques. They provide for the possibility of using provocation, a secretly supervised shipment or the purchase of a controlled purchase or a controlled bribe. Only state authorities that are granted such powers by law have the right to carry out operational and reconnaissance activities. However, private entities do not have them. Operational and reconnaissance activities are strictly regulated by law. When combating cybercrime, they may include in particular:

- monitoring websites, discussion forums, social networking sites and other platforms to detect irregularities, attempted attacks and suspicious activity,
- infiltrating criminal groups online in order to obtain information about criminal activities, the identity of perpetrators and planned attacks,
- searching computers, mobile phones and information media in order to identify perpetrators of crimes and prove their guilt, as well as reconstruct the course of events,
- tracking and analyzing digital traces (e.g. an analysis of digital data such as IP addresses, server logs, browsing histories) in order to gather evidence that can be used in a lawsuit.

In order to ensure appropriate effectiveness and efficiency of operational and reconnaissance activities carried out by The Bureau officers, in Art. 19 section 1 of the Police Act, the catalog of crimes in the case of which operational control may be used has been extended. It was supplemented with the crime of promoting pedophilia (Article 200b of the Penal Code), misleading public utility institutions as to the threat (Article 224a of the Penal Code), computer hacking (Article 267 § 1–4 of the Penal Code), (destruction of IT data (Article 268a § 1 and 2 of the Penal Code), computer sabotage (Article 269 of the Penal Code), disruption of network operation (Article 269a of the Penal Code), unlawful use of programs and data (Article 269b § 1 of the Penal Code), burglary – in the context of cash recorded in bank accounts (Article 279 § 1 of the Penal Code) and computer fraud (Article 287 § 1 of the Penal Code) (Kamuda, Trybus, 2023)

In art. 20 of the Police Act, changes were introduced to speed up obtaining information from entities providing payment services and enable more efficient tracking of funds derived from crime, by expanding the catalog of information and data that should be made available to the Police at the request of its authorized bodies and officers. In the past, refusal to provide such information often made it impossible to carry out further activities in a given case.

Additionally, it should be emphasized that the Commander of The Bureau has been granted powers similar to those previously held by the Commander of the Central Bureau of Investigation, related to operational control, controlled purchases, secret supervision of the production, movement, storage and trade of crime items, obtaining and using information constituting legally protected secrets and obtaining data that does not constitute the content of a telecommunications message, a postal item or a message as part of a service provided electronically. The Commander of The Bureau, therefore, became one of the Police bodies authorized to perform activities necessary to apply the above-mentioned measures and use the evidence obtained through them in further stages of proceedings against perpetrators of crimes.

## 6. CONCLUSIONS

The Central Cybercrime Bureau is a new and extremely necessary security protection service, which is becoming increasingly important for protection against cyber threats.

Cybercrime is not just a temporary trend, it is an inevitable consequence of technological development and the increasing use of modern information technology in all areas of modern life, including crime. The Bureau is also a response to the need for greater specialization of security services, and its creation allowed for the concentration in one place of forces and resources used to combat all forms of computer and internet crime, which should translate into increased effectiveness of activities in this area in the near future.

In order to effectively counteract all modern threats, security services must use the same means as criminals, and must also have personal and material resources to carry out their activities. Therefore, the fight against cybercrime requires appropriate adaptation of both organizational structures, but also tools and means of action. The establishment of The Bureau should, therefore, be considered an important, but only initial stage in this process. In the coming years, further challenges should be consistently addressed: ensuring sufficient staffing of The Bureau, providing its officers with access to the latest IT technologies, continuous training and professional development of officers, as well as the development of broad cooperation with similar entities from other countries and the widest possible exchange of information. Appropriate recruitment, as a result of which it is possible to select people with knowledge and experience in the field of IT, is a step in the right direction.

An equally important issue is the appropriate financing of The Bureau and its officers. Modern society can no longer afford to save on cybersecurity. The funds provided in the budget for the purchase of the necessary equipment and software are a necessary and indispensable condition for the effective and efficient implementation of its tasks. However, it is important that financing possibilities do not decrease when the office formation stage is completed. The creation of an incentive to take up service in The Bureau should also be assessed positively by providing additional funds for the remuneration of its specialists dealing with combating cybercrime, as well as the establishment of allowances for work in The Bureau, intended to encourage people with specialized education in IT to take up service.

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## LEGAL ACTS

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- Act of April 6, 1990 on the Police (consolidated text: Journal of Laws of 2024, item 145).
- Act of July 5, 2018 on the national cybersecurity system (consolidated text: Journal of Laws of 2023, item 913, as amended).
- Act of December 2, 2021 on special rules for remunerating persons performing cybersecurity tasks (consolidated text: Journal of Laws of 2023, item 667).
- Act of December 17, 2021 amending certain acts in connection with the establishment of the Central Bureau for Combating Cybercrime (Journal of Laws of 2021, item 2447, as amended).

Regulation of the Council of Ministers of January 19, 2022 on the amount of ICT benefits for persons performing cybersecurity tasks (Journal of Laws of 2022, item 131).

Resolution No. 125 of the Council of Ministers of October 22, 2019 on the Cybersecurity Strategy of the Republic of Poland for 2019–2024, (MP. of 2019, item 1037).

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## DENTAL SERVICES FINANCED FROM PUBLIC FUNDS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT: CURRENT STATUS AND CHALLENGES IN POLAND

Dentistry in Poland is based on services financed from consumers' private funds. The catalog of services available under general health insurance is so narrow that a significant number of patients have stopped using the public system and have devoted their funds to commercial dental services. Educational and preventive activities in the field of dentistry are consistent with the idea of sustainable development, especially from the point of view of the social and economic spheres, because prevention or quick treatment is usually more effective and cheaper. The article aims to show possible problems with implementing the idea of sustainable development in the context of health care resulting from the adopted financing policy of the National Health Fund. The work is based on the analysis of macroeconomic data and applicable legal acts in relation to the literature on the subject.

**Keywords:** dental market, consumer in health care, health services, dentistry, sustainable development.

### 1. INTRODUCTION

Dentistry in Poland is based on services financed from consumers' private funds (Wicka, 2021; PIU, 2018; J. Kozera, M. Kozera 2022). Dental care within the public health care system is provided to a very limited extent, especially for adults. There is also no protection for members of low-income households (Tambor, Pavlova, 2020). The catalog of services available under general health insurance is so narrow that a significant number of patients stopped using the public system, allocating their funds for commercial dental services, or stopped using them altogether. On the one hand, dental services are among the most expensive, on the other hand, as it may seem, many of them are not strictly necessary. Therefore, the National Health Fund covers only part of dental services, extending the benefit package to particularly sensitive groups, such as children and pregnant women.

It should be noted that not only treatment, but primarily educational and preventive activities in the field of dentistry fit into the idea of sustainable development, especially from the point of view of the social and economic spheres, because prevention or quick treatment is usually more effective and cheaper, and consumers/ patients fit in better in

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society, have greater self-confidence, and are healthier not only in their oral cavity (Jaraszek, Hanke, Marcinkiewicz, 2022).

## **2. SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF VARIOUS SECTORS OF THE ECONOMY**

Sustainable development is a concept that has been appearing at least since the second half of the 20th century. Increased interest in this issue, especially in aspects related to economics, appeared after the first UN Conference in Stockholm in 1972 (Zalega, 2016). This idea was further developed at the second "Earth Summit" in Rio de Janeiro twenty years later, when the "Rio Declaration" constituting a general philosophy of sustainable development and a document called "Agenda 21" were adopted, which presented a road map for the introduction of this philosophy in life (Skowroński, 2006). In United Nations documents and strategies, sustainable development is based on three equal levels: economic, social and ecological. A. Pawłowski (2006; 2009) postulates a broader view of this issue and talks about the following levels: ethical, ecological, social, economic, technical, legal and political. The author assumes that all decisions should have their source in the ethics of an individual, and further postulates equal treatment of ecological, economic and social issues, and technical, legal and political issues should be based on them.

A more people-oriented definition was proposed by the Swiss "Monitoring of Sustainable Development Project" MONET:

Sustainable development means ensuring dignified living conditions with regard to human rights by creating and maintaining the widest possible range of options for freely defining life plans. The principle of fairness among and between present and future generations should be taken into account in the use of environmental, economic and social resources. Putting these needs into practice entails comprehensive protection of bio-diversity in terms of ecosystem, species and genetic diversity, all of which are the vital foundations of life (Keiner, 2005).

Researchers are looking for the sources of the concept of sustainable development in classical economics, whose representatives wondered about the limits of economic growth in connection with the falling productivity of arable land and population development. Already at the turn of the 18th and 19th centuries, Thomas R. Malthus drew attention to the limits of economic growth caused by resource shortages. He postulated that the problems emerging in the socio-economic environment result not so much from bad human institutions, but from the fertility of the human race, i.e. population growth (Mebratu, 1998). The English economist David Ricardo, assuming that natural resources are unlimited, but not uniform, that is, better and worse. Therefore, we can talk about the scarcity of natural resources (Rechul, 2004). In further considerations, representatives of the Club of Rome pointed to the natural limits of growth and, consequently, the need to limit their use and protect them (Jeżowski, 2012).

The idea of sustainable development, although at the beginning of the 21st century some researchers wondered whether it was not treated as a kind of myth (Sztumski, 2006), has gained some dynamics in recent years, both in terms of raising this topic by scientists representing various disciplines and in practical dimension.

Researchers are particularly interested in the impact of the idea of sustainable development in various sectors of the national economy. The issue of sustainable



development of tourism is particularly frequently discussed (e.g. Rasoolimanesh et al., 2023; Streimikiene et al., 2021; Guo, Jiang, Li, 2019), especially due to its dynamic development caused by, among others, an increase in free time and disposable income (Para, 2013). Thus, some tourist reception places are beginning to reach or even exceed their limits (e.g. Birendra, Dhungana, Dangi, 2021) and ideas are emerging to transfer at least part of this traffic to other, previously less popular, although interesting, places (e.g. in. Siakwah, Musavengane, Leonard, 2020; López-Sanz, Penelas-Leguía, Gutiérrez-Rodríguez, Cuesta-Valiño; 2021; Paluch, Sarat, 2013), and the last impulse that sparked further interest in this topic was the global epidemic crisis related to with COVID-19 (including Jones, Comfort, 2020; Rahmanov., Aliyeva, Rosokhata, Letunovska, 2020). However, researchers often raise the issue of sustainable consumption - both food (e.g. Maciejewski 2020; Coderoni, Perito, 2020; Vega-Zamora, Torres-Ruiz, Parras-Rosa, 2019) and other goods (e.g. Hernandez, Miranda, Goñi, 2020), especially taking into account the changes brought by the COVID-19 pandemic (Maciejewski, 2023; Chae, 2021).

### 3. THE PLACE OF HEALTH CARE IN SUSTAINABLE DEVELOPMENT

The health care market, as a branch of the national economy, is relatively poorly researched. For many years, it was ignored in Poland because it was treated as an unproductive sector of the national economy. Also after the political transformation, researchers rarely discussed this issue due to the dominant share of services financed from public funds. Thus, most health care services are distributed without following free market principles.

Researchers who discuss this topic, at least to a limited extent, focus largely on the description of the health care market (Kantyka, 1998), the functioning of the health care system (Nojszewska, 2011), the broadly understood economics of health care (Suchecka, 2011), sources of financing (Golinowska, Tambor, 2014; Markowska, Węglińska, 2019) or reforms of the health care system carried out in recent years (Golinowska, 2013). Topics touched upon by authors in scientific publications, even if they concern social sciences, usually refer indirectly (Kosiński, 2018) or directly (Syrkiewicz-Światała, Światała, 2012) to management and quality sciences.

The dental services market is examined on the one hand as part of the health care market, which should be considered legitimate, but also as a separate market due to significant differences in the form of financing health services. They are, unlike on the health care market in Poland, usually financed commercially, i.e. from consumers' private funds. Therefore, it can be assumed that this consumer is more aware of his needs and is looking for the most effective solutions, as well as requiring an individually prepared package of medical services. To a large extent, these analyzes focus on issues related to the marketing of dental services (Jończyk, Werenda, 2016; Syrkiewicz-Światała, Holecki, Bryła, 2014). The issue of the value of the quality of dental services for the consumer is also raised (Bukowska-Piestrzyńska, 2017; Cieślik, Przybylska, 2018).

Among the 17 UN Sustainable Development Goals there is goal 3: good health and quality of life (e.g. Anju et al., 2023), which is directly influenced by the level, quality and organizational, geographical and financial availability of services in the field of health care. From the point of view of achieving this global goal, the issue of educating society is extremely important - on the one hand, regarding the importance of health protection, as well as regarding lifestyle and impact on the environment, including activities that we could consider as health prevention (Tuszyńska, Pawlak, 2019).

The health of individuals and populations is linked to care for the environment, social development, and the level of economic development of society. Some researchers assume that it is impossible to implement economic growth within the concept of sustainable development without taking into account the special role of health and activities aimed at its protection (Suchanek, 2013).

In principle, the health care system itself, whose primary task is the health safety of citizens. Due to the limited financial and human resources remaining in the system, it must balance the health needs of society, as well as assume the participation of individual people in self-financing their health needs in various categories (Michaluk-Mazurek, 2019). Under the UN Sustainable Development Goal 3, we can also talk about activities aimed at improving the mental health of society. Mental health is defined as "a dynamic state of internal balance that enables individuals to use their abilities in harmony with universal social values. Basic cognitive and social skills; the ability to recognize, express and modulate one's own emotions as well as compassion for others; flexibility and ability to cope with adverse life events and perform functions in social roles; and a harmonious relationship between body and mind are important components of mental health that contribute to varying degrees to a state of internal balance" (Galderisi, Heinz, Kastrup, Beezhold, Sartorius, 2017). The state of mental health and the ability to find one's place in the psycho-socio-economic environment will depend on many factors, but remain in constant connection with the issue of physical health (Niewielska, 2021), including the state of oral health, which affects the level of self-confidence (Romaniuk-Demonchoux, 2020).

#### **4. RESEARCH METHODOLOGY**

The work is based on the analysis of data collected by the Polish Central Statistical Office and the Polish National Health Fund regarding the number of health services financed from public funds and the financial outlays for these services, as well as the analysis of applicable legal acts regarding the objective and subjective scope of universal insurance coverage for dental needs. Time range 2016–2022 (for numerous services provided) and 2008–2021 (for financial data). The spatial scope is the area of the Republic of Poland.

#### **5. DENTAL SERVICES FINANCED FROM PUBLIC FUNDS IN POLAND**

The provision of dental services financed from public funds in Poland results from the provisions of the Act on health care services financed from public funds (Act, 2004), the Act on medical activities (Act, 2011) and the Regulation of the Minister of Health on guaranteed benefits in the field of dental treatment (Act, 2013). In the latter document, which is modified from time to time, you can find an extensive list of health services, which include:

- general dental services,
- general dental services for children and adolescents up to 18 years of age (including those provided in the dental bus and in the dental office located at school),
- general dental services provided under general anesthesia,
- dental services for beneficiaries at high risk of infectious diseases, including AIDS patients,
- dental surgery and periodontology services,
- orthodontic services for children and adolescents,

- dental prosthetics services,
- providing dental prosthetics for beneficiaries after surgical treatment of facial cancer,
- provision of emergency dental care,
- preventive dental services for children and adolescents up to 19 years of age (including those provided in the dentist's bus and in the dental office located at school).

A simplified list of benefit groups and their limitations are presented in Table 1.

Table 1. Simplified list of restrictions of dental services financed from public funds in Poland

Services group	Quantitative and qualitative limitations	Subject limitations
Oral hygiene examinations and instructions; medical consultations	Limited number of services per time period	Increased frequency in pregnant and postpartum women
X-ray diagnostics	Limited number of services per time period; Limitation regarding of dentist specialization; Limitation of dental equipment	Increased number of services for people up to 18 yo
Conservative dentistry	Material limitations	A wider range of materials for people up to 18 yo
Endodontics	Treatment of incisors and canines; Limitation of dental equipment	Treatment of all teeth in pregnant and postpartum women and for people up to 18 yo
Periodontology	Limited number of services per time period	A wider range of services for pregnant women and the postpartum period, as well as for people up to 18 yo
Dental surgery	-	-
Dental prosthetics	Type (acrylic dentures) and material limitations; Limited number of services per time period	The restrictions do not apply to people after surgical removal of craniofacial tumors
Pediatric dentistry – adaptation visit	Independent visit without other services	Until the age of 6
Preventive services for children	Only specific tooth groups; Place of providing services (school dental office, general dentist's office, dental bus)	Age restrictions
Pediatric dentistry in general	Restrictions on the type of teeth (baby/permanent)	Age restrictions
Orthodontic diagnosis, orthodontic treatment and orthodontic treatment control	Type limitations (one- and two-jaw appliances)	Age restrictions

Source: Own study based on the Regulation of the Minister of Health of November 6, 2013 on guaranteed benefits in the field of dental treatment (Act, 2013).

Despite the extensive list of dental services provided and paid for by the public payer, it has a number of exceptions and limitations, especially regarding the number of services provided of a given type, their frequency, equipment and material limitations, as well as limitations regarding the patients themselves (usually an increased scope of services for children and adolescents and also for pregnant women and the postpartum period).

The greatest limitations, especially from the point of view of conservative dentistry and the aesthetic final effect of treatment, are material limitations. The regulation lists in detail what types of dental materials may be used when providing dental services financed by the National Health Fund to specific groups of patients. This list is presented in Table 2.

Table 2. Materials used in the provision of dental services financed from public funds in Poland

Groups of beneficiaries	Dental materials
All patients	<ul style="list-style-type: none"> <li>• material for temporary fillings,</li> <li>• base cements based on calcium hydroxide, phosphate cement,</li> <li>• glass ionomer cements,</li> <li>• chemically hardened composite material for filling cavities in upper and lower front teeth (from 3+ to +3, from 3- to -3),</li> <li>• non gamma 2 capsule amalgam,</li> <li>• materials for filling root canals,</li> <li>• gutta-percha points,</li> <li>• alginate impression material,</li> <li>• material for functional impressions in edentulism,</li> <li>• surgical sutures,</li> <li>• immobilization splints, ligature wire.</li> </ul>
Children and adolescents up to 18 yo	<ul style="list-style-type: none"> <li>• light-cured composite material for filling cavities in incisors and canines in the upper and lower jaws,</li> <li>• fissure sealants,</li> <li>• varnishes,</li> <li>• surgical cement as a dressing for periodontal procedures.</li> </ul>
Pregnant and postpartum women	<ul style="list-style-type: none"> <li>• surgical cement as a dressing for periodontal procedures.</li> </ul>

Source: Own study based on the Regulation of the Minister of Health of November 6, 2013 on guaranteed benefits in the field of dental treatment (consolidated text: Journal of Laws of 2021, item 2148).

Minors can count on the best dental materials. A particularly large difference is visible in the case of conservative dentistry, i.e. in the types of fillings for cavities.

As can be seen in Table 3, the number of dental consultations within the public system remains at a similar level of 33-34 million consultations per year in 2016-2022 (except for 2020-2021, which can be explained by the COVID-19 pandemic crisis). The number of dental consultations within the public system usually constitutes approximately 11-12% of the number of medical consultations in a given year and this percentage remains at a relatively similar level. However, in financial terms (Table 4), the value of dental services in relation to all services financed by the public payer is constantly decreasing. The planned cost of dental services in 2008 represented 3.83% of the planned expenses for all medical services, and in 2021 it was to be only 1.72%.

Table 3. Number of medical consultations and the number of dental consultations financed from public funds in Poland in 2016–2022 (in millions)

Year	Number of medical consultations	Number of dental consultations	Percentage of dental advice compared to medical advice
2022	297.6	33.2	11.2
2021	285.9	30.7	10.7
2020	256.6	26.5	10.3
2019	291.5	34.3	11.8
2018	288.2	34.4	11.9
2017	285.7	34.5	12.1
2016	282.5	34.5	12.2

Source: Own study based on( GUS 2017, GUS 2018, GUS 2019, GUS 2020, GUS 2021, GUS 2022, GUS 2023).

Table 4. The value of dental services financed from public funds in Poland compared to all medical services financed from public funds according to the National Health Fund's expenditure plans in 2008–2021 (in PLN million)

Year	Total medical services	Dental services	Percentage of expenditure on dental services in relation to total services
2008	49 348	1 889	<b>3.83</b>
2009	53 498	1 964	3.67
2010	56 415	1 716	3.04
2011	58 399	1 753	3.00
2012	61 698	1 801	2.92
2013	62 974	1 774	2.82
2014	63 792	1 773	2.78
2015	67 879	1 763	2.60
2016	70 793	1 781	2.52
2017	74 064	1 822	no data
2018	77 509	1 901	2.45
2019	91 122	1 912	<b>2.10</b>
2020	102 132	1 911	<b>1.87</b>
2021	120 151	2 070	<b>1.72</b>

Source: (NIL, 2019).

## 6. DISCUSSION

Despite many voices, especially in the media, saying that dental treatment under the National Health Fund is practically impossible (Stec-Fus, 2023), expenditure on this field of health care is nominally increasing. However, taking into account the share of dentistry in the general expenditure of the public payer, this amount is decreasing every year. From the point of view of the significantly increasing costs of medical entities, operating within the public health care system seems to be unprofitable for many of them (Zagórski, 2021).

Undoubtedly, restrictions on the financing of dental services result in longer queues to the dentist. Although there are voivodeships in Poland where the waiting time for an

appointment under the National Health Fund is about a week, in others this time is extended to almost a month (Dentonet, 2023a).

The value of the dental market in Poland in 2024 is estimated by PMR Market Experts at PLN 16 billion (Dentonet, 2023b). The National Health Fund plans to allocate PLN 3.3 billion for dental treatment (Dentonet, 2023a). Therefore, it can be assumed that nearly 80% of dental services in Poland will be paid for commercially (most often from patients' private funds and voluntary insurance). However, it should be remembered that income, education and place of residence influence the use and non-use of dental services and we can talk about health inequalities (Piotrowska, Pędziński, Jankowska, Milewska, 2020).

Dentistry is the branch of medicine that particularly recognizes the need for preventive measures. This is due to, among others, due to the high prevalence of dental diseases and the often ineffectiveness of the treatment undertaken (Jańczuk, 2018). On the one hand, this idea fits into the financial decisions of the National Health Fund in the field of dentistry, because the National Health Fund actually finances preventive activities, and on the other hand, the relatively narrow and shallow scope of the guaranteed benefits package causes some patients to resign from these services, which may even result from ignorance, what they are entitled to under universal health insurance. Of course, the basis for preventive activities should be health education from an early age (Banasiuk, Uracz, Lishchynskyy, Brukwicka, Kopański, 2017; Szeroczyńska, 2023). Its lack may result in negative health effects throughout life, but when properly implemented, it may bring positive effects - not only health-related, but also economic, due to the lower need for medical interventions or their better and longer-lasting effects (Anopa, Macpherson, McMahon, Wright, Conway, McIntosh, 2023). Appropriate actions from the point of view of prevention and education include, on the one hand, a fairly wide range of benefits for people up to 18 years of age, and on the other hand, the correction coefficient introduced in 2019 for services provided in this age group at the level of 1.5, i.e. the entity providing the benefit receives 50% more remuneration for these benefits than if they were provided to adults (Act, 2019).

Living in good health is one of the sustainable development goals. Due to the broad definition of health as physical, mental and social well-being, this topic should be considered in many aspects. Dental problems, diseases of the masticatory system or tooth loss also adversely affect other functions of the human body (DTP, 2011), but they also directly affect the quality of people's lives (Kuryu, Niimi, Gotoh, Shimizu, Kobayashi, 2019). Researchers also calculate that the loss of a tooth or teeth is equivalent to a decrease in the value of the QALY indicator (Wigsten, Kvist, Jonasson, Davidson, 2020), i.e. further quality-adjusted years of life, which is intended to optimize the choices of health interventions (Topór-Mądry, Gilis-Januszewska, Kurkiewicz, Pająk, 2002).

Although the beginnings of the COVID-19 pandemic indicated that its duration may impede the implementation of the Sustainable Development Goals, including Goal 3, related to health (Kaczmarek, 2020), problems with access to health services at that time made many people realize how important it is taking proper care of their health, increasing public health awareness.

## **7. CONCLUSIONS, IMPLICATIONS AND LIMITATIONS**

The inability to cover many dental services under general health insurance means that some consumers will pay for these services from their own funds, but others will forgo them, especially in the case of relatively minor health problems or simply dental

prophylaxis. Preventive and educational activities in the field of oral health and hygiene are most often not only more effective, but also more economically rational. Advanced disease states, however, may lead to far-reaching consequences - specialized treatment or the appearance of missing teeth. This causes problems for the patient - social (related to appearance, lack of self-confidence) and economic (costs). However, it is not only the patient/consumer who bears the economic costs. The public payer finances part of the services in the field of dental prosthetics and dental surgery, which are cost-intensive branches of dentistry. Moreover, worsening dental problems may negatively impact a person's overall well-being and go beyond the scope of interest of a dentist. This may result in the need for additional expenditure on the part of the National Health Fund for the treatment of diseases that may be directly or indirectly caused by negligence in the oral cavity.

Particularly noteworthy are activities in the field of prevention and dental education, which influence not only the maintenance of good health, but also proper health habits, and, consequently, influence a better quality of life, self-confidence and a better place in society. At the same time, these are the activities that the public payer should focus on. However, we cannot forget about other services, the significant limitations of which in terms of implementation or quality may lead to further migration of patients towards private health care, and in the case of some of them, to giving up dental treatment and creating further health inequalities. However, this cannot be done without significant increases in expenditure on public dentistry, which, although nominally increasing year by year, is falling dramatically in relation to the overall expenditure of the National Health Fund on health care.

Due to the fact that this work is largely based on secondary data and applicable legal acts, it lacks a broader perspective from both health care entities and patients themselves. In further considerations, it would be appropriate to conduct direct research among managers of dental entities in Poland and among consumers. It seems that qualitative research would be the most appropriate, and in the case of patients, additionally quantitative research. Another imperfection is the different time frames for quantitative and financial data on benefits financed from public funds, which results from the limited data published by the Polish Central Statistical Office (GUS).

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## INFLUENCE OF DIGITALIZATION ON MUSICAL ARTS CONSUMERS' BEHAVIOURS DURING THE COVID-19 PANDEMIC: ART MANAGEMENT FROM A GENERATIONAL PERSPECTIVE

The digitalization of the aesthetic experience influences the quality of participation in musical arts. Due to differences in perception among consumers of musical arts belonging to particular generations, this study aims to assess the influence of the participation form (in-person or digital) in the aesthetic situation. The COVID-19 pandemic forced the common digitalization of the aesthetic situation and catalyzed broad research on all art disciplines. Qualitative data analysis (based on ten criteria) constructed on an international sample concludes that the form in which one participates in musical arts determines the perception of quality in the aesthetic situation, which is assessed differently depending on one's generation. Significant determinants exist among generations in participation in musical arts and between particular forms of participation. The research results should interest musical arts creators, managers, marketers, recipients, and researchers.

**Keywords:** art management, generation differences, quality, aesthetic situation.

### 1. INTRODUCTION

Art management can be analysed on many levels like the operational and financial organisation of cultural events, institutions, and environments for art creation (Kostera, 2013; Kostera, Śliwa, 2012) or reflexive self-consciousness and self-organisation of art creators (Kostera, 2019; Linstead, Höpfl, 2000) or management of the form and content of the artwork by the art creator who can be considered as the manager of the aesthetic situation (Szostak, 2023). However, it always combines two seemingly opposite directions: creative freedom and strict order. For centuries, the content of the artistic activities of humanity has been relatively fixed, although their forms change endlessly. With the digitalisation process, the end of the 20th century opened a new dimension of artistic

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activities. Digitalisation determines new management challenges and possibilities because in-person (it will be called in this paper, in-real) activities are transferred to virtual forms, and this transfer changes the content and the form of art disciplines. Due to its audible characteristics, music reacts to the digitalisation process in particular ways. Furthermore, the COVID-19 pandemic touched all human processes and sped up digital participation in numerous areas, including the arts (Lei, Tan, 2021). Because the form of participation shapes participation content and accordingly switches contributions and outcomes (Karayilanoğlu, Arabacıoğlu, 2020), we cannot forget that culture plays an important role (Hofstede, 2011; Vollero et al., 2020). Furthermore, digitalisation progressively changes the culture in its wholeness: along with technological advancement comes a transformation of aesthetic experiences, social contacts and forms of expression (Kröner et al., 2021). Therefore, in constantly-evolved circumstances, management also requires new approaches and tools.

Considering the participation in musical arts from the aesthetic situation perspective, the exploration should be undertaken from two sides: the creators and the recipients (Gołaszewska, 1984; Szostak, 2020, 2021a; Szostak, Sułkowski, 2020a). Therefore, the spine of this investigation is a function of the combination of “aesthetic situation” and “digital technologies” to get information about the change of creativity and artistry potential. The primary research problem focuses on analysing the impact of digital technologies on the aesthetic appreciation of different musical genres, in different formats of delivery, to people of different ages. This issue can be separated into the following levels: 1) creator-artwork (creative process) and 2) artwork-recipient (receiving process). This article focuses on the artwork-recipient and its aims are: 1) assessment of the influence of digital technologies on the perception of musical arts by particular generations; 2) assessment of the level of the influence of digital technologies on the perception of musical arts by particular generations; 3) assessment of the level of creativity and artistry loss or gain due to the use of digital technologies in musical arts seen by particular generations. Therefore, based on differences, the following research hypothesis was created to achieve these goals: The form of participation (in-real or digital) in musical arts shapes participation quality in the aesthetic situation by arts recipients belonging to particular generations differently. Therefore, the following research questions were established to verify this hypothesis: RQ1) How do arts recipients from particular generations perceive the quality of participation in musical arts regarding the form of participation (in-real or digitally)? RQ2) What are the differences among arts recipients from different generations between particular forms of participation in musical arts? This research does not intend to explain differences in evaluating the aesthetic situation’s quality, which can be described only after broad comparative qualitative research. However, this investigation’s results can be a central basis of indicators for forming the model for this kind of roots research. Therefore, this paper presents a rather general discussion of generational differences.

## 2. LITERATURE REVIEW

Art in human existence has been present since the earliest times, and through the centuries, the roles of arts and creativity have mixed and evolved. Although aesthetics as a distinct discipline has split off relatively late, it was present from the beginning of abstract thought within philosophical discourses (Gołaszewska, 1984; Szostak, Sułkowski, 2020a; Tatkiewicz, 2015). Art is a way of transferring the artist’s will into the artwork to affect

the recipients, and the artist's role is to communicate inner states; artists express their states of mind, permitting recipients to achieve particular states (Szostak, Sułkowski, 2020a). From the aesthetic situation point of view, the art creator generates his artwork reflecting the real world and the world of universal values, and the art creator departs this ready-made result (artwork) for the recipient. The work of art is a carrier of creativity and artistry (Szostak, 2020); the level of creativity and artistry (universal values included) located in the artwork varies on the art recipient's attitude and the form of participation in art (Szostak, 2021a). The recipient selects the way of participation in the receiving process fitting to particular conditions. On the other side, the unadjusted-to-the-circumstances choice of the perception form determines the content of the receiving process. More experienced recipients may be supplementary fluent in using a less efficient form of participation without the quality of the content. Opposing, even the most efficient participation form may not be sufficient to distribute the complete content to the less-experienced recipient (Gołaszewska, 1984; Szostak, 2020).

Art participation requires senses (Ekmekçi et al., 2014; Sosnowska, 2015). However, despite the arts' digitalisation being regulated by the technical possibilities to transmit the analogue senses' experience into virtual aspects (Mao, Jiang, 2021), it is justified that virtual involvement in musical arts plays the role of 'digital mediation'. This notion locates the role of digital technology in a proper position, i.e., in 'between' the artwork and the recipient (Jarrier, Bourgeon-Renault, 2019). Furthermore, senses allow for physical, emotional (Buravenkova et al., 2018), intellectual, and spiritual (Rivas-Carmona, 2020; Wu, J.C., 2020) participation in art. Examining the receiving process on all levels in the context of cultural differences exposes the investigated problem's complexity level.

Advanced IT tools, digitalisation, social media, and constantly developing business skills forced the arts to take a sharp turn (Handa, 2020). In the digital age, performative arts have radically shifted since ephemeral performance may be stopped, replayed, and repeated (Dunne-Howrie, 2020). Even though the escalation of digitalisation use in musical arts has been faster, more comprehensive, and more severe year by year, the COVID-19 pandemic added additional stimuli to this process, like lockdowns and social distancing (Lei, Tan, 2021; Raimo et al., 2021; Szostak, Sułkowski, 2021a). Parallely, aside from the digital transformation of participation in musical arts, there are complementary trends among artists like their shift in the direction of entrepreneurship (Szostak, Sułkowski, 2021a) or new problems with artists' auto-identification (Szostak, Sułkowski, 2021b, 2021c). That is why digitalisation may be seen as a revolution or evolution. Digital technologies permit redesigning the environment and historical attempts to address numerous issues. Therefore, it can be said that today's culture is ordered by digitalisation (Roberge, Chantepie, 2017). Because digital transformation marks and is marked by specific cultures differently, it also amplifies spirituality from its real setting in the socio-cultural interpretation of the real world to current digitally mediated settings (Sosnowska, 2015). Mediatisation of cultural practices has been switching the processes of cultural memory construction, and online interface skills have become the foundation of education to equalise tradition and modernisation (Arkhangelsky, Novikova, 2021). The aim of using the Internet as a sharing platform engaging the public in creating artwork is to showcase the connection between the common imagination and the certain artistic sensibilities of its participants (Literat, 2012).

Digitalisation, broadening horizons for musical arts recipients, unlocks other concerns simultaneously. First, the attitude of the mass recipients decreases the musical artwork's artistic quality. Second, the digitalisation of musical arts develops the serving role of these

arts to make them more understandable and customer friendly (Pöppel et al., 2018; Szostak, 2021a). Third, digital exclusion limits participation in the receiving process (Hracs, 2015; Rikou, Chaviara, 2016). Still, a vital question is the relationship between value and quality used to measure and compare various objects encountered (Fortuna, Modliński, 2021). For example, considering musical arts, during the reception of a concert in in-real form, the recipient meets the artwork in its desired-by-artist appearance: no volume adjustments, no pauses. On the contrary, the digital form of involvement in musical arts allows for these adjustments and – if made arbitrarily – the artwork affects the recipient differently from the creator's desire. In performing arts perceived in-real, a recipient is also a hostage of the artwork; he must keep the regimes of the artwork (its length, volume, visibility). Therefore, digitalisation probably shapes the performing arts the most (Dube, Ince, 2019). Finally, the concept of self-historicisation, merging with the contemporary artistic language of performance, supports the artists' recognition in the international art context; a long period of communism shaping the culture of participation in art plays a vital role here (Proksch-Weilguni, 2019). Based on that, digital collaboration in art, digital marketing and digital performance can differentiate and include audiences as authentic arts co-producers (Fortuna, Modliński, 2021). It seems interesting to examine how art recipients of different cultures (post-communist and non-communist) perceive artworks formed in this process because the effectiveness and sustainability of the aesthetic situation digitisation are not apparent (Nawa, Sirayi, 2014; Rusinko, 2020).

Generations should be understood as a group of people in the same age range who, primarily due to their similar age, experienced similar events and grew up in similar conditions and times. In light of that definition, the following generations of people can be distinguished: the Silent Generation, Boomers, Generation X, Generation Y and Generation Z. It is worth noting that certain historical conditions strongly influence the formation of characteristic features for a particular social group. Globalisation and the development of technology have also had a substantial impact on the formation of generations. Modern society has changed over the past 20 years due to developing technologies. A change factor is primarily the development of the Internet, social media, and mass communication, which shape modern lifestyles and behaviour in the sphere of professional and personal development (Oleksyn, 2011).

The Silent Generation is exceptionally quiet, raised during World War II. This generation is attached to fixed values that guided them throughout their lives and with a firmly rooted work ethos. They emphasise values such as hard work, loyalty, and thrift and are also known for developing positive relationships (Lissitsa et al., 2022). A life motto most often characterises representants of the Boomers generation: "I work to survive". The most important values for people of this generation are independence, optimism and commitment. In addition, they are oriented toward cooperation, consensus-seeking and active communication (Olsson et al., 2020; Rusak, 2014). In contrast, representatives of Generation X have an instilled work ethic. For those in Generation X, the following values are essential: personal development, independence, diversity, initiative, and diligence. It is a mature generation of economically active people who prefer secure work that does not require new challenges, subordinating their private lives to work. Representatives of Generation X value ownership, wealth, and social status (Baran, Kłos, 2014; Hardey, 2011). Generation Y and their successors Gen Z (often referred to as "generation C - connected means plugged in) express the principle that all activities are temporary, and work is only a means to achieve goals. Their central values are optimism, idealisation, diversity, ambition, creativity, initiative, innovation, education, and training. They



prioritise private life over professional success - the successes of personal life. Representatives of Generation Y have a strong sense of self-worth, so they do not want to sacrifice for work – it is work that should fit their needs (Baran, Kłos, 2014; Meister, Willyers, 2010). They most value and seek experience, freedom, fun, and social status (Hardey, 2011). They are open to change and adapt quickly to a new environment. In addition to the demands for opportunities for intensive development and challenges at work, they also emphasise a balance between personal and professional life and a clear development path (Deal et al., 2010; Kaźmierczak, Kocur, 2009). Characteristics attributed to Generation Z include self-confidence, openness, individualism, optimism, tolerance, commitment, search for novelty and change, accumulation of experiences and proximity to social media. This generation constantly uses social media and spends hours using the Internet to gain valuable information, knowledge, and entertainment (Czuchaj-Łagód et al., 2014; Hardey, 2011).

It is worth asking about the reasons for differences between generations in assessing the receiving process of musical arts. The first trace may lead to political system transformation theory focusing on time perspective for changes in culture and identity of society; more extended period and power of communist burden, more significant changes and a more extended period of forgetting about the past and achieving free perspective of non-communist societies (Pavlica, Thorpe, 1998; Szostak, 2021b, 2021c). These results were observed by researchers of many European post-communistic countries like the Czech Republic (Hornat, 2019), Estonia, Latvia, Lithuania (Kreuzer, Pettai, 2003), Slovakia (Mikloš, 2021), and currently communist countries like China (Xue et al., 2021). There are three transformation strategies of countries from communism: 1) gradualist, 2) radical, and 3) spontaneous (Mikloš, 2021), and each of them determines the cultural results differently. In addition, the quality of the education system and the governments' priorities are crucial (Birch, 2003; Golob, Makarovič, 2017; Hornat, 2019). In this context, the sustainability issue in this transformation is crucial for all three pillars of sustainable development; each mentioned strategy has different consequences on economics, the environment and societies (Mikloš, 2021).

### 3. METHODS AND MATERIALS

Research in reviewing literature focused on a qualitative choice of the content of Google Scholar, Mendeley, EBSCO, JSTOR, and Scopus databases, especially from the last five years (2018–2022), and data using NVivo Pro software was undertaken. The methodological approach to the literature review was based on an interdisciplinary approach blending aesthetic theory, cultural and reception studies, sustainable development, information visualisation, human-computer interaction, arts and management. However, only musical arts (instrumental and vocal concert and performance, oratorio) were analysed for this research. Based on the literature review, ten aspects were set for the participation quality in musical arts assessment: 1) satisfaction from the participation (Guo et al., 2020; Quattrini et al., 2020; Zollo et al., 2021), 2) participation pleasure (Dunne-Howrie, 2020), 3) participation engagement (Dube, Ince, 2019; Quattrini et al., 2020; Wu, Y. et al., 2017), 4) catharsis-experiencing possibility (Craig et al., 2020; Lee, 2011), 5) contact with the artwork itself (Habelsberger, Bhansing, 2021), 6) contact with the performer itself (Wu, Y. et al., 2017), 7) participation comfort (Guidry, 2014), 8) shaping-the-aesthetical-experience possibilities (Jackson, 2017; Park, Lim, 2015), 9) own

motivation to participate (Hobbs, Tuzel, 2017; Pianzola et al., 2021), 10) participation easiness (Dunne-Howrie, 2020; Fancourt et al., 2020).

For the analysis, the division of generations was adopted according to the following periods (The Pew Research Centre, 2019): Silent (1928–1945); Boomers (1946–1964); Gen X (1965–1980); Gen Y (1981–1996) and Gen Z (1997–2012). In the second step, a quantitative investigation was made to estimate generation-differentiated recipients' participation quality in musical arts analysed based on the ten criteria described above. Furthermore, this step aimed to conclude the results about different artistic activities possibly being comprehensible simultaneously. IBM SPSS and MS Excel software executed data analysis; however, complex statistics were not conducted due to the small sample size ( $n = 115$ ). The quantitative investigation was held between May and December 2021, applying digital tools by SURVIO company. The survey was arranged in English and disseminated by social media, direct requests, and official announcements. It contained 71 questions and was divided into six parts. The first five parts regarded each type of art. All questions were closed-type; respondents could select prepared answers only. While assessing the level of quality of a factor, the respondents used a 5-step Lickert scale: *very low* (1), *rather low* (2), *neutral* (3), *rather high* (4), and *very high* (5). The sixth part of the survey permitted categorising the respondents regarding age (it allowed categorising participants on certain generations), gender, nationality and education level. 28.4% out of 777 visits concluded in 221 responses. The oldest participant was born in 1931 (90 y.o.), and the youngest in 2005 (16 y.o.). Most respondents ( $n=81$ , 70.4%) graduated from Bachelor's, master's, or engineer studies; 33.9% ( $n=39$ ) had a doctorate, habilitation, or professorship; 8.7% ( $n=10$ ) graduated from a technical college or high school, and 1.7% ( $n=2$ ) from primary school or junior high school. Respondents (55.2% men and 44.8% women) came from 38 countries: 37.4% from Poland, 14.8% from the USA, 9.6% from Finland, 7.0% from Ukraine, 6.1% from Germany; the rest of the participants came from Australia, Bangladesh, Belarus, Brazil, Canada, Estonia, Ghana, Holland, Hong Kong, Iran, Lithuania, Nigeria, Slovakia, South Africa, Spain, Switzerland, Thailand, Turkey, the UK, Uzbekistan, and Zimbabwe. This paper describes only a fraction of the research results.

## 4. FINDINGS

### 4.1. Characteristics of interests in musical arts among different generations

Particular generations participate in types of musical arts differently. The Silent generation is not interested in popular musical art only; 25.0% of this generation participates in classical and popular music, and 75% indicate classical music only. Boomers are not interested in popular musical art only; 65.2% of this generation participates in classical and popular music, and 34.8% indicate classical music only. 2.6% of Generation X participates in popular musical art only; 66.7% of this generation participates in classical and popular music, and 30.8% indicate classical music only. 11.1% of Millennials participate in popular musical art only; 75.0% of this generation participates in classical and popular music, and 13.9% indicate classical music only. Finally, 38.5% of Generation Z participate in popular musical art only; 46.2% of this generation participates in classical and popular music, and 15.4% indicate classical music only. See: Figure 1.

The research exposes the following variances between generations in the form of participation in musical arts. Musical arts recipients belonging to the Silent generation consider the quality of the whole aesthetic situation undertaken in-real as 4.52 and digitally

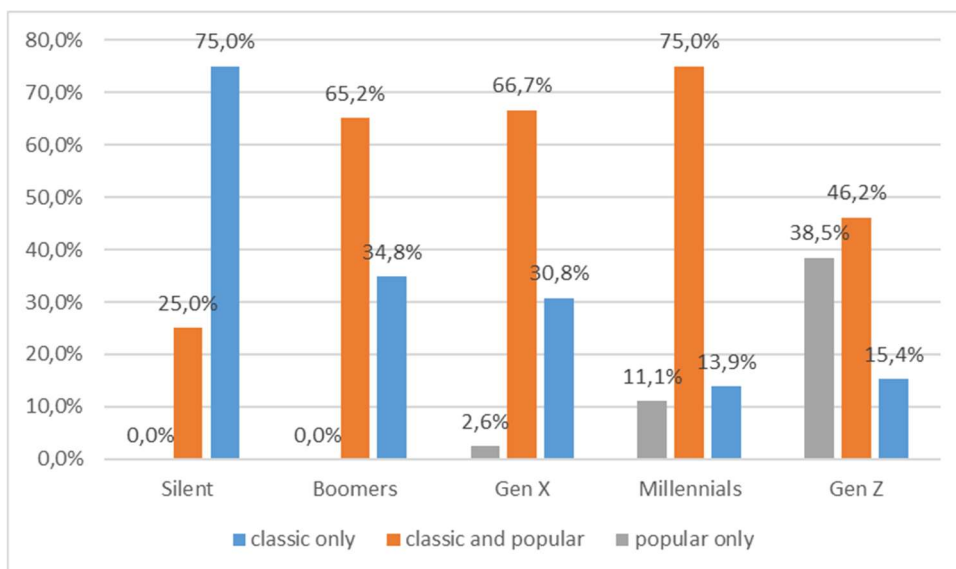


Figure 1. Participation in musical arts regarding its types (classical only, both classical and popular, popular only) by generations

Source: own elaboration.

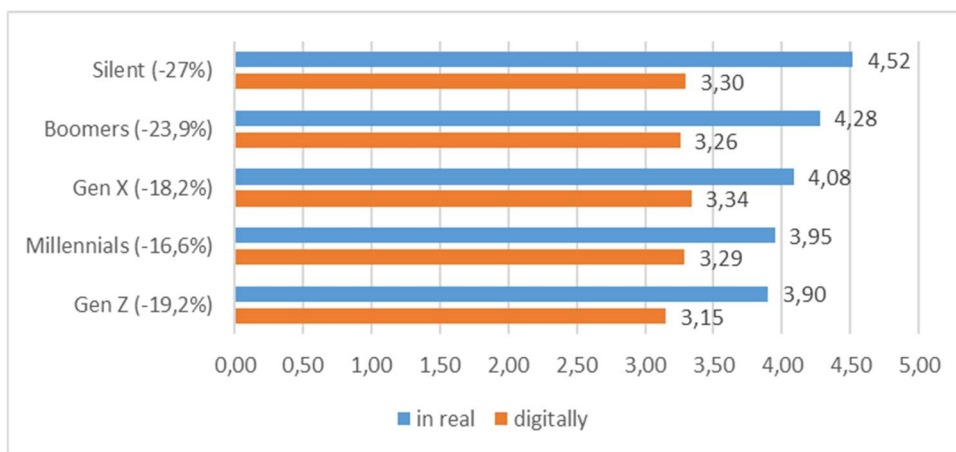


Figure 2. The differences between generations regarding the participation form in musical arts – assessment of the aesthetic situation quality

Source: own elaboration.

as 3.30 (a difference of 27.0%). Musical arts recipients belonging to the Baby Boomers generation assess the quality of the whole aesthetic situation undertaken in-real as 4.28 and digitally as 3.26 (a difference of 23.9%). Musical arts recipients of Generation X assess the quality of the whole aesthetic situation undertaken in-real as 4.08 and digitally as 3.34 (a difference of 18.2%). Musical arts recipients belonging to the Millennial generation

consider the quality of the whole aesthetic situation undertaken in-real as 3.95 and digitally as 3.29 (a difference of 16.6%). Finally, musical arts recipients belonging to Generation Z consider the quality of the whole aesthetic situation undertaken in-real as 3.90 and digitally as 3.15 (a difference of 19.2%). See: Figure 2. All generations assess the higher quality of the whole aesthetic situation undertaken in-real. The oldest generation assesses the highest quality of the whole aesthetic situation undertaken in-real, and then the assessment score declines with every generation. On the other hand, differences in assessing the quality of the whole aesthetic situation undertaken digitally are flatter, and there is no linear correlation. The youngest generation sees no apparent difference in the quality of reception of musical arts in-real and digitally.

#### 4.2. Participation quality assessment in musical arts – the perspective of different generations

After analysing general variances between the forms of participation in musical arts by generations, it is worth verifying how certain constituents of the aesthetic situation act regarding the type of participation in musical arts, considering ten quality aspects.

##### 4.2.1. Satisfaction

The Silent Generation assesses its satisfaction from participation in the receiving process in the in-real form as 4.60 and digitally as 3.40 (a difference of 26.1%). Baby Boomers assess their satisfaction from participation in the receiving process in the in-real form as 4.67 and digitally as 3.32 (a difference of 28.9%). Generation X assesses its satisfaction from participation in the receiving process in the in-real form as 4.45 and digitally as 3.24 (a difference of 27.2%). Millennials assess their satisfaction from participation in the receiving process in the in-real form as 4.32 and digitally as 3.25 (a difference of 24.8%). Generation Z assesses its satisfaction from participation in the receiving process in the in-real form as 3.92 and digitally as 3.45 (a difference of 12.0%). See: Figure 3.

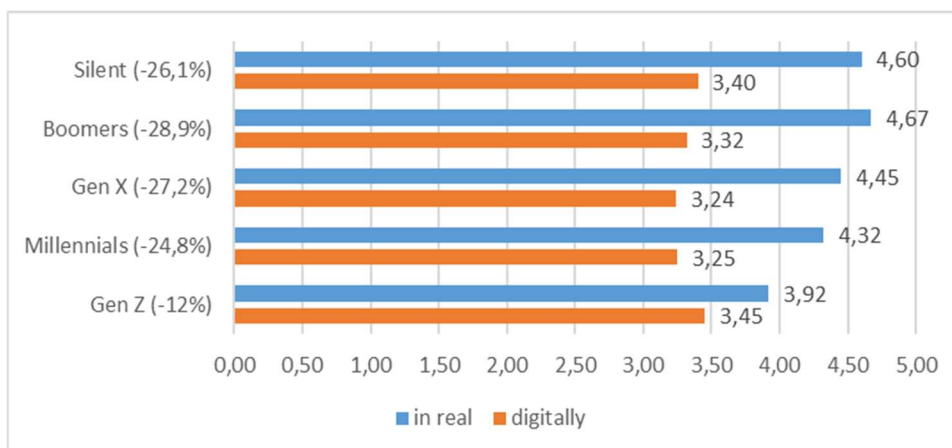


Figure 3. Assessment of satisfaction flowing from musical arts concerning the participation form in the receiving process between generations

Source: own elaboration.

#### 4.2.2. Pleasure

The Silent Generation assesses its pleasure from participation in the receiving process in the in-real form as 4.60 and digitally as 3.20 (a difference of 30.4%). Baby Boomers assess their pleasure from participation in the receiving process in the in-real form as 4.63 and digitally as 3.35 (a difference of 27.6%). Generation X assesses its pleasure from participation in the receiving process in the in-real form as 4.35 and digitally as 3.24 (a difference of 25.5%). Millennials assess their pleasure from participation in the receiving process in the in-real form as 4.29 and digitally as 3.25 (a difference of 24.2%). Finally, Generation Z assesses its pleasure from participation in the receiving process in the in-real form as 4.31 and digitally as 3.45 (a difference of 20.0%). See: Figure 4.

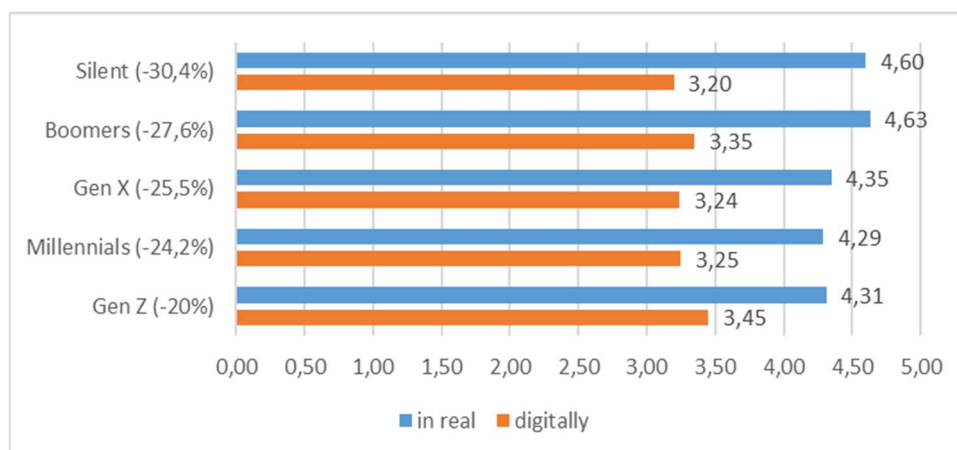


Figure 4. Assessment of pleasure flowing from musical arts concerning the participation form in the receiving process between generations

Source: own elaboration.

#### 4.2.3. Engagement

The Silent Generation assesses its engagement in participating in the receiving process in the in-real form as 4.60 and digitally as 3.20 (a difference of 30.4%). Baby Boomers assess their engagement from participation in the receiving process in the in-real form as 4.21 and digitally as 3.22 (a difference of 23.5%). Generation X assesses its engagement in participating in the receiving process in the in-real form as 4.23 and digitally as 2.95 (a difference of 30.3%). Millennials assess their engagement in participating in the receiving process in the in-real form as 4.16 and digitally as 3.00 (a difference of 27.9%). Finally, Generation Z assesses its engagement in participating in the receiving process in the in-real form as 4.15 and digitally as 2.83 (a difference of 31.8%). See: Figure 5.

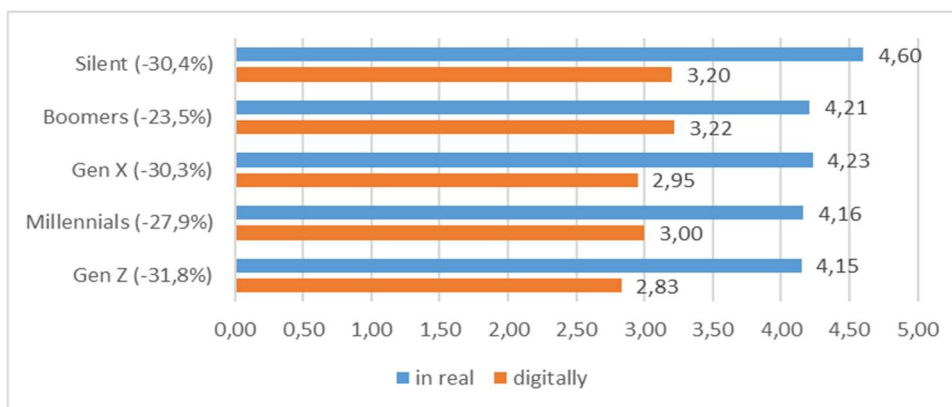


Figure 5. Assessment of engagement flowing from musical arts concerning the participation form in the receiving process between generations

Source: own elaboration.

#### 4.2.4. The possibility of experiencing catharsis

The Silent Generation assesses the possibility of experiencing catharsis from participation in the receiving process in the in-real form as 4.60 and digitally as 3.00 (a difference of 34.8%). Baby Boomers assess the possibility of experiencing catharsis from participation in the receiving process in the in-real form as 4.50 and digitally as 2.96 (a difference of 34.2%). Generation X assesses the possibility of experiencing catharsis from participation in the receiving process in the in-real form as 4.10 and digitally as 3.24 (a difference of 21.0%). Millennials assess the possibility of experiencing catharsis from participation in the receiving process in the in-real form as 3.76 and digitally as 3.19 (a difference of 15.2%). Finally, Generation Z assesses the possibility of experiencing catharsis from participation in the receiving process in the in-real form as 4.08 and digitally as 2.82 (a difference of 30.9%). See: Figure 6.

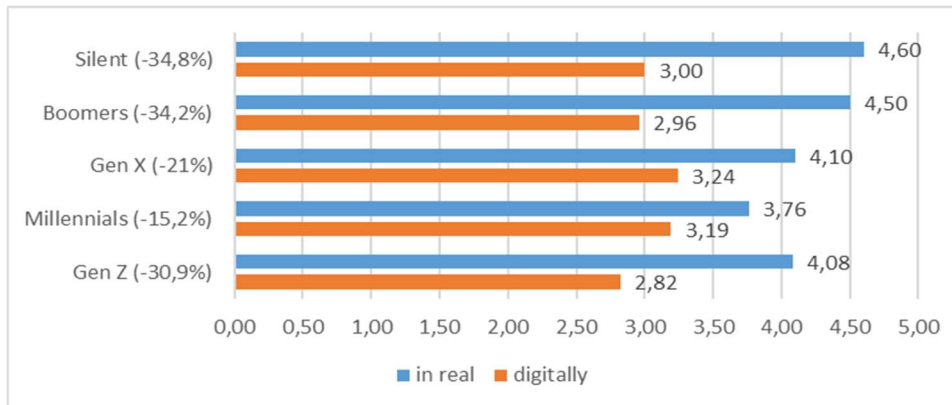


Figure 6. Assessment of the possibility of experiencing catharsis in musical arts concerning the form of participation in the receiving process between generations

Source: own elaboration.

#### 4.2.5. Contact with the artwork itself

The Silent Generation assesses the contact with the artwork itself based on participation in the receiving process in the in-real form as 4.40 and digitally as 3.40 (a difference of 22.7%). Baby Boomers assess the contact with the artwork itself based on participation in the receiving process in the in-real form as 4.50 and digitally as 3.04 (a difference of 32.4%). Generation X assesses the contact with the artwork itself based on participation in the receiving process in the in-real form as 4.25 and digitally as 3.18 (a difference of 25.2%). Millennials assess the contact with the artwork itself based on participation in the receiving process in the in-real form as 4.14 and digitally as 3.17 (a difference of 23.4%). Finally, Generation Z assesses the contact with the artwork itself based on participation in the receiving process in the in-real form as 4.00 and digitally as 3.18 (a difference of 20.5%). See: Figure 7.

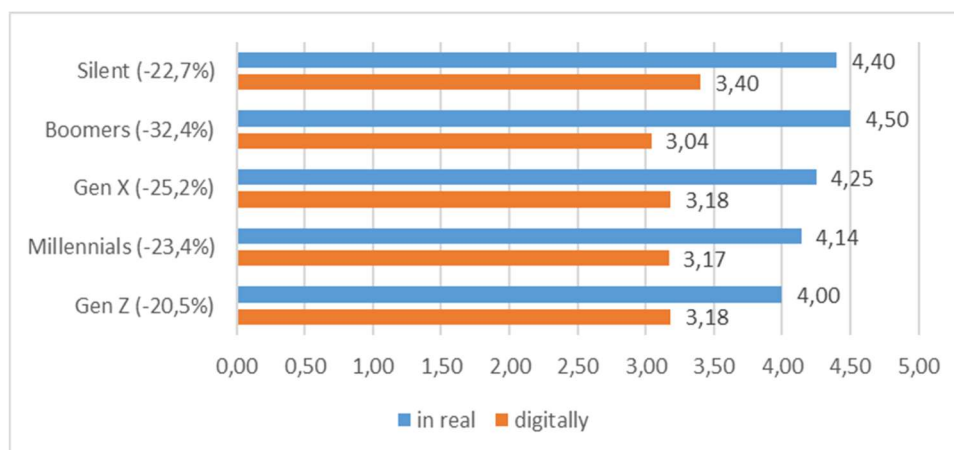


Figure 7. Assessment of contact with the artwork itself in musical arts concerning the form of participation in the receiving process between generations

Source: own elaboration.

#### 4.2.6. Contact with the performer itself

The Silent Generation assesses the contact with the performer itself based on participation in the receiving process in the in-real form as 4.40 and digitally as 3.40 (a difference of 22.7%). Baby Boomers assess the contact with the performer itself based on participation in the receiving process in the in-real form as 4.38 and digitally as 2.70 (a difference of 38.4%). Generation X assesses the contact with the performer itself based on participation in the receiving process in the in-real form as 4.05 and digitally as 3.03 (a difference of 25.2%). Millennials assess the contact with the performer itself based on participation in the receiving process in the in-real form as 4.18 and digitally as 2.74 (a difference of 34.4%). Finally, Generation Z assesses the contact with the performer itself based on participation in the receiving process in the in-real form as 3.69 and digitally as 2.58 (a difference of 30.1%). See: Figure 8.

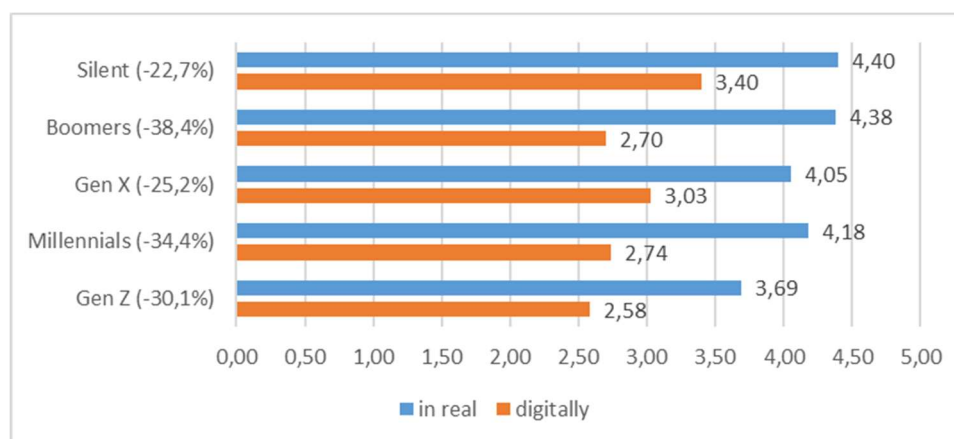


Figure 8. Assessment of contact with the performer itself in musical arts concerning the form of participation in the receiving process between generations

Source: own elaboration.

#### 4.2.7. Comfort of participation

The Silent Generation assesses the comfort of participation in the receiving process in the in-real form as 4.60 and digitally as 3.40 (a difference of 26.1%). Baby Boomers assess the comfort of participation in the receiving process in the in-real form as 4.38 and digitally as 3.52 (a difference of 19.6%). Generation X assesses the comfort of participation in the receiving process in the in-real form as 4.15 and digitally as 3.41 (a difference of 17.8%). Millennials assess the comfort of participation in the receiving process in the in-real form as 3.89 and digitally as 3.72 (a difference of 4.4%). Finally, Generation Z assesses the comfort of participation in the receiving process in the in-real form as 3.77 and digitally as 3.25 (a difference of 13.8%). See: Figure 9.

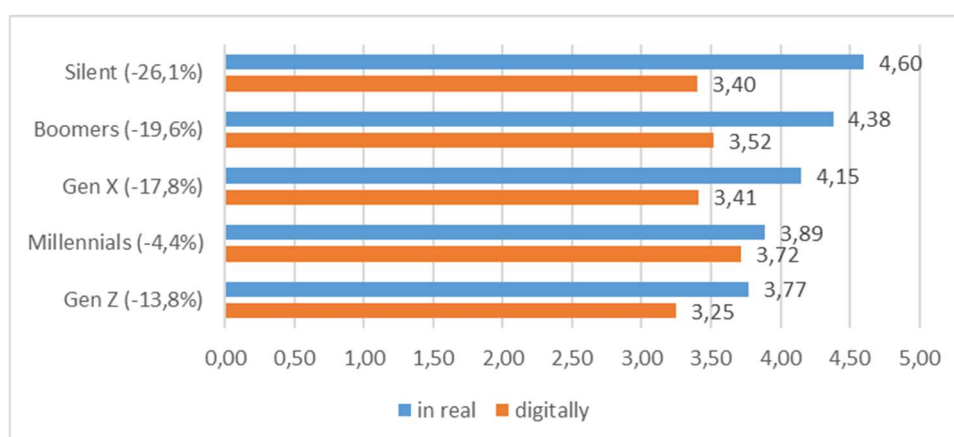


Figure 9. Assessment of comfort of participation flowing from musical arts concerning the form of participation in the receiving process between generations

Source: own elaboration.



#### 4.2.8. Possibilities of shaping the aesthetical experience

The Silent Generation assesses possibilities of shaping the aesthetical experience by participation in the receiving process in the in-real form as 4.20 and digitally as 3.60 (a difference of 14.3%). Baby Boomers assess possibilities of shaping the aesthetical experience by participation in the receiving process in the in-real form as 3.71 and digitally as 3.35 (a difference of 9.7%). Generation X assesses possibilities of shaping the aesthetical experience by participation in the receiving process in the in-real form and digitally equally as 3.63 (no difference). Millennials assess possibilities of shaping the aesthetical experience by participation in the receiving process in the in-real form as 3.32 and digitally as 3.61 (a difference of 8.7%). Finally, Generation Z assesses possibilities of shaping the aesthetical experience by participation in the receiving process in the in-real form as 3.31 and digitally as 3.50 (a difference of 5.7%). See: Figure 10.

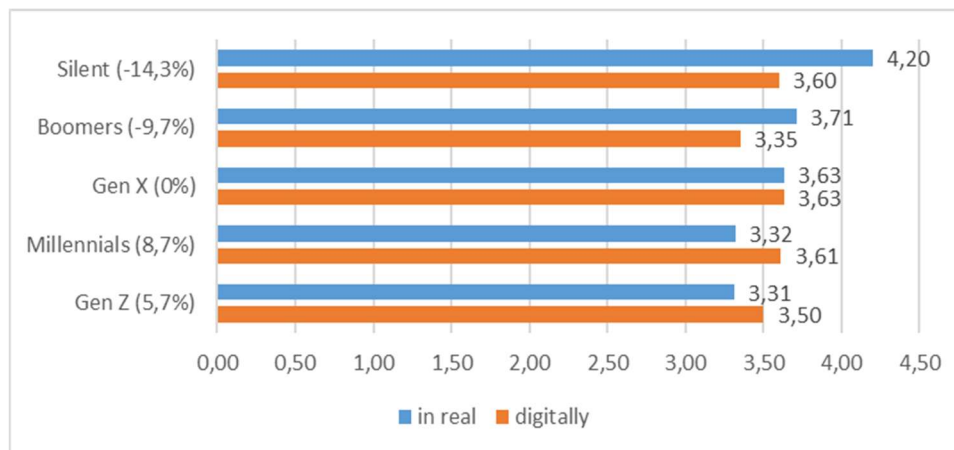


Figure 10. Assessment of possibilities of shaping the aesthetical experience in musical arts concerning the form of participation in the receiving process between generations

Source: own elaboration.

#### 4.2.9. Own motivation to participate

The Silent Generation assesses its motivation to participate in the receiving process in the in-real form as 4.80 and digitally as 3.20 (a difference of 33.3%). Baby Boomers assess their motivation to participate in the receiving process in the in-real form as 4.21 and digitally as 3.35 (a difference of 20.4%). Generation X assesses its motivation to participate in the receiving process in the in-real form as 4.28 and digitally as 3.37 (a difference of 21.3). Millennials assess their motivation to participate in the receiving process in the in-real form as 4.00 and digitally as 3.47 (a difference of 13.3%). Finally, Generation Z assesses its motivation to participate in the receiving process in the in-real form as 4.08 and digitally as 3.17 (a difference of 22.3%). See: Figure 11.

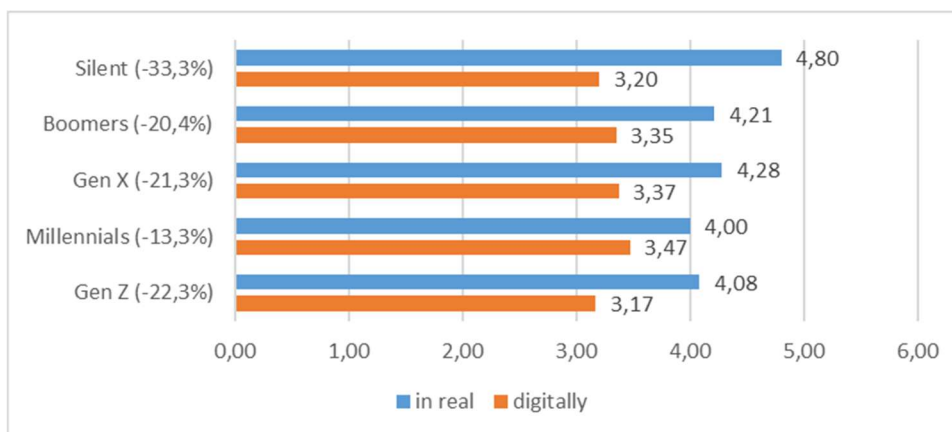


Figure 11. Assessment of own motivation to participate in musical arts concerning the form of participation in the receiving process between generations

Source: own elaboration.

#### 4.2.10. Easiness of participation

The Silent Generation assesses the easiness of participation in the receiving process in the in-real form as 4.40 and digitally as 3.20 (a difference of 27.3%). Baby Boomers assess the easiness of participation in the receiving process in the in-real form as 3.58 and digitally as 3.74 (a difference of 4.5%). Generation X assesses the easiness of participation in the receiving process in the in-real form as 3.35 and digitally as 4.16 (a difference of 24.3). Millennials assess the easiness of participation in the receiving process in the in-real form as 3.42 and digitally as 3.67 (a difference of 7.3%). Finally, Generation Z assesses the easiness of participation in the receiving process in the in-real form as 3.69 and digitally as 3.42 (a difference of 7.3%). See: Figure 12.

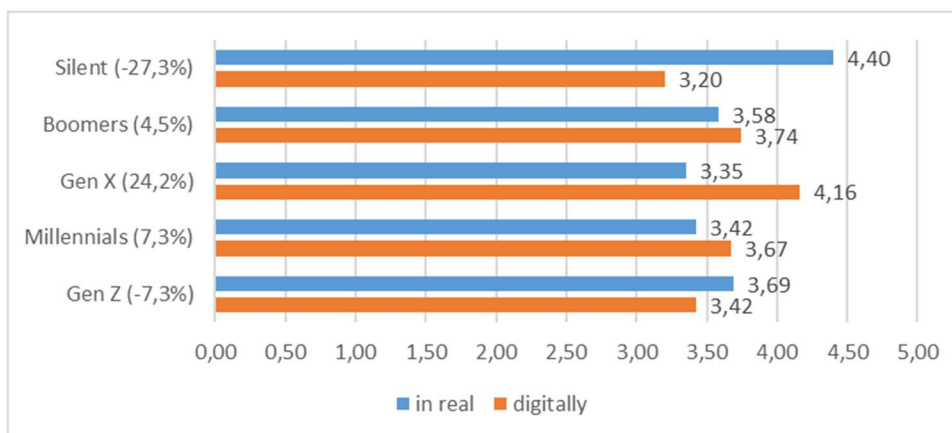


Figure 12. Assessment of easiness of participation in musical arts concerning the participation form in the receiving process between generations

Source: own elaboration.

## 5. CONCLUSIONS

It can be concluded that the form of participation (in-real or digital) in musical arts influences the level of participation quality in the aesthetic situation by recipients from particular generations differently. The confirmation of the hypothesis followed the answers to the research questions, showing variances between participation in musical arts and particular forms of participation by the representatives of different generations (Silent, Boomers, Gen X, Gen Y, Gen Z). Finally, extrapolating the conclusions, it can be said that these differences are based on fundamental cultural dimensions, e.g., individualism-collectivism or uncertainty avoidance and arise strictly from history (Hofstede, 2011).

In general, the minor differences in the quality reception of musical art between offline and online forms of participation occur in the aspect of possibilities of shaping the experience, ease of participation, and comfort of participation. The most significant observed differences appear in the context of engagement, the possibility of experiencing catharsis and pleasure. It means that especially these quality aspects are dependent on the form of participation in musical arts. The stationary form of participation is essential for musical arts attendees as the possibility of experiencing catharsis and pleasure is the most influential on engagement.

Considering how the various qualitative aspects of the aesthetic situation behave concerning the type of participation in the musical arts, one can see differences between generations. For representatives of the Silent Generation, the most significant importance of the stationary form of participation in musical art is their motivation to participate, while the digital form of participation affects the possibilities of shaping experiences the most. For the Boomer Generation and Generation X, the stationary form of participation is crucial for the satisfaction and pleasure obtained from musical art. From the perspective of the digital form, on the other hand, the easiness of participation and comfort of participation matter the most. Interestingly, participation is easier for these generations through digital than in-real forms. For Generation Y, on the other hand, satisfaction and pleasure matter for offline participation, while the comfort of participation and possibilities from shaping experiences matter for participation in the digital form. Finally, the youngest Generation Z focuses on qualitative characteristics: pleasure and engagement - offline, while possibilities of shaping own experiences are essential online.

As limitations of the research may be seen: 1) The vast majority of the sample was represented by persons with Bachelor's, Engineer's, Master's, Doctoral and Professorship diplomas, who are more conscious of their behaviour and better equipped to describe their perception of ethereal issues and features in comparison to the rest of society; 2) The sample set was relatively small for broad conclusions ( $n = 115$ ).

The results of this investigation should be stimulating for: 1) Musical arts creators looking for the optimal and sustainable way of distributing artworks among recipients from different generations; 2) Musical arts managers and marketers for a deeper understanding of generation-diversified musical arts recipients' perspectives and their preferences about participation in musical arts in-real or digitally; 3) Musical arts recipients to compare their opinion about the ways of participation in musical arts with the preferences of recipients belonging to particular generations.

Potential research questions for additional research may be the following: 1) How do musical arts creators belonging to particular generations perceive the loss or gain of artistry and creativity regarding diverse forms of artwork distribution? 2) What are the generations' variances in artistry and creativity loss or gain regarding diverse forms of receiving process

between diverse cultures? 3) What are the variances in artistry and creativity loss or gain regarding diverse forms of receiving process by members of particular generations? 4) How can particular generations use the differences in participation in musical arts towards sustainable development of society, economy and environment?

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