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Actors in Environmental Discourse: The Discursive Institutionalism Perspective

Abstract:

Objective: Examined for years in various contexts, the environmental issue does not directly focus on the involvement of actors in the process of discourse institutionalisation, which is achievable through the application of discursive institutionalism. The aim of the study is to characterise actors involved in the environmental discourse studied using the discursive intuitionalism approach: who participates in discourses, with whom they co-participant, and based on which sources of discourse records their presence is studied.

Research Design & Methods: A systematic review examined 185 DI articles from 2004 to 2022, selecting 33 focused on environmental topics for content analysis.

Findings: Seven actor groups in environmental discourse were identified, with government, experts, and NGOs being the most frequent participants. Government predominated in co-occurrence, and discourse records mainly originated from government documents, legislative materials, and reports.

Implications/Recommendations: Further research is recommended to delve into actor profiles, explore the relationship between discourse source selection and actor appearance, and observe trends in DI research methods. Emphasising inclusive representation in environmental discourse is crucial for policymakers.

Contribution/ Value Added: Participation in environmental discourse is dominated by actors with specialised knowledge or resources, responsible for shaping political agenda goals. This results in low representation of unaffiliated citizens, business, and media.

Article classification: research article

Keywords: environmental discourse, environmental policy, discursive institutionalism, actors, environmental economics

JEL classification: Q5, H8

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Introduction

The placement of specific social needs and problems on the agenda of state action is achieved through their politicisation in political discourse (Kulawik, 2009). The process of the institutionalisation of particular challenges is accompanied by numerous actors who, through interaction, determine the final form – the shape – of public programmes, policies, or social visions. Discourse intensification occurs in those areas of social topics that are connected to values. Environmental policy has become one of the most crucial topics in recent years in public discourse based on values due to observed climate changes and planet degradation (Alam et al., 2016; Fricko et al., 2017). Climate change and planet biodegradation have been addressed globally for years (Hertwich & Peters, 2009; Panagos et al., 2013; Sarkodie & Adams, 2018; K. Zhang & Wen, 2008). The topic of environmental policy is intertwined with various other aspects of human and societal functioning: public health (Watts et al., 2015), trade and consumption (Khan et al., 2020), food (Kopittke et al., 2019; Stehfest et al., 2009), energy (Creutzig et al., 2015), and innovation (Dangelico & Pujari, 2010; Horbach et al., 2012).

It is possible to capture the process of the institutionalisation of the environmental theme on the public agenda through the approach of discursive institutionalism (DI). This approach has been proposed by Vivien Schmidt, who places discourse, the arena for idea-carrying actors – discourse participants – at the research centre (Schmidt, 2016). Discourse allows us to explain the dynamics of institutional change by examining the discursive interaction of ideas and why some discourse actors succeed in bringing their ideas into the public space while others do not (Fairbrass, 2011). Despite its growing popularity, discursive institutionalism is not a fully defined research approach. Examining which actors are considered in discourses about the environment will identify decision-makers influencing the vision of environmental policy throughout society.

Given the above, the aim of the study is to characterise actors involved in the environmental discourse studied using the DI method. The following questions were asked and examined:

(I) Which types of actors appear most frequently in environmental policy discourse study that use the DI method?
(II) What are their actual configurations, i.e. with whom do the actor groups most often co-occur?
(III) What sources were used to characterise the occurrence of actors?

Literature review

Research approach of DI

To describe in the research the process of institutionalising ideas into public policy, the approach of DI, as a fourth type of institutionalism, is used (Carstensen & Schmidt, 2016; Schmidt, 2008, 2016). It is an umbrella concept for the vast range of works in political science that take account of the substantive content of ideas and the interactive processes of discourse that serve to generate those ideas and communicate them to the public (Schmidt, 2010a). Despite the criticism, which pointed out that discourse analysis should be treated more as a research tool than an approach (Bell, 2011; Campbell & Pedersen, 2015), DI is gaining popularity. In the indexed Web of Science (WoS) and Scopus databases of scientific papers, the phrase ‘discursive institutionalism’ in the title, keywords, or abstract results in more than 500 records.

The DI approach assumes placing three aspects at the centre of research interest: ideas, discourse, and discourse participants, allowing us to capture the ongoing process of institutional change

(Schmidt, 2010b). Ideas are the object of analysis and discourse is the arena for their exchange between participants – the carriers of ideas. In the process of discourse, actors utilise ideas to comprehend their surroundings and envision a future perspective (Hauptmeier & Heery, 2014). Discourse, as a distinctive way of comprehending and describing the world (Jørgensen & Phillips, 2002), involves the interaction of various actors with an interest in a specific area. Through this interaction, social issues are transformed into political problems, agendas are set, decisions are made, and actions are taken (Hajer, 2004). Two types of discourse can be distinguished based on the actors involved: (I) coordinative discourse – between policy actors, and (II) communicative discourse – between policy actors and the public (Wahlström & Sundberg, 2018). Discourse is an active process. Meaning in it is derived from what one says, to whom one says it, where, when, and with what authority (Ball, 1993; Schmidt, 2008).

The significance of 'to whom' lies in identifying discourse participants – actors. Actors, through the use of ideas, possess the ability to influence the cognitive or normative beliefs of other discourse participants, a phenomenon known as ideational power (Carstensen & Schmidt, 2016). Ideas play a crucial role in shaping the attitudes and actions of these actors (Campbell, 2004). Participants in a discourse can be different individuals or groups, depending on the subject matter: members of government, politicians, activists, media representatives, officials, experts, lobbyists (Schmidt, 2010a). Schmidt has not closed the catalogue. Actors play various roles in discourse, such as: (I) participants demonstrating actions to legitimise them to each other (Schmidt, 2002, p. 169); (II) creators of ideas capable of criticising the existing institutions to bring about changes (Schmidt, 2010b, p. 4); (III) carriers of cognitive and normative ideas whose interactions facilitate institutional changes (Carstensen & Schmidt, 2016, p. 2).

Actors in environmental policy discourse

Apart from being invited to join the discussion, the extent and consistency of involvement are vital. Merely being present in idea exchange does not signify active and thorough participation. Full engagement entails contributing ideas from the topic's inception to its public manifestation. Participants with fewer individual resources compared to their counterparts (Almeida & Gomes, 2020) and limited access to experts and professional tools of influence (Böhmelt, 2013) have less impact on the evolving solution. Governance actors, due to their access to a network of contacts and a pool of knowledge, typically have stronger opportunities to engage in the debate than civic organisations, for instance. Conversely, the persistence of actors' involvement in environmental policymaking depends on the substance they present and the ability of other participants to resonate with it (Almeida & Gomes, 2020). Persistence in this context refers to the extent to which the ideas and rationales presented by one group of discourse participants are acknowledged and embraced by other groups.

There is no closed list of actor groups who should participate in the discourse on environmental policy. Majone (1992) highlighted that in specialised discourses, actors possessing knowledge not readily available to their surroundings either join the discussion or are invited to it. Subjects such as the environment are typically entrusted to specialised governmental or supranational agencies. While this approach enhances the effectiveness of the proposed reforms (Trein & Maggetti, 2023), it also hinders the inclusion of diverse actor groups in the dialogue. Consequently, the process of devising solutions becomes somewhat insular and dominated by actors with power and/or knowledge. The inclusiveness of the dialogue has a positive impact on the acceptance

of the results of the policymaking process, even for those participants who held a different opinion from the prevailing ideation path or whose priorities are oriented towards other areas (Ansell & Gash, 2008; Nasiritousi & Grimm, 2022; Ran & Qi, 2019). However, studies analysing the participation of various actor groups in the development and/or implementation of local and central initiatives related to environmental themes reveal the predominant role of the government (Huh, 2014; D. Zhang et al., 2019). They are present in all stages of policymaking. While experts and researchers actively contribute to initiating public discussions and shaping proposed solutions, their role in implementing these solutions remains marginal (Tellmann, 2012). Despite the positive correlation between residents' involvement in co-creating environmental policy and its implementation, residents are not frequently invited to engage in discourse on the environment (Aldunce et al., 2016; Geron et al., 2023). In the studies, there is also noted a noticeable absence of active media involvement (Takahashi & Meisner, 2012). The private sector gains significance in the discourse when capitalist ideas, productivity, and innovation come into play (Liebenguth, 2020). It is also noticeable for its thematic alignment with environmental non-governmental organisations (Anshelm & Hansson, 2011).

Capturing the full dynamics of environmental politics requires the use of contextual analysis, i.e. one that takes into account different sources and records of discourse (Nylén & Jokinen, 2023), although available studies on the role of actors in the environmental topic are based on limited data sources. No studies exist that provide a description of the actors engaged in environmental discourse from the DI perspective.

Research methodology

Adopting the systematic literature review (SLR) approach as guided by the PRISMA protocol (PRISMA-P Group et al., 2015), I conducted an examination of articles published between 2004 and 2022 indexed within the Scopus and Web of Science (WoS) databases. The data source selection process involved four main stages.

Initially, 525 English articles with the term ‚discursive institutionalism' in their title, abstract, or keywords were extracted from the Scopus and WoS databases. After removing duplicates (59), analysing abstracts (466), and verifying the use of discursive institutionalism (DI) (172), 33 articles on the environmental issue were identified for analysis. The data collection spans 2004 to 2022, with consistent application of DI to environmental topics since 2010, as shown in Figure 1.

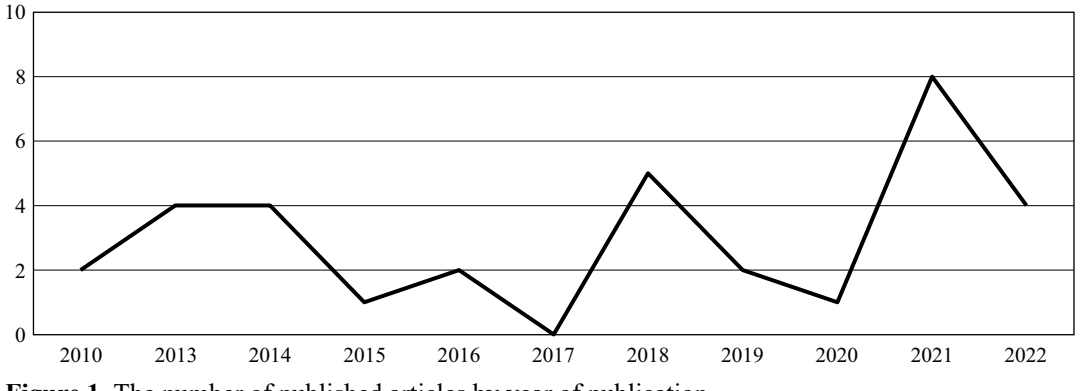

Figure 1. The number of published articles by year of publication

Source: Own research.

No discernible time trend in publications was observed. The highest number of texts on environmental topics using this approach was published in 2021 (8), while four years prior, in 2017, no texts meeting the criteria were found (0).

The discourse was studied primarily in the domestic arena (18), less frequently between countries (9, including 4 within the European Union). The arena of discourse studied also included regions within a country (4) and global organisations (2). Studies of environmental discourse with the DI approach most often referred to European countries and regions (20), less frequently to Asian (4), North America (2), Australasia and Oceania, (2) and North America (1). 2 studies were intercontinental – discourse in Indonesian Peru and Tanzania, and discourse in Vietnam and Mexico.

A comprehensive analysis for the ongoing research problem required a thorough examination of the Discursive Institutionalism (DI) approach employed. Articles were scrutinised concerning research characteristics, actor characteristics, and research data. The coding scheme can be found in the Annex.

In the fourth step of the analysis, thematic groups were identified among the articles based on the DI approach. A detailed overview of these groups is provided in Table 1.

Table 1. Thematic groups of DI papers

	Thematic areas	Number of occurrences
1	Environment and resources management	33
2	Social issues	27
3	Market and economy	26
4	Education	23
5	Policymaking	18
6	International relationships and policy	14
7	Other	12
8	Journalism	12
9	Urban and planning	7

Source: Own research.

Subjects concerning the environment and resource management constitute a predominant research area. An exploration of discourses related to resource management was also encompassed within this thematic area, emphasising that resource management is a relevant element in the context of the environment rather than solely economic efficiency.

Results discussion

Upon analysing the content of the articles, thematic areas were assigned within the broader category of ‚environment.' The thematic subcategories under the keyword ‚environment' encompass environmental policy (9), energy (8), water management (5), the formalisation of organisations serving the environment (4), and forestry policy (3). Individual texts covered topics such as consumption, biodiversity, agriculture, and health policy. An overview is presented in Table 2.

Table 2. The thematic area under the keyword 'environment'

Thematic areas	Number of occurrences
Enviromental policy	9
Energy	8
Water management	5
Formalisation of organisations	4
Forestry policy	3
Agriculture	1
Health policy	1
Biodiversity	1
Consumption	1

Source: Own research.

The identified themes were not homogeneous and often pertained to more than one topic. The dominant ones were selected. In one out of three articles (11), the discussion of environmental discourse is accompanied by a segment on the policymaking process.

The statement that environmental issues are the most frequently discussed topic in the discourse proved to be true. However, it is not possible to establish a correlation between the year of publication of the research and the number of publications appearing.

The characteristics of actors

Seven types of actors, participants in the discourse, were identified. They are summarised in Table 3.

Table 3. Types of actors, participants in the discourse

Types of actors	Number of occurrences
Government	29
Experts	21
Ngos and trade unions	18
Politicians	17
Citizens	10
Business	9
Media	6

Source: Own research.

The dominant role of the government group is evident and proved as in other research (Huh, 2014; D. Zhang et al., 2019). It is also observed that the participation of experts, NGOs and trade unions and politicians is frequent (in more than half of the discourses studied). Frequent participation of these four actor groups could be associated with access to individual resources, expert knowledge, and tools of influence (Almeida & Gomes, 2020; Böhmelt, 2013). Representatives of the media potentially have access to such resources as well, but their representation in discourses

is low. The limited participation of media and business representatives in the study should be considered a potential drawback for the dissemination of environmental discourse. Media serve as information carriers and play a significant role in popularising socially-relevant topics in the 21st century. However, in the literature, they are often treated as a platform for discourse rather than its participants (Curran et al., 2022). Conversely, the low participation of business in the discourse may negatively impact the implementation of environmental policies, which are supported by properly functioning business models (Hofmann, 2023). The exclusion of the general public from discussing environmental issues may be driven by the professionalisation of the policy creation process and its reduction to knowledge-based recommendations (Tellmann, 2012), highlighting the dominance of experts, or by the utilisation of different resources and opportunities for influence characteristic of political actors (Kagan & Olofsson, 2023). The relatively strong position of organised civic groups does not necessarily indicate a reduction in the hermetic nature of the environmental discussion, as the analysis failed to distinguish between types of NGOs. Some NGOs have specialised in environmental issues and play more of an expert role rather than representing citizens. Despite the widespread impact of environmental topics on the community, the participation of unaffiliated citizens in the discourse was low, which is observed in other studies (Aldunce et al., 2016)

The configurations of actors

The co-occurrence of actors within the ongoing discourse for the overall subjects is illustrated in Table 4.

Table 4. The co-occurrence of actors

	Government	**Experts**	**NGOs and trade unions**	**Politicians**	**Citizens**	**Media**	**Business**
Government	X	19	17	17	10	5	9
Experts	19	X	14	12	6	5	7
Ngos and trade unions	17	14	X	9	7	4	6
Politicians	17	12	9	X	6	3	5
Citizens	9	6	7	5	X	5	3
Business	9	7	6	5	4	3	X
Media	5	5	4	3	5	x	3

Source: Own research.

Each of the aforementioned groups of actors in the discourse most frequently interacts with the government. When governments are excluded from the analysis, experts assume the dominant role for all actors. An exception is observed with citizens, who appear more frequently in discourse with NGOs and trade unions than with experts. The less frequent actors in the discourse – business, media, and citizens – do not engage with each other more often but, rather, accompany the discourse of government, experts, NGOs, and politicians. These results may also suggest that mainly coordinative discourse and not communicative discourse is being studied. The high representation of government and experts confirms Majone's (1992) observation about the concentration of specialised topics within the government and expert groups, irrespective

of the discourse arena (Sääksjärvi, 2020). The discourse, more often serving in the phase of setting goals for political agendas or social programmes than in their implementation stage, is primarily represented by policy creators (Buijs et al., 2022). The main role in setting the political agenda is played by the governing authorities. Opponents seek support either within the governing group or challenge their position (Louwerse & Otjes, 2018). It is noteworthy in this context that politicians did not appear independently in the discourse; they always co-occurred with another group of actors, most often with the government.

In the analysed articles, the co-occurrence of actors within the discourses is illustrated in Table 5.

Table 5. The co-occurrence of actors in one discourse study

Number of types of actors occurrence in one discourse	Amount of discourses
7	2
6	1
5	5
4	5
3	10
2	6
1	4

Source: Own research.

Within the analysed texts, there were only two discourses when all groups of actors co-occurred. Considering the call for scientists to account for the complexity of the socio-ecological system in research (Ostrom, 2007), the low involvement of many actors groups in a single study on environmental discourse is surprising. Three groups were most frequently mentioned (10). In four researches, the discourse was examined within a single group. No statistically significant relationship was observed between the occurrences of actors in the studied discourse and its thematic area. The samples for each thematic area were too small to draw conclusive remarks from. However, an observation was noted for thematic groups with similar frequencies: environmental policy (9) and energy (8). In environmental policy discourses, there were more instances of three or more actors being present than in the energy discourse.

Sources used for discourse analysis

The types of secondary sources used in studies analysing environmental discourse are shown in Table 6.

For all participants in the discourse, the most frequently utilised sources were official statements, documents, and legal acts, including regulators. This pattern persists even in the case of experts, whose primary space for discussion is typically scientific publications and expert reports. The recording of discourse on social media was practically non-existent (isolated cases). The relatively equal contribution of the four dominant actors in environmental discourse is evident in transcriptions of public debates, with the remaining sources being predominantly from the government.

The selection of sources – discourse records – is characteristic of the aforementioned discourse-dominant groups. In the face of Schmidt's non-systematisation of the DI approach, determining

the direction of this relationship is challenging: whether researchers first recognised the sources of the discourse record and identified the involved actors from these or whether the actors were identified first, and then the records of their statements were found. The limitation of the discourse record sources may also suggest that other actors participate in the discourses but are not included in the study using the DI approach

Table 6. Types of secondary sources used to analyse discourse

	Articles in newspapers	Videos and digital records	Audio records	Law and legal acts, regulations	Social media	Promotional materials	Official statements and documents	Transcript of public debates	Research or experts papers
Government	8	0	0	21	1	1	22	7	11
Experts	5	0	0	16	1	1	16	6	10
Ngos and trade unions	7	0	0	15	1	1	13	5	7
Politicians	4	0	0	15	0	1	15	6	8
Citizens	3	0	0	8	0	0	7	2	4
Business	1	0	0	7	0	1	6	3	4
Media	3	0	0	4	0	0	3	2	3

Source: Own research.

The primary data sources were interviews, with an average of 25 discourse participants interviewed. Representations of the different groups of discourse participants are presented in Table 7.

Table 7. Interviews with groups of actors

Government	Experts	Ngos and trade unions	Politicians	Citizens	Media	Business
24	18	15	14	8	4	8

Source: Own research.

The depicted representation aligns with the distribution of participant groups in the overall study, with government officials dominating (24). The interviews encompassed the entire business group (18) both in the interviews and, overall, in the discourse study. More instances of business, media, or citizen involvement were observed in studies where they were interviewed. This may reflect the more comprehensive approach of researchers who chose to invite a broader range of actors, indicating their research inquisitiveness. Using various discourse sources aligns with the research presented by Nylén & Jokinen (2023).

Conclusions

The objective of the study was to characterise actors in the discourse on environmental issues using the DI approach. Based on the analysis of the selected papers, groups of actors were identified:

government, experts, NGOs and trade unions, politicians, citizens, businesses. Representatives from governments, experts, and official civic organisations (NGOs, trade unions) dominate the study. Government representation prevails across all subjects examined in the discourse. Experts and NGOs typically secure the second and third positions. The configuration of co-occurrence in discourse is also predominantly led by government, and its arrangement depends on the object of study.

The chosen number of groups for research using the DI approach is apparent, as more than half of the studies incorporate three or fewer actor groups. The reliance on official documents and legal acts as primary discourse sources underscores the formal nature of the studied discourse. The selection of data sources may inherently narrow down participants in the discourse.

Policymakers should pay attention to the highlighted lack of representation in the study of citizen, media, and business discourse, whether this absence is reflective of their limited presence in the environmental discourse in general or is only in research about environmental discourse by using DI approach. Policymakers should consider initiatives to address these potential representation gaps for a more inclusive environmental policymaking process and equating coordinative discourse with communicative one. The research is part of a growing trend of interest in the DI approach. Observing research trends over time, particularly the division into specific thematic groups within the environmental field, can contribute to the establishment of consistent research methods using the DI approach.

The study has certain limitations. Firstly, the chosen number of groups for research using the DI approach is constrained, with over half of the studies incorporating three or fewer actor groups. Additionally, the heavy reliance on official documents and legal acts as primary discourse sources highlights the formal nature of the investigated discourse. Furthermore, the selection of data sources may inherently limit the range of participants in the discourse. The concentration of research on environmental discourse using DI in Europe is also a limitation. The uneven representation of discourse research between continents can be further analysed for its cause.

To fully describe the influence of interest groups on the institutionalisation of solutions, it is crucial to capture the multifaceted aspects that accompany these groups (Bey, 2022; Halpin & Jordan, 2012). Consequently, research is recommended to delve deeper into the presented analysis, particularly in presenting the complete profile of actors. Identifying the relationship between discourse source selection and the appearance of actors, as well as the direction of this relationship, would be advisable. The co-occurrence of discourse actors, from the perspective of coalition formation, could be the subject of further research using Discourse Network Analysis based on Leifeld's (2018) research. Observing research trends, including the division into specific thematic groups within the environmental field, will contribute to establishing consistent research methods in the DI approach. For policymakers, the research results should highlight the lack of adequate representation in the study of citizen, media, and business discourse. Whether this is a result of their absence in the discourse or in the study of environmental discourse remains an open question.

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Annex. Coding scheme

Research plan	
Research type	1–explanative
	2–explorative
	3–predictive
	4–descriptive
Fields	1–environment
	2–social issues
	3–market and economy
	4–education
	5–international relations
	6–journalism
	7–policy making
	8–urban planning
	9–other
Research object	1–policy
	2–programme
	3–philosophy
Period of analysis	0–not given, difficult to define, lack of division between historical background and actual object of analysis
	1–one year
	2–two-three years
	3–four and more
DI as methodological framework	
Presence of ID definitions	1–yes
	0–no
Role of ID in the research plan	1–main, principal
	0–one of many
Accompanying institutionalisms	0–lack
	1–historical
	2–rational choice
	3–sociological
Discourse actors	1–politicians
	2–government
	3–businessmen
	4–NGOs, workers unions
	5–citizens
	6–journalists
	7–experts (scholars)

Data sources and analysis	
Data source	1–directly mentioned 2–indirectly mentioned 0–not specified
Data selection	1–described in detail 2–described generally 0–not specified
Explanation of data collection	1–described in detail 2–described generally 0–not specified
Type of data sources	1–primary 2–secondary
Primary data sources	1–interviews 2–surveys
Secondary data sources	1–articles in newspapers 2–videos and digital records 3–audio records 4–legal acts, regulations 5–social media 6–marketing materials 7–official statements and documents 8–transcripts of public debates 9–research or experts papers
Analysis process	1–described in detail 2–described generally 0–not specified

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Jolanta Chluska

Challenges to Performance Management in Health Care Entities During Crisis Situations

Abstract

Objectives: The article aims to identify the challenges faced by the management of health care entities – clinical hospitals – in evaluating their performance during crises. The research hypothesis posits that crises add new areas to the performance evaluation of health care entities – clinical hospitals – and alter their evaluation tools.

Research Design & Methods: The research was empirical, based on the reporting data for the period 2019–2021 (quantitative and qualitative) in selected clinical hospitals. The analyses were performed by an expert and included the perspective of a certified auditor and long-term researcher of issues related to the operation of health care entities – hospitals.

Findings: Health care entities in Poland, as public sector entities, incorporate crisis management requirements into their activities.

Implications / Recommendations: The results of the analyses are addressed mainly to the constituent bodies of health care entities, institutions affecting the operation of the health care system, and hospital managers.

Contribution / Value Added: It has been shown that crises add new areas to the performance evaluation of health care entities – clinical hospitals – and alter their evaluation tools.

Keywords: crisis management in hospitals, performance management in health care entities.

Article Classification: research article

JEL classification: M40, M41, L21

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Introduction

Health care entities in Poland act as providers of medical services. Public entities typically operate as independent public health care institutions. Health care entities have certain characteristics that distinguish them from other business entities, e.g.:

a) their activity is heavily regulated;
b) they employ highly-qualified health care professionals;
c) their operation is not for profit;
d) they lack incentives to identify and improve their effectiveness;
e) they have limited potential for conducting financial analyses of their operation;
f) their activity is publicly funded.

Hospitals are those institutions of the health care system which have a crucial role to play during crisis situations such as pandemics. For the present research, clinical hospitals have been chosen. In addition to providing health care services to patients, such institutions:

a) engage in teaching and research activities;
b) train medical personnel;
c) perform health-related tasks and programmes;
d) discharge tasks commissioned by entities from other sectors;
e) offer consultations and opinions for other entities;
f) perform tasks related to the national defence.

The above characteristics make these institutions indispensable for the proper operation of the whole health care system. Since the trends observed in clinical hospitals epitomise the trends across the whole health care sector, the conclusions from their analyses can also be transposed onto other health care institutions.

The aim of this paper is to identify the challenges faced by the management of health care entities – clinical hospitals – in the evaluation of their performance during crisis situations. The formulated research hypothesis states that crisis situations open up new areas within their performance evaluation system and alter the tools used in such evaluation processes. The applied research tools include an analysis of the literature of the subject, relevant legislation, and financial statements of selected 10 clinical hospitals for the years 2019–2021.

Clinical hospitals as objects of performance evaluation – a literature review

Clinical hospitals obtain funding for their operation mainly from public funds (health insurance contributions), under contracts with the National Health Fund [Narodowy Fundusz Zdrowia – NFZ]. They derive other funds from sources such as:

a) the provision of paid medical services;
b) business activities;
c) donations, legacies, bequests;
d) the provision of health programmes financed from sources other than public;
e) receiving co-financing for the training of medical personnel;
f) grants and other funds from the European Union

How health care entities – clinical hospitals – are managed ought to take into account both their legal status, their nature of their activities, and their sources of financing. The prevalent legal status of clinical hospitals, i.e. that of independent public health care institutions, means that their

founding bodies are the main stakeholders, concerned with their performance. Patients who expect health care services to be effectively discharged are another group interested in a smooth operation of these entities. The remaining stakeholders are other addressees of information generated by the key operational areas of clinical hospitals.

Due to their specific nature of operation, an integrated, holistic approach to management is of cardinal importance. Performance management tools take into account both various aspects of the evaluation's scope (specific areas within the entity, the entity as a whole) and competencies of the staff.

The application of performance management tools in health care entities has been discussed by researchers both in Poland and abroad. Selected areas of their uses in the health care sector are summarised in Table 1.

Management-related issues on the evolution and diffusion of the performance management concept are tackled in the paper by Czekaj and Ziębicki. The authors emphasise that PM, a concept frequently associated with financial or human resources management, has seen dynamic growth in the last two decades.

In the recent years, there have been many attempts at the adaptation of state-of-the-art activities to support business decisions through the application of information technologies known as Business Intelligence. One common feature of the concept is management based on performance monitoring (Czekaj & Ziębicki, 2014, p. 11). The paper presents theoretical deliberations whereby the authors underline the concept of performance management, which largely focuses on the level of the organisation as such, and summarise its evolution. The authors make their analysis on the basis of secondary research on performance management in organisations operating in the United Kingdom, the USA, China, Japan, and Australia.

Based on their research, the authors formulated the following conclusions:

a) performance evaluation suggests the prevalence of operational, and not strategic perspective;
b) the measurement typically employs financial indicators;
c) higher-level managers are the main addressees of the evaluations;
d) the evaluation process makes little use of the IT infrastructure;
e) the awareness of benefits derived from the implementation of performance management is low.

In their analyses, Czekaj and Ziębicki also presented the findings from their own research of enterprises operating in Poland (both with foreign and Polish shareholdings). The findings from Poland were largely consistent with those obtained elsewhere (in five selected countries). Based on their research, the authors concluded that:

a) the management process often made use of performance evaluation;
b) the evaluation showed considerable dispersion;
c) the prevalent evaluation perspective was focused on the operational side and typically employed financial measures;
d) top managers were the main addressees of the analyses;
e) spreadsheets and ERP were used as supplementary evaluation tools;

Balanced Scorecard (BSC) and Activity-Based Costing (ABC) were the tools typically applied in the decision-making processes (Czekaj & Ziębicki, 2014, pp. 17–21).

Although Czekaj and Ziębicki pursued their research in commercial enterprises, they believe that research can also be conducted in public sector and non-profit organisations, provided that their specific characteristics are taken into account. This can be attributed to the growing interest in the performance management concept, its viability, and its holistic approach. As is demonstrated

Table 1. The applications of performance management tools in the health care sector

The applications of performance management tools	Comments and conclusions
P. Mućko and S. Hońko (2014), *Specyfika zrównoważonej karty dokonań w podmiotach leczniczych* [Characteristics of the Balanced Scorecard in healthcare entities]	
The article analyses the conclusions drawn from some examples of BSC uses in the operation of health care entities described in the literature regarding the scorecard's basic elements, i.e. dimensions of performance measurement. Special attention was paid to the sequence of financial and customer perspectives at health care entities and their modifications in specific practical applications.	The authors point out that the application of the BSC in healthcare entities "helps translate strategies into actions, identify persons and units responsible for their completion, and communicate with lower-level managers and employees".
M. A. Jaworzyńska (2015), *Zastosowanie Strategicznej Karty Wyników w szpitalu – studium przypadku* [Applications of the Strategic Balanced Scorecard in hospitals – a case study]	
The aim of the paper was to design a Balanced Scorecard for the Independent Public Healthcare Institution in Puławy.	The author claims that the BSC offers a comprehensive picture of the entity's effectiveness as it integrates both financial and non-financial information. However, the system for performance management should only be regarded as a means to an end, i.e. a system of financial planning that facilitates strategy execution and enables monitoring the progress in its implementation.
M. Kludacz (2014), *Zasady i etapy rachunku kosztów działań w angielskich szpitalach na potrzeby wyceny świadczeń zdrowotnych* [Principles and stages of activity-based costing for the pricing of healthcare services in English hospitals]	
The paper outlines the principles of cost accounting used in English hospitals and describes how they are put to practice. Special attention is paid to those cost accounting components which most strongly affect the assessment of treatment costs for individual patients.	The author concludes that the cost accounting principles that are currently followed in English hospitals should not be regarded as models for any Polish solutions in that sphere. She points out, however, that such solutions, just as those applied in England, ought to be the same for all hospitals and based on such a form of activity-based costing that is regarded as the most adequate for calculating the costs of medical services.
J. Chluska (2007), *Determinanty wprowadzenia rachunku kosztów działań w szpitalu* [Determinants of introducing activity-based costing in hospitals]	
The author discusses the conditions of, and opportunities for, calculations using activity-based costing as a tool to determine unit costs. Such costing can be regarded as an alternative to other methods of calculating the costs of health care services in hospitals.	The author demonstrates that such considerations as the lack of clear demand and supply sides, non-sovereign consumers, limited competition, and absence of stimuli to boost effectiveness make it difficult to evaluate performance and improve it at the individual levels of the health care system. All this is not without impact on the structure of cost accounting, cost information, and change trends even at its lowest level, i.e. hospitals.
M. Hass-Symotiuk (Ed.) (2010), *Koncepcja sprawozdawczości szpitali na potrzeby zintegrowanego systemu oceny dokonań* [The concept of hospital reporting for an integrated performance management system]	
The paper aims to identify sets of economic and medical information needed for an integrated performance management system for public hospitals using selected categories of measures and indicators.	Importantly, the project: – defined the key areas and perspectives for measuring hospital performance; – designed a BSC model aimed at improving management processes both within individual hospitals and in the whole health care system (by connecting the areas, perspectives, and measures while taking into account the goals set in individual areas for specific shareholders).

The applications of performance management tools	Comments and conclusions
S. Ostrowska (2013), *Zmiana w zorientowanej na misję karcie wyników (MSC) i jej wpływ na zachowanie członków organizacji publicznej* [Modifications of a Mission-Oriented Scorecard (MSC) and their impact on the activities of public organisation members]	
The author presents the implementation principles of the Mission-Oriented Scorecard in health care entities.	Among the functions of performance measurements in the MSC, the author stresses inspections, the improvement of results, and motivation (p. 237).
W. N. Zelman, G. H. Pink, and C. B. Matthias (2003), *Use of the Balanced Scorecard in Health Care*	
The paper reviews the application of the Balanced Scorecard in the health care system.	The authors point out that although the BSC is a useful tool in managing health care entities, it needs to address the sectoral and organisational conditions. It is used not only in strategic management, and requires modifications aimed at including some non-physical perspectives such as the quality of care, access to health care services, and effects of the activities.
T. Mettler and P. Rohner (2009), *Performance Management in Health Care: The Past, the Present, and the Future*	
The authors analyse the *status quo* and development prospects of performance management (PM) in health care entities, and summarise their research in that area.	The authors emphasise that using PM in the operational practices of health care entities depends on their regulatory environment, new technologies, strategic goals, organisational structure, and employee attitudes. They conclude that for a future development of PM, it is necessary to prioritise the areas in which the concept could be applied (roadmap).
F. Betto, A. Sardi, P. Garengo, and E. Sorano (2022), *The Evolution of Balanced Scorecard in Healthcare: A Systematic Review of Its Design, Implementation, Use, and Review*	
The authors analyse the evolution of BSC uses in health care organisations in the recent years, specifically during the COVID-19 pandemic.	The authors indicate that the financial perspective is preferred for an effective and efficient use of the BSC in health care entities. Empirical research suggests cost-based financial indicators such as costs of medicines and materials, costs of training, general system and organisation costs, expenditures, revenues, efficiency, productivity, and some other indicators such as liquidity, accessibility, and profitability.

Source: Own elaboration based on the literature of the subject.

by the literature review, performance management tools are currently used in the analyses of decision-making processes in health care entities.

Crisis management in health care entities

Crisis situations can occur in any economic entity. As Walas-Trębacz and Sołtysik point out, the managers in an enterprise affected by a crisis event need to determine whether they deal with a crisis situation or a crisis of the organisation (Walas-Trębacz & Sołtysik, 2014, p. 86). A crisis situation means that certain preventive measures can be undertaken and crises can be prepared for. According to Zelek (2003, p. 25), a crisis means the consequence of disruptions in one or several factors dependent on the quality of management, whether external or internal, that determine the very existence and development of a given entity.

Certain specialist papers and legislative acts (Davoli, 2007; Act of 26th April, 2007) emphasise the need to prepare organisations for potential crisis situations caused by pandemics or other crises in health care entities. The Act of 26th April, 2007, on Crisis Management defines a crisis situation as "a situation which negatively affects the safety of individuals, property of significant

size or the environment, which leads to severe restrictions in the operation of the relevant public administration bodies due to an inadequate nature of their means and measures" (Act of 26th April, 2007, Art. 3). This applies, among others, to health care. Although the legal arrangements encompass the entire crisis management system, health care entities represent its major constituent. Such a crisis situation occurred during the COVID-19 pandemic.

The challenges that the managers of health care entities had then to grapple with stemmed from such crisis conditions as (Buchelt & Kowalska-Bobko, 2020, p. 24):

a) the need to hospitalise many patients at the same time;
b) shortages of staff, materials, and equipment;
c) the absences of medical and non-medical personnel;
d) increased number of deaths as well as logistic problems with transport and supplies;
e) financial and organisational problems.

Given the relevant legislation and literature of the subject, the tasks of the management can be formulated in such areas as:

a) preparing for the potential crisis situations;
b) activities during combatting the consequences of crisis situations;
c) alleviating the economic consequences once the crisis situation is over in order to return onto the planned development path[1].

All these stages can be incorporated into the organisation of in-house crisis management systems, which, given the present turbulent times, ought to be regarded as a *sine qua non* arrangement. As a minimum, such systems ought to include:

a) operational plans of the health care entity which take into account the applicable macroeconomic regulations governing specific solutions and activities aimed at combatting the consequences of crisis situations;
b) structures and resources needed for the implementation of the entity's tasks;
c) information and communication systems;
d) decision-making processes and arrangements stipulated for emergency situations and unexpected disruptions in the discharge of the entity's tasks[2].

Research suggests that the initial preparatory stage concerning the activities to enable combatting the consequences of crisis situations can account for as much as 85% of all undertaken activities (Walas-Trębacz & Sołtysik, 2014, p. 92).

Crisis situations not only affect the organisation's day-to-day operation but can also lead to its own crisis and jeopardise its very existence. This is reflected in the entity's deteriorated economic and financial situation compared to the period prior to the COVID-19 pandemic. Walas-Trębacz and Sołtysik proposed an interesting specification of tools and methods that can be used in the designing of a crisis management system; it is summarised in Table 2.

The methods listed above demonstrate that crisis management systems are elements of the entity's management processes and can significantly complement the internal management systems. Many of them are essential tools used by health care entities in their operational and strategic management.

[1] The authors distinguish the following stages of the crisis management process as: preparation, prevention, response, and restoration (Walas-Trębacz & Sołtysik, 2014, p. 92)

[2] For more on the role of hospital staff in crisis management during pandemics, see: Chluska, 2022.

Table 2. Methods used in designing a crisis management system

Stages and activities of the crisis management process	Methods applied
Crisis identification and analysis – identifying the source of the crisis; – determining the factors leading to the crisis; – analysing the impact of such factors on the organisation; – assessing potential consequences; – evaluating the likelihood of a similar situation being repeated in the future.	– simulations; – scenarios; – forecasts; – decision trees; – SWOT analysis; – profile analysis; – catalogue of risk factors; – descriptive risk evaluation.
The evaluation of the crisis situation – quantitative analysis of the crisis factors; – qualitative analysis of the crisis factors.	– risk matrix; – preference ranking analysis; – ratio analysis; – stakeholder analysis.
Crisis management – identifying priorities; – selecting methods to curb or eliminate crisis situation factors; – identifying supplementary actions.	– reducing higher-risk activities; – increasing precautionary measures; – stakeholder analysis; – simulations; – forecasts; – restructuring; – turnaround; – lean management; – outsourcing; – balanced scorecard.
Controlling and monitoring – analysing and evaluating the undertaken activities; – monitoring the changes (within and outside the organisation); – improving the crisis management process; – responding to changes which take place and were not identified in the initial stage of the process.	– controlling; – audit auditing; – early warning systems; – ratio analysis; – balanced scorecard; – IT methods.

Source: Own elaboration based on: Walas-Trębacz & Sołtysik, 2014, p. 91.

Crisis management and performance evaluation of health care entities – research methods and findings

The research focused on clinical hospitals. The Polish "Register of Healthcare Entities" lists 32 such hospitals. Clinical hospitals can be established by medical universities or local governments[3]. The research comprised 10 hospitals for which complete financial data in the form of financial statements (profit and loss accounts in particular) and descriptive additional information for 2019–2021 could be obtained, alongside reports on their economic and financial situation.

The research process comprised the following stages:

1) analysing the legislation governing the operation of hospitals, including financing their activities during pandemics;
2) identifying the management principles relating to health care entities (literature review, review of clinical hospitals' websites, synthesis);

[3] For instance, the St. Jadwiga Queen of Poland Clinical Provincial Hospital No. 2 in Rzeszów.

3) obtaining financial statements information from the National Court Register as well as reports on the economic and financial situation;
4) identifying and comparing selected data on the financial activities of clinical hospitals in the researched period;
5) applying selected economic and financial measures as well as expert analysis of the data relationships from financial statements;
6) conclusions from the research.

In the period under scrutiny, the analysed hospitals achieved different financial results, mostly in consequence of the COVID-19 pandemic in 2020. In the remaining two years, the treatment of COVID-19 patients was provided during a part of the financial year. What 2020 and 2021 had in common was partial resignation from performing planned procedures to allow treatment of COVID-19 patients; such procedures were postponed to the following years. The fund provider (National Health Fund) remitted the advance payments for the concluded contracts, to settle them in full in the subsequent years. Such an arrangement helped improve the hospitals' liquidity. The financial results of the analysed hospitals are shown in Table 3.

Table 3. The financial results of the analysed hospitals in 2019–2021

	Year	Number of hospitals with a financial result	
		Net profit	Net loss
1	2021	6	4
2	2020	4	6
3	2019	2	8

Source: Own elaboration based on financial statements.

In 2020, two of the analysed hospitals produced a positive financial result and recorded a loss in 2019. This means that they were able to improve their finances despite a crisis situation. Operational costs proved to be a parameter which had a significant bearing on the financial result achieved during the pandemic, unlike revenues, which largely depended on the fund provider (NFZ) and legislation adopted for the health care sector for the pandemic period[4].

The operating costs of health care entities focusing on the treatment of COVID-19 patients were similar in many hospitals and depended on the number of admitted patients, their medical characteristics, and prices of materials and other resources used during treatment. Changes in the costs of the analysed clinical hospitals are shown in Table 4.

The financial data suggests that the costs increased differently from hospital to hospital, and grew by 5%–31% in 2020, i.e. the most testing year of the COVID-19 pandemic. In turn, the period of gradual overcoming the crisis and resuming the provision of planned medical procedures saw the costs increase by 17%–40%, as compared to 23%–74% for the services provided throughout the entire period of the COVID-19 pandemic.

In-depth analyses of the financial and non-financial data of selected hospital no. 6 were made to identify the detailed factors underpinning the cost relationships. The analysis of the financial

[4] Such special sources of funding include the financing of doctors' and nurses' costs of labour, hospital supplies and equipment, donations, and other forms of financial support.

statements were accompanied by an examination of the reports on the entity's economic and financial situation. The following financial ratios were selected:

– liquidity ratios (current and quick);
– debt to asset ratios;
– return on sales (return on operations)[5].

Table 4. Changes in operating costs of analysed clinical hospitals

Hospital/ year	2021 (in thousand PLN)	2020 (in thousand PLN)	2019 (in thousand PLN)	2021/2020 (%)	2020/2019 (%)	2021/2019 (%)
1	214 821	162 912	132 677	132	123	162
2	136 803	107 948	96 608	127	112	142
3	811 351	667 908	587 430	121	114	138
4	905 578	681 137	520 841	133	131	174
5	713 393	557 697	510 028	128	109	140
6	353 262	252 775	221 838	140	114	159
7	268 050	225 804	206 479	119	109	130
8	204 171	174 717	165 882	117	105	123
9	410 995	305 167	288 391	135	106	143
10	418 375	351 466	317 030	119	111	132

Source: Own elaboration based on the hospitals' financial statements.

These ratios were used by the team led by Hass-Symotiuk as the financial measures representing the hospital's (micro) perspective in the draft BSC model for the needs of an integrated performance evaluation system (Hass-Symotiuk, 2010, p. 235). They are also listed in the secondary legislation to the Act on Healthcare Services, i.e. Regulation of the Health Minister of 12th April, 2017, on economic and financial factors needed to make analyses and forecasts concerning the economic and financial situation of independent public health care institutions.

Tables 5 and 6 show a comparison of the planned and actual values of these ratios, as communicated by the analysed hospital.

Table 5. The liquidity ratios of the selected hospital

Year	Plan	Execution	Plan	Execution
	Current liquidity ratio (%)		Quick liquidity ratio (%)	
2021	0.45	0.58	0.34	0.40
2020	0.42	0.58	0.31	0.41
2019	–	0.56	–	0.45

Source: Own elaboration based on the selected hospitals' economic and financial reports.

[5] The return on operations ratio includes other operating income, since the donations of current assets received during that period were reported as other operating income. The relevant calculations were based on the guidelines set in the Regulation of 12th April, 2017.

Although the analysed hospital reported an unsatisfactory yet stable liquidity level (score of 0 in the economic and financial report for 2020), the financial forecasts published in the reports were largely consistent with the actual results. What is more, the ratios' values were even slightly better, which can be viewed as proof of effective management, also in the time of crisis. The hospital management explained:

> *The hospital has taken a number of remedial measures to improve its liquidity. However, the ongoing pandemic, the decision of the provincial governor (*wojewoda*) to turn two of the hospital's branches into COVID-19 hospitals with a large number of additional beds, as well as having to provide the required COVID-19 protective equipment for the A&E unit in the main hospital branch… meant that huge costs had to be incurred from the hospital's own funds, among others in order to adapt the hospitals to the epidemiological requirements, such as partition walls, oxygen, personal protection equipment such as masks, gloves, goggles, etc. and to buy medical devices such as life-saving ventilators. Therefore, it was extremely difficult to improve liquidity in any significant way or to pay our liabilities faster.*

Table 6 shows that a similar stability was maintained in the case of the hospital's debt to asset and return on sales ratios.

Table 6. Debt to asset and return on sales ratios for selected hospital

Year	Plan	Execution	Plan	Execution
	Debt to asset ratio (%)		Return on sales (%)	
2021	52	53	1	1
2020	57	53	2	1
2019	–	64	–	1

Source: Own elaboration based on the selected hospitals' economic and financial reports.

The hospital in question turned a positive financial result in the three analysed periods. Achieving this was far from straightforward since, as the management claims,

The economic crisis caused by the COVID-19 pandemic adversely affected the financial situation of businesses both in Poland and abroad. However, health care institutions had protections guaranteed by the system, among others the NFZ's decisions to settle the contracts with health providers on a monthly basis, faster bank transfers for the performed medical procedures or extending the period for the settlement of the flat-rate funding until the end of 2021.

> In 2020, the analysed hospital obtained its funding from the contract with the NFZ (219 million PLN), subsidies (40 million PLN), and donations (417,000 PLN). Despite the challenging conditions, the hospital was able to fulfil the flat-rate funding in 86.38%. In response to the increased level of debt in 2021, the hospital reached settlements with contractors to pay its liabilities in instalments. Owing to such arrangements, the due payments were made according to the agreed schedules.

Conclusion

Crisis situations caused by the COVID-19 pandemic forced health care entities to engage in many activities aimed at alleviating the consequences of the crisis. An analysis of selected financial aspects of clinical hospitals suggests that although hospitals as entities with their own economies have made it through a challenging period, the consequences of their activities during

that time will be felt in the subsequent settlement periods. The conversion of hospitals into so-called "COVID-19 hospitals", governed by separate legislation, was accompanied by the provision of additional funds for salaries, subsidies, donations, and other forms of support. Another instrument that helped maintain financial stability was the disbursement of funds under the NFZ contracts in monthly instalments (as advance payments), with their settlement postponed until 2021.

Additional tasks imposed by the COVID-19 pandemic enabled hospitals to tap into their potential and identify new forms of financing their activity. Under regular conditions, the provision of extra health care services going beyond the scope of the contract concluded with the funding provider does not secure their financing (so-called services exceeding the contracted limits). Similarly, the analysed hospitals did not witness any significant deterioration in their financial result. This invites the question on the extent to which health care entities fulfil their potential, and whether there exist some untapped reserves in the system's resources. Such questions and concerns might provide a topic for analysis by decision-makers in the health care sector.

The COVID-19 pandemic posed a significant crisis for health care entities, whose managers were forced to discharge the daunting task of crisis management given the limited financial resources in the health care sector. This managing function had to address such challenges as:

a) securing additional sources for financing the increased range of medical services;
b) modifying the conditions in which their basic activity was to be pursued;
c) new areas and uncommon medical services;
d) the need for in-depth analyses of medical cases and cooperation with persons coordinating the fight against the COVID-19 pandemic.

The data suggests that the hospital managers had their ups and downs in coordinating the institution's activities. Nonetheless, some specific features of crisis management in hospitals could be observed:

a) the prevalence of short-term, activity-focused attitudes;
b) the modification of performance evaluation to take into account the special tasks discharged during the crisis;
c) the modification of the applied tools to stabilise liquidity and profitability;
d) the amendment of tasks from a strategic perspective.

There have been no changes in the legal tools and measures laid down in the Regulation of the Health Minister of 12th April, 2017, on economic and financial factors needed to make analyses and forecasts concerning the economic and financial situation of independent public health care institutions. Decision-makers in the health care sector will most likely include the pandemic emergencies in their evaluation of individual entities.

The objective of the article can be regarded as fulfilled, and its hypothesis has been proved correct. Health care entities have to factor in new challenges and crisis situations when designing in-house management systems, such as inflation, rising prices of resources, or the effects of the war in Ukraine. However, this involves different tasks than those discharged during the COVID-19 pandemic and other decision-making areas – and, therefore, requires different performance measures.

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The Asymmetry of Access to Public Data

Abstract

Objective: This paper critically investigates the phenomenon of asymmetrical access to public data, a growing issue in our increasingly digitised society. Its objective is identify the root causes of asymmetry in access to public data and to propose solutions that would promote greater transparency and fairness, and foster citizen participation in public life.

Research Design & Methods: The research section includes the analysis of the users of the Internet in the context of using government websites or applications by income group, age group, and place of residence. Then, the R-Pearson linear correlation analysis was used to examine the relationship between the mentioned variables.

Findings: The study shows the presence of a digital divide within Poland, attributing its existence to several factors including income, educational attainment, residential location, and age. This divide encompasses not merely the accessibility of digital networks but extends to the competence required to effectively utilize these resources. Furthermore, the research highlights a significant correlation between one's level of education and their proficiency in utilizing digital tools and conducting information searches on the internet.

Implications/Recommendations: To reduce asymmetry in access to public data, policymakers should focus on creating open, user-friendly data portals with standard formats and detailed metadata. Engaging in public consultations can tailor accessibility to community needs, while partnerships with educational and non-profit organisations can offer training to enhance data utilisation skills. Such strategies aim to democratise data access, ensuring it serves a broad and diverse audience effectively.

Contribution/ Value Added: The research confirms the existence of a digital divide in Poland, and some of the factors are income level, education, place of residence, and age. The gap is not only about access to the network, but also about the ability to use it. In addition, familiarity with digital tools and the ability to search for information online are strongly related to education level. Analysing the accessibility of public data in the context of income, we note that the higher the income, the higher the percentage of people using public administration online. The analysis also shows that older citizens, despite being the group least likely to use the Internet, have seen the greatest increase in regular Internet use over the studied period, in contrast to teenagers and young adults.

Article classification: research article

Keywords: public data; data asymmetry; data governance

JEL O38, O36, H4

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Introduction

Information in any organisation, institution, entity is – along with finances, things, and people – one of the basic resources used to achieve the goals of the institution. Its basic function comes down to giving managers the ability to assess the decision-making situation, and thus make rational decisions. The efficiency and effectiveness of the activities of an institution, organisation, or entity depends on the use of resources without unnecessary waste as well as on making the right decisions and successfully implementing them. In practice, it largely depends on having an adequate supply of information. Information should be accurate (accurately and reliably reflecting reality), timely (available at the time the manager is working out a decision and putting it into practice), complete (providing all the facts needed and at the right level of detail), and relevant (giving confidence that it is useful) (Griffin, 2004). The process of information management itself involves collecting, storing, retrieving, processing, and transmitting information, and in some situations making it public. Publicising refers primarily to the public's access to information of a public nature, which, by definition, should contribute to public sphere organisations taking actions consistent with the public interest.

Information is collected by various organisations, entities, institutions in different cross sections, at many levels of detail, etc. In spite of the acquisition of a lot of information by entities, in the relations between them, the phenomenon of asymmetry of information is often revealed, which translates into a disorder in the operation of the market, through inefficient allocation of resources. Information asymmetry (Akerlof, 1970; Stiglitz, 2004; Możdżeń, 2015) consists in unequal access to information important to the parties to a transaction, and in the case of the public sphere, unequal access to information of authorities at the level of the state, region, city, NGOs, business entities, public sector organisations, informal groups of citizens, residents, etc.

For several years, demand for access to public data has been growing due to the fact that it has become a key tool necessary for many stakeholder groups to understand the world and make informed and rational decisions in their interests. However, despite widespread recognition of the importance of public data, there are significant differences in access to it among different segments of society. One factor contributing to these differences is the digital divide, in which individuals or communities with limited access to the Internet or information and communications technologies (ICTs) are at a disadvantage when it comes to accessing public data. This divide is particularly prevalent in low-income communities, rural areas, and developing countries. In addition, monopolies or "data gatekeepers," such as social media platforms and search engines, can control the availability of public data, creating asymmetry in the access to information.

Asymmetry in access to data in public administration refers to the unequal distribution of access to such data among organisations, public institutions, or even their individual organisational units, and it can arise for a variety of reasons, such as, for example, differences in technical capabilities, financial constraints, or a lack of clear guidelines for sharing data. Some organisations and public institutions may have better technical infrastructure and resources to manage and share data, while others may lack the necessary resources and expertise.

The consequences of unequal access to public data can be serious. They can not only affect the decision-making process in public administration entities, but also deepen social inequalities, hindering progress towards the development of a more democratic and civil society, as citizens will not be able to obtain the information necessary to hold public authorities accountable for achieving their goals. In addition, it will negatively affect cooperation between organisations,

public institutions, and – as a result of duplicate collection of the same data separately by different organisational units in public structures – will lead to the waste of resources and the generation of excessive costs. Another consequence of deliberately limiting access to public information in the broadest sense is the building of mistrust in public authorities and the progressive process of the alienation of formal and informal social groups, translating into reduced citizen participation in public life. Unequal access to public data can also limit scientific progress due to the lack of access to critical datasets necessary for scientific research. In addition, government policies and regulations can also create asymmetry in access to public data, e.g. for reasons of national security or privacy, limiting public access. In addition, some organisations and public institutions may provide preferential access to certain groups or other organisations, creating an imbalance of power in access to data.

This article revolves around the following research questions:

1. What are the main factors that create asymmetries in access to public data?
2. How do socioeconomic factors such as, e.g., income and education affect access to public data (Cendrowicz & Chrisidu-Budnik, 2022)?
3. What are the institutional barriers that limit access to public data?
4. What are the geographical and technological factors that affect access to public data?

Therefore, the purpose of this paper is to try to identify the root causes of asymmetry in access to public data and to propose solutions that would promote greater transparency and fairness, and foster citizen participation in public life. The availability of up-to-date, real, and useful information should be widespread and current, for this is a requirement for rational decision-making also in the case of a community self-organisation. The condition for real access to public information is the creation of mechanisms that would favour various entities (public and private spheres) interested in collecting and placing information in systems and sharing information with others (Wrana et al., 2014).

Literature review on public data asymmetry factors

Data-driven management is an approach in which decisions made must be supported by verifiable data. At its core is the belief that good-quality, complete data allows for more rational, effective decisions. W. E. Deming stressed that a person without data "is just another person with an opinion" (Jones & Silberzahn, 2016). However, the success of this approach depends not only on the quality of the data, but also on the effectiveness of its analysis and interpretation. This process contrasts sharply with decision-making based on gut feeling, instinct, tradition, or theory. In public administration, data-driven decision-making is beginning to take on particular importance in the face of the crises affecting the modern world. The COVID-19 pandemic, the war in Ukraine, as well as climate change and its negative effects on both the environment and socioeconomic development make it more likely that data collection and processing – and, consequently, rational decision-making based on data – will become more likely owing to huge advances in ICTs.

Public data is data produced and collected by public institutions, available to the public or with limited access. Understood in the category of ownership, it represents a wide range and can come from a variety of sources, such as, for example, Central Statistical Office (CSO), public records, reports and statements, official government and local government platforms, the Internet of Things (IoT), the results of public opinion polls, and many others. Despite the continuous work

of public authorities to improve the searchability, accessibility, interoperability, and reuse of digital resources, there is still a large gap or disparity in access to data (Verhulst & Young, 2022). At the same time, the field of this data is largely uncoordinated and associated with many problems. There are many factors that can cause asymmetries in access to public data, which can limit its utility, value, and impact. These asymmetries can occur at various levels – including individual, organisational, and societal levels – and can involve different stakeholders (Verhulst, 2022).

Despite the widespread presence of information asymmetry, it is noteworthy that existing public governance research lacks a thorough examination of this concept and its associated scholarly discussions. The absence of a methodical evaluation means that there is no clear consensus on the depth of understanding regarding information asymmetry within the realm of management studies. Presently, the comprehension of this concept relies on discrete sub-disciplines and various theoretical frameworks. Consequently, interpretations and applications of information asymmetry are prone to discrepancies, and a coherent framework to guide future inquiries is missing (Bergh et al., 2018).

Among the many reasons for unequal access to public data, the following are most often cited:

1. the digital divide, referring to the unequal distribution of access to the Internet and technology, and resulting from the insufficient digital competence of both the professionals who create information collections and the recipients of such information;
2. monopolies and "data gatekeepers," which include large corporations, mobile operators, social media platforms, information search engines, and other technology companies that control large amounts of data and can restrict access to information;
3. government policies and regulations that restrict access to certain data or access for certain stakeholders (including censorship);
4. costs associated with collecting, processing, and publicising data;
5. the inefficiency of the management in public institutions of the very process of information management, which involves collecting, storing, retrieving, processing, and publicising information;
6. low level of education of the public, which translates into a low level of involvement in public affairs and, consequently, does not force organisations, public institutions, and other entities to disseminate public information;
7. other factors related to data collection and processing (format, quality, interoperability, etc.), and cultural norms related to data sharing.

Understanding these factors and their implications leads to a better design of strategies and policies that promote more equitable access to data. These factors are described in more detail below.

Digital divide

The digital divide is one of the most significant factors contributing to unequal and unfair access to public data. The term was originally defined by Allan Hammond (1997) in the United States. At the time, it referred to unequal access to the Internet and ICTs, with the result that some individuals or communities have limited or no access to data. This can create an imbalance of power in access to information, as individuals or communities without access to technology and the Internet may not be able to obtain the necessary data, analyse it, or use it effectively. The issue has now moved beyond access to technology and has expanded to include inequalities

in digital skills and how they are used. Indeed, there is a gap related to the control of digital data production tools and the appropriate context for using these tools (Rogers, 2016). The digital divide is particularly acute in marginalised communities, such as the economically vulnerable, rural communities and national minorities.

The variation in the understanding of the digital divide stems from the three levels of the concept proposed. The first level concerns simple access to technology. The second level encompasses operational skills in using the Internet, navigating and evaluating online information, communicating with others online, creating and sharing content, and how to use devices. This level illustrates the differences in reality faced by educated, affluent citizens compared to those with lower skills and material status, even when they have access to technology (Blomberg et al., 2021). The third and final level, on the other hand, is concerned with answering the question of why ICTs, initially considered as a tool for bridging social inequalities, actually contribute to their creation (Goedhart et al., 2019).

The digital divide and the resulting technological differences can, therefore, take many forms and result from the following:

– socioeconomic status – leading to information asymmetry between groups of different socioeconomic status;
– education – people with limited education may not have the appropriate digital skills required to navigate and use the vast amount of information available online, and may therefore have poorer access to public data or have difficulty understanding and interpreting it effectively, contributing to data asymmetry;
– age – which can shape the generational digital divide;
– location – rural and isolated areas often face challenges in accessing reliable and high-speed Internet connections. Inadequate infrastructure or the high cost of extending services to these areas can lead to a digital divide between urban and rural populations, exacerbating public data asymmetries;
– cultural and language barriers – their existence depends on the language in which the data is shared, as well as the organisational culture.

Monopolies and "data gatekeepers"

A data monopoly refers to a situation in which one entity, often a large corporation, has exclusive control over a significant portion of the data in a given industry or market. Data monopolies can arise for a variety of reasons, including network effects, economies of scale, and first-mover advantage. They can lead to concentrations of market power that can be used to stifle competition, limit innovation, and create barriers to entry for new players. "Data gatekeepers," on the other hand, are entities that control access to and use of data within an ecosystem or specific platform. They often have significant influence over the flow of data and can use their control to dictate terms of access, use, and pricing to other market participants (Marty & Warin, 2020). Data gatekeepers can be private companies, public institutions, or other organisations that exercise control over critical data infrastructure such as Internet service providers (ISPs), search engines, and social media platforms.

Currently, the FAANG (Facebook, Apple, Amazon, Netflix, and Google) have more data about humanity than anyone had ever had in the past. Some of this data could be useful to public institutions, but the FAANG are nevertheless very strict about sharing information, and interested

parties often have to enter into partnerships based on contracts or technical dependencies to obtain it (The Power of Gatekeepers, web).

Although "data monopolies" and "gatekeepers" are separate concepts, in practice they often overlap. "Data monopolies" can also function as "gatekeepers," using their control over data to influence the market and dictate terms to other players. Additionally, the available data may not reflect the full range of perspectives or experiences, as large corporations may not prioritise data collection on certain populations or topics. Understanding the interplay between data "monopolies" and their "gatekeepers" is essential to analysing the broader implications of these phenomena for innovation, competition, and consumer choice in the digital age.

Government policies and regulations

Implemented government policies and regulations play an important role in shaping access to public data, but they can also contribute to asymmetries in access. Restrictions on access can arise for a variety of reasons, e.g. sensitive defence, intelligence, or law enforcement information is often not made available to the public. Similarly, data protection laws impose restrictions on the disclosure of sensitive or personally identifiable information. While these measures serve important purposes, they can also create barriers to accessing valuable public data.

However, asymmetry in data access can be further amplified when government policies grant preferential access to data to certain groups or organisations while imposing restrictions on others. Such preferential treatment can disproportionately favour large corporations, academic institutions, or research organisations, exacerbating the power disparity in data access based on resource availability and institutional influence. In addition, the complexity and ambiguity of data-sharing policies and regulations can impede data access efforts. Inconsistent or unclear guidance on sharing protocols, ownership or licensing agreements can significantly impede access for researchers and organisations without legal or regulatory expertise. Consequently, this exacerbates the existing imbalance in access to data.

Addressing the asymmetry requires establishing clear and unambiguous guidelines for data sharing and access. Governments should strive to develop comprehensive policies that effectively balance privacy and data security issues with promoting open access to data for research, innovation, and the public interest. Collaboration among government agencies, researchers, and data users is essential to establish efficient processes that ensure fair and effective data-sharing mechanisms.

Management inefficiency in public institutions

There are many reasons for a significant impact on limiting the efficiency of governance in the public sphere. In the practice of organising and operating public administration, there is the politicisation of the authorities, the decision-making process, and the decisions themselves. The monopolistic nature of the operation of the public administration is not conducive to taking action in line with the public interest in every situation, and the public has no opportunity to change its choice of provider. The separation of the management function from the ownership function (organisations of the public sphere dispose of huge physical and financial assets, which are the property of all citizens of the country or regional, local communities) results in decisions regarding the management of assets being made outside the owner, and in principle he/she has no influence on these decisions. Such a solution "dilutes" in the practice of operation

of public organisations to some extent the responsibility for these decisions. The activities of public administration are primarily undertaken using public funds, which are not directly earned by the organisations of this sphere. The measure of management effects in public administration should be combined with the public good, which, in turn, is difficult to define in practice. It should also be mentioned here that there is a high degree of the formalisation of activities within public sphere organisations, determined by legislation, which results in officials' concerns about the legitimacy of decisions made and, consequently, contributes to the bureaucratic approach in solving many problems. In addition, control over the activities of public administration organisations is limited to the activities of the media and third-sector organisations (non-government organisations) (Stawasz, 2011). Arguably, the very organisation of the work of offices, institutions as well as the staff working in them has a considerable impact on the efficiency of management in the public sphere.

When analysing the problem of management inefficiency in organisations of the public sphere, it is necessary to refer to the phenomenon of information asymmetry in relation to the title of the article. The process of managing information involving its collection, storage, search, retrieval, processing, and transmission is improved by ICTs. Thus, the principles of building the Management Information System itself assume special importance. The basic questions in this regard are: what information is important to the organisation; how to obtain this information' how to collect and store it, update it, process it, and use it; and, possibly, under what conditions it should be transferred to users and stakeholders. Every Information Management System has five main structures. These are:

– information structure – who, why, what, how often to inform;
– spatial structure – concerns the location of source information, the location of users, and the routes of information transmission;
– technological structure – refers to methods and techniques through which information is obtained, stored, processed, updated, used, and transmitted (what are they?);
– technical structure – refers to the equipment useful for operating the system;
– organisational structure – defines the relationship of information with the hierarchical links and formal structure of the organisation (Kuczmera-Ludwiczyńska et al., 2002).

Depending on how the information system is structured translates into whether or not one will have to deal with the phenomenon of information asymmetry and information gap (Flakiewicz, 1974; Romanowska, 2008). It does not translate into when every organisational unit will have free access to the information necessary for its functioning. It may be that the information system does not contain information useful to the department, organisational cells, or the acquisition of information on a given topic is duplicated and there is no inter-cellular information coordination in this regard.

Public information is also used to communicate between the organisation and its stakeholders. To perform this function satisfactorily, it must be made public. The manipulation of information and the transfer of low-quality data serves to camouflage the facts and hide mistakes, ultimately reducing the efficiency of public administration. Without making public information public, there is no way to control the effectiveness of public sector activities. In turn, without control, the authorities – managers having a sense of impartiality and impunity – may be inclined to implement with public funds particularistic goals, often not corresponding to the public interest. Then comes the phenomenon of the alienation of the authorities from the society, the lack of trust in the authorities, and the weakening of social capital.

Other factors

Among other factors contributing to asymmetry in access to public data, there is low data quality. It can result, for example, from measurement error caused by inaccurate instruments, human error during data collection or entry, non-participation in the survey, inconsistencies that make it difficult to combine some data, and the inherent complexity of some constructs.

A significant barrier to building equitable access to data is low interoperability, which, in practice, means the poor ability of ICT systems and the processes they support in order to exchange data and share information and knowledge (Ustawa o informatyzacji…, 2005). One aspect of interoperability is the standardisation of data formats, structures, and semantics. Data sources often use different formats and structures to store and represent data, making it difficult to seamlessly integrate or analyse data from multiple sources. Incompatibilities in data formats can hinder the ability to accurately aggregate or match datasets, potentially leading to asymmetries in the combined data. In addition, interoperability involves consistency and coherence in data and metadata definitions. Data sources may use different terminologies, coding schemes, or classifications of similar concepts or variables (Malomo & Sena, 2017). As a result, when attempting to combine or analyse data from different sources, discrepancies in definitions and meanings of data elements can cause inconsistencies and asymmetries.

Another factor influencing data asymmetry may be contextual, resulting from social, economic, and cultural conditions affecting the willingness of individuals or groups to disclose certain information or participate in data collection activities. Additionally, inequality in access to public data will be influenced by insufficient digital competence in government offices or insufficient employee involvement in digitisation and data management processes.

Research methodology

As indicated earlier, one of the main factors in asymmetry in access is digital gap, a concept formulated by African-American politician S. J. Jakson in reference to differences in computer and Internet use between citizens from countries of different economic status, socioeconomic status, gender, age, and place of residence. That is, the digital divide includes variables such as income level, race, gender, and ethnicity (Szpunar, 2007). However, digital gap does not just mean a lack of access to the network, but also, to a large extent, a lack of skills to use it.

As mentioned earlier, the purpose of the article was to try to identify the root causes of asymmetry in access to public data and analyse them in relation to socioeconomic conditions. The research part of the paper, preceded by a literature review, was contextualised as follows. The first step of the undertaken research is to measure access to the Internet and the types of information searched by Internet users in Poland in the period of 2018–2022. The analysed group was individuals with access to the Internet. Then, the ways in which citizens use electronic/digital government in 2022 were analysed in relation to education level, the place of residence, and income received. All data was obtained from databases and statistical studies of the Central Statistical Office.

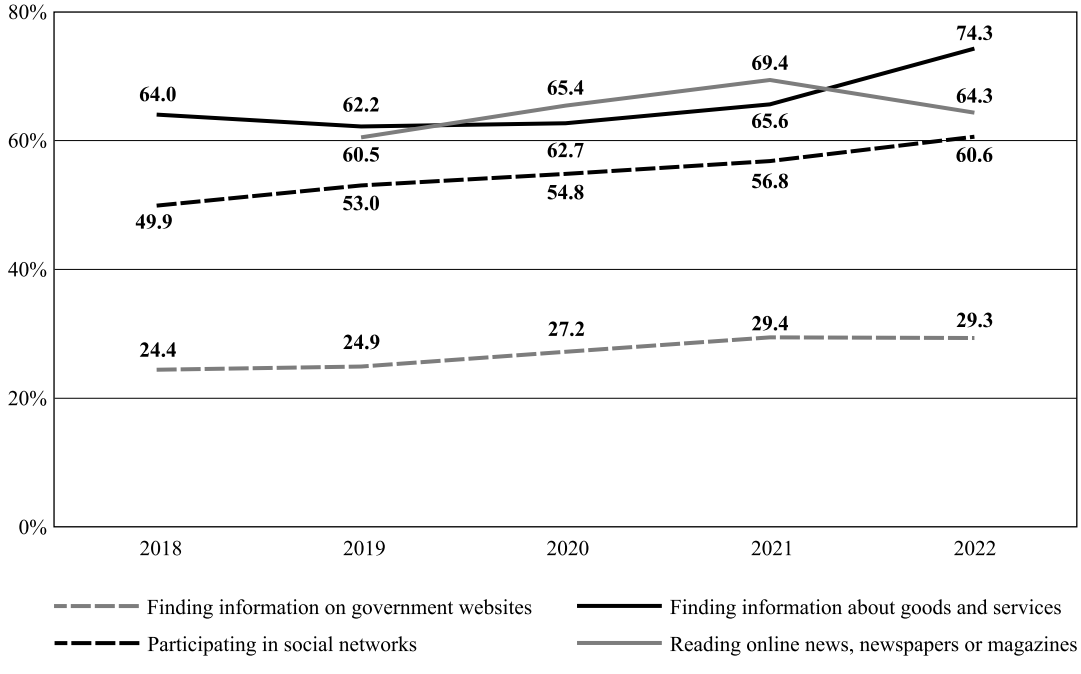
Later, the R-Pearson's correlation coefficient was analysed between the percentage of people who use the Internet regularly and the percentage of people who search for information on government websites by place of residence in the last five years and age group. The R-Pearson correlation coefficient makes it possible to determine whether there is a linear relationship between

two variables – if so, it gives the possibility to determine what the strength of the relationship is and what its nature is.

The final step was the analysis of the number of entries to the Open Data portal between 2018 and 2022.

Discussion of the results

In 2022, 93.3% of households in Poland had access to the Internet, with 90,6% using it. (*Społeczeństwo…*, 2022). Considering the types of publicly available information searched, it can be noted that the most frequently searched information was that on goods and services (on average, almost 66% of people with Internet access searched for such information in the last 5 years), while the least frequently searched information was on public administration websites (only 27%). However, the percentage of people making searches for publicly available information did not change significantly in the studied years (Figure1).



* no data available for 2018.

Figure 1. ***Internet search for publicly available information in 2018–2022****

Source: Own study based on data from the publication Information Society in Poland in 2022, Central Statistical Office in Poland, Statistical Office in Szczecin, Szczecin 2022.

The level of education is one of the determinants of data equity issues. Figure 2 illustrates the goals of using public e-government by education level in 2022.

As can be seen in the Figure 2, people with higher education generally made much greater use of searching for information from government websites and its electronic services than those with primary and junior high school education. This may be due to better skills of using

information and communication tools as well as the ability to search for relevant information. Analysing income quartiles in the context of the means of purposes for using government websites also shows a relationship between income and the percentage of people obtaining information by this means. The higher the income, the higher the percentage of people in particular with regard to searching for information and accessing personal information collected by public administration (Table 1).

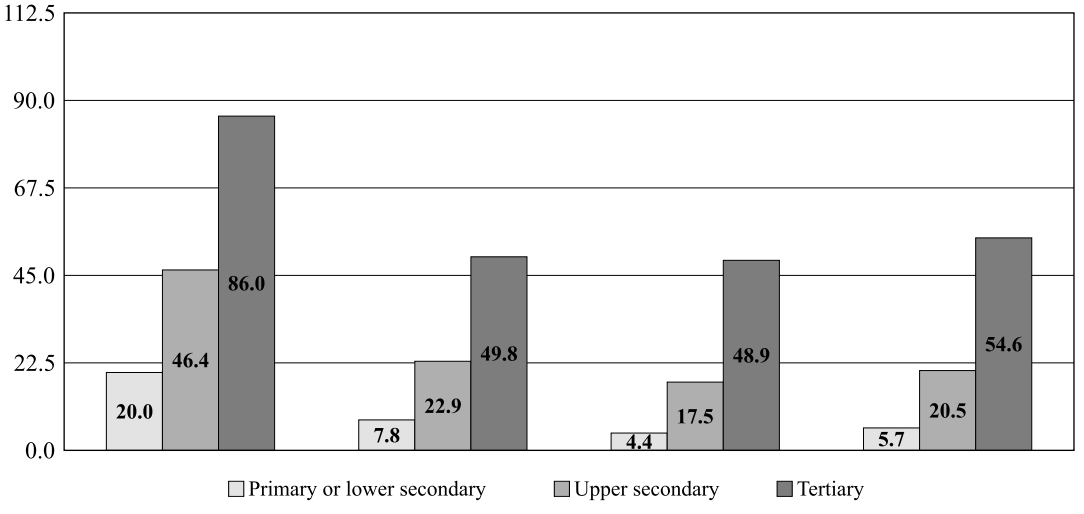


Figure 2. The use of public e-government by purpose and education in 2022

Source: Information Society in Poland in 2022, Central Statistical Office in Poland, Statistical Office in Szczecin, Szczecin 2022.

Table 1. The use of government websites by purpose and income in 2022

%	Net income – quartiles (in PLN)			
	< 3600	3600-6000	6000-8000	> 8000
People who have used websites or applications of government entities in the last 12 months:	43.3	52.9	57.6	61.6
to access personal information held by government entities	18.5	23.0	24.4	31.8
in order to use public databases or registers	4.9	6.5	7.2	11.7
to search for information on government websites	20.7	27.3	31.6	33.1

Source: Own study based on Central Statistical Office data, www.stat.gov.pl [accessed: 01.06.2023].

With regard to geographic factors, differences in searching for information on government websites among people living in urban and rural areas also become apparent (Table 2).

The most significant differences are found between residents of large cities and rural areas, which may be due to the skills they possess, but also because of the provision of adequate infrastructure. An analysis of the correlation coefficient between the percentage of people using the Internet regularly and the percentage of people searching for information on government websites by place of residence in the last five years provides interesting insights. The highest

correlation coefficient is for medium-sized cities with less than 100,000 inhabitants (corr = 0.97). This may mean that people living in medium-sized cities have similar skills in using information and communication tools as those in cities with more than 100,000 inhabitants (corr = 0.90), but due to the lack of direct access to some public institutions, they use the Internet route. The same factor may apply to regular Internet users from rural areas, in which case the correlation coefficient was 0.95.

Table 2. The use of government websites by purpose and place of residence in 2022

%	Total	Cities up to 100,000 inhabitants	Cities with more than 100,000 inhabitants	Villages
People who have used websites or applications of government entities in the last 12 months:	55.4	55.1	65.9	48.1
to access personal information held by government entities	25.4	23.7	37.2	18.4
in order to use public databases or registers	8.1	7.5	13.8	4.5
to search for information on government websites	29.3	28.8	37.0	24.1

Source: Own study based on Central Statistical Office data, www.stat.gov.pl [accessed: 01.06.2023].

In the breakdown of regular Internet users by age group, the highest positive correlation with the percentage of people searching for information on the websites of public institutions occurs among seniors aged 65+ (corr = 0.99) and 55–64 (corr = 0.98). Seniors, moreover, are the group with the largest change in regular Internet use, from 29.8% in 2018 to 51% in 2022 (see Figure 3). Undoubtedly, the COVID-19 pandemic and the lockdown introduced from March 2020 had a key impact on this change. The negative moderate correlation (corr = –0.44) is for those under the age of 25.

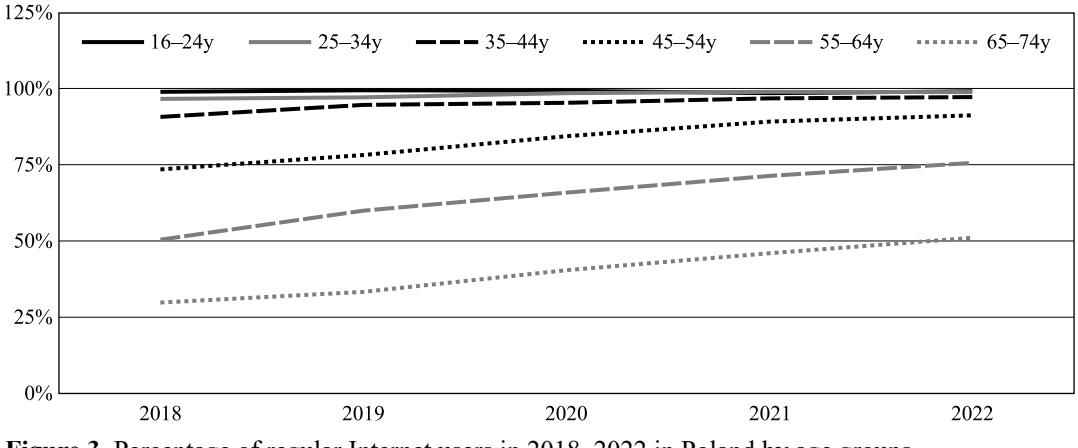


Figure 3. Percentage of regular Internet users in 2018–2022 in Poland by age groups

Source: Own study based on data from the publication Information Society in Poland in 2022, Central Statistical Office in Poland, Statistical Office in Szczecin, Szczecin 2022.

In addition to the factors identified above for the asymmetry of access to public information, lying in the social area, there are also institutional or organisational factors in Poland, such as the types and methods of data made available. For example, the national Open Data portal provides access to 1,916 datasets, although most of them are made available through it not by local government institutions, but by other public sector entities. Of all the providers, 80 belong to local governments, while the vast minority of them are municipal offices. Most of the public institutions provide access through their own websites. The number of hits on the portal's website grew until 2021, with a rather large drop in website views in 2022 (see Figure 4).

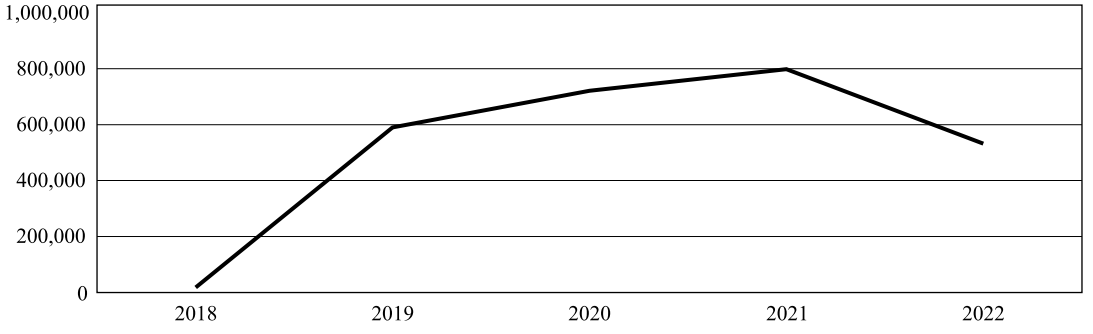


Figure 4. The number of views of the Open Data portal between 2018 and 2022

Source: Own compilation based on statistics from https://widok.gov.pl [accessed: 15.06.2023].

Moreover, the asymmetry is reinforced by barriers to data sharing and exchange between public and private institutions in Poland, as described in a report commissioned by the Chancellery of the Prime Minister on the challenges and prospects of information sharing (*Wyzwania i perspektywy…*, 2021). These include:

– the lack of adequate regulations on data openness;
– restrictions arising from licensing agreements;
– charging fees for making data available for commercial purposes;
– the availability of data in closed or proprietary formats;
– the lack of data interoperability.

Conclusions

Asymmetry of access to public data is a complex issue. As a result of the analysis of selected factors affecting unequal access to information in Poland in 2018–2022, several important conclusions can be made. First, the research confirms the existence of a digital gap in Poland, and some of its factors are income level, education, the place of residence, and age. The gap is not only about access to the network, but also about the ability to use it. Second, familiarity with digital tools and the ability to search for information online are strongly related to the education level. People with higher education are much more likely to use online public administration services than those with primary or secondary education. Thirdly, analysing the availability of public data in the context of income, it can be noted that the higher the income, the higher the percentage of people using online public administration. The analysis also shows that older citizens, despite

being the group that uses the internet the least, record the largest increase in regular Internet use, i.e. from 29.8% in 2018 to 51% in 2022. Adolescents and young adults, despite being the most active group online, hardly use government services online. Meanwhile, the availability and quality of data provided by public institutions poses a significant challenge. Although the number of datasets provided on the national Open Data portal is significant, their distribution is uneven, and many public institutions choose to provide data on their own websites, which can make it difficult to access and view this information.

We are aware, of course, of the fact that the analysis conducted is a small slice of research on asymmetry of access to data. Citizens are one of several stakeholder groups affected by unequal access to information. More in-depth research is needed in the area of business entities and their ability to access and use public data, as well as in the field of public institutions in terms of their ability to share data depending on the type of institution, geographic location, and a number of other potentially relevant factors.

The research suggests the need for measures to increase access to public data, especially among people with lower incomes, from smaller towns, with lower levels of education, and in age groups that are less digitally-proficient. These measures could include digital education, investment in Internet infrastructure, and increasing the quality and availability of public data. From the institutional perspective, the study's findings suggest the need for further digitisation and standardisation of data-sharing processes by public institutions. It may be expedient to promote a uniform data format and centralise data distribution to facilitate access to information and increase the transparency of public administration.

It should be emphasised that asymmetry in access to data can be mitigated by appropriate government policies through the implementation of transparent and fair data dissemination practices. Central to this endeavour is the establishment of open data portals, which should be designed to be user-friendly and accessible to individuals from diverse backgrounds, thereby reducing technical barriers. Furthermore, the adoption of standard data formats and the provision of comprehensive metadata can enhance the usability of these datasets. Policymakers should also consider regular public consultations to identify and address specific community needs, ensuring that data accessibility initiatives are inclusive and responsive. Additionally, fostering partnerships with educational institutions and non-profit organisations can facilitate the development of training programmes, aimed at equipping citizens with the necessary skills to effectively utilise public data. Through these measures, policymakers can significantly contribute to democratising access to public data, promoting transparency, and fostering more informed citizens.

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New Technologies in Humanitarian Logistics

Abstract

Objective: The aim of the article is to present new technologies and the possibilities of their implementation by entities involved in the implementation of logistics activities (humanitarian logistics).

Research Design & Methods: To achieve the assumed goal, the method of analysing literature in the area of humanitarian logistics and new technologies related to the so-called digital revolution is used. Based on a literature review, general considerations on humanitarian logistics were related to the needs of business models of entities carrying out humanitarian aid activities in the implementation of new technologies.

Findings: The article outlines the role and importance of new technologies in humanitarian logistics, which is an interesting and prospective research area. All presented examples of new technologies that are used in humanitarian logistics are extremely important for the easy, fast, and effective flow of information, finances, and supplies with humanitarian aid. The key to success is appropriate use of technology while ensuring the security of humanitarian supply chains.

Implications / Recommendations: There is a need to deepen research in the field of humanitarian logistics, because identifying needs and barriers in the implementation of humanitarian logistics processes can significantly streamline and improve the effectiveness of humanitarian supply chains.

Contribution / Value Added: The article shows that the role of new technologies treated as support for aid activities in humanitarian actions is the ability to quickly obtain and disseminate information that guarantees the effectiveness and efficiency of the undertaken actions. New technologies are an element of new business models of organisations involved in humanitarian aid.

Article classification: theoretical/review paper

Keywords: humanitarian relief situations, revolution 4.0, new technologies, humanitarian logistics, business models

JEL classification: H12, H84, Q55, O35

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Introduction

No matter where humans appear, the effects of their activities can be seen. The positive ones include urban development, technical and technological progress, and new discoveries and inventions that improve the quality of life. Unfortunately, the negative ones are more visible, e.g. environmental pollution, environmental degradation, or deepening social inequalities. As a result of their activities, humans bring undesirable situations in the form of initiating armed or ethnic conflicts or causing natural disasters. These situations cause many people to suffer and need the help they can get from entities and people who can provide such help.

In today's volatile world, delivering humanitarian aid is a complex undertaking. The demand for humanitarian aid is growing faster than the capacity to deliver it, resulting in a growing number of people whose life needs remain unmet. Humanitarian actors are required to act to ensure that aid is delivered as quickly as possible. The only way to make relief efforts highly effective is through humanitarian logistics, which should be treated as a key priority in all humanitarian projects.

Humanitarian organisations recognise the need to update their approach to the flow of physical goods (humanitarian resources) and information along supply chains, in order to deliver aid efficiently and effectively. All relief efforts rely on information, which should be timely and reliable. The reliability of information determines where, what, how much, and to whom it will be sent. The rapid transfer of information and data is made possible by the development of digitisation. Therefore, the purpose of the article, based on a systematic review of the literature, is to present new technologies and the possibilities of their implementation by those involved in the implementation of logistics activities (humanitarian logistics).

Literature review

Situations requiring assistance

Increasingly, through the media, we are learning about situations occurring in various corners of the world that require humanitarian aid. Situations requiring humanitarian aid are a collection of numerous and varied events, viewed in the category of disasters. The term "disaster" describes a sudden and unexpected event with negative consequences in the form of the loss of life and property, a phenomenon tragic in its consequences, covering a large area (*Słownik języka polskiego*, 2023). In everyday language, a disaster is a sudden change in the characteristics of the world around us. Disasters are natural phenomena of the development of the world and are the consequences of human activity (destructive action negatively affecting the environment and society) (Hajder et al., 2014).

The most important causes of the emergence of disasters include the following:

1. violations of the natural equilibrium in nature through the indiscriminate use of scientific and technological achievements alien to the natural environment;
2. impediments to the natural regeneration of the biosphere: anthropogenic transformation of the natural environment as well as the massive exploitation of previously pristine areas of the Earth (Hajder et al., 2014);
3. sociopolitical instability and increasing religious, ethnic, political persecution, e.g. the situation in the Caucasus;
4. armed conflicts, e.g. the war in Syria or Ukraine.

The above-mentioned causes of the emergence of disasters make it possible to consider situations requiring humanitarian assistance in two categories: anthropogenic and non-anthropogenic disasters. Non-anthropogenic disasters are situations related to the forces of nature, especially intense precipitation, hurricanes, seismic shocks, landslides, fires, droughts, or the action of another element. These are known as natural disasters, calamities, or cataclysms. The United Nations defines a natural disaster as a situation in which there is a serious disruption in the functioning of a community or society involving human suffering, material, economic, or environmental loss, or an impact that exceeds the ability of the affected community or society to cope using its own resources (UNISDR, 2009). Anthropogenic disasters are events related to the occurrence of armed conflicts, the waging of wars and battles, as well as ethnic, religious, and political persecution and terrorism. They are the result of human actions. They can be referred to as "complex emergencies" (Łupicka, 2011).

Examples of disasters that humanity has experienced – e.g. genocide in Rwanda, famine in Sudan, the war in Ukraine, tsunami in Japan, earthquake in Haiti – indicates that each disaster is unique and causes different effects in the economic, social, economic, and, above all, health and social conditions of the affected population. It undoubtedly allows a preliminary assessment of the differences in the need for assistance in the event of a specific disaster and is the first step in planning humanitarian action (PAHO, 2001).

Humanitarian organisations

The consequences of the growing number of disaster situations include the involvement of many organisations in providing help. This growing trend makes us anxious and fearful on the one hand, and fills us with optimism and faith in people on the other. Negative feelings are related to information appearing in the media about disasters occurring in various and distant corners of the world. Positive feelings are the result of the work of many aid organisations and faith in people around the world who are committed to selflessly helping others in need. These are intergovernmental, governmental, or non-governmental organisations. They differ not only in their institutional and legal forms, but also in the ways in which they are involved in relief operations (directly, indirectly).

The largest group of humanitarian actors consists of entities directly involved in relief operations (PAHO, 2001). A brief description of such organisations is presented in Table 1.

A more detailed characterisation of the actors directly involved in humanitarian aid reveals great diversity of this group. These entities have the largest funds at their disposal. The type and size of the capital depends on the sources of its funding, e.g. they can come from contributions from member states, the European Union, government grants, or private donations. These organisations have the appropriate infrastructure, resources (material and human), and experience along with previously acquired skills and competencies, and are thus the ones with the greatest responsibilities in providing humanitarian assistance.

Those directly involved in humanitarian action can include so-called "grassroots" aid movements. These limitations do not apply to aid involvement by independent volunteers. The involvement often consists of trips of a few days or a few weeks (short term volunteering), with irregular frequency or on a one-off basis. Some activities are carried out over a longer period of time and include multi-month stays in camps.

Table 1. The characteristics of selected humanitarian organisations directly involved in humanitarian operations

Type	Abbreviation	Full name	Description
UN agency	UNDP	United Nations Development Programme	It promotes and supports disaster preparedness activities in member states. In a disaster situation, the UNDP Country Office provides support to the government, helping to report humanitarian needs from other countries and coordinating the work of other UN agencies.
	WFP	World Food Programme	It provides and coordinates humanitarian assistance for food supplies. In the case of large-scale emergencies, it often also takes over as the main coordinator of logistical operations.
	UNHCR	United Nations High Commissioner for Refugees	Its mission is to protect refugees and seek lasting solutions to their problems. The UNHCR coordinates all activities for refugees.
	UNICEF	United Nations Children's Fund	Its main focus is health, education, and care for women and children in developing countries. During an emergency, UNICEF is involved in providing water, food, sanitation, health care, and social assistance, among other things.
International agency	ECHO	European Community Humanitarian Office	It works with non-governmental organisations, especially UN agencies, providing food and other humanitarian aid as well as helping refugees and the homeless.
	OAS	Organisation of American States	A regional organisation that supports its members by assessing exposure to natural disasters and implementing measures to help mitigate their negative effects. It provides technical support and training.
	CDERA	Caribbean Disaster and Emergency Response Agency	A regional organisation established by the countries of the Caribbean Community. It is headquartered in Barbados and includes 16 members. Its main functions include coordinating the response to and recovery from a disaster affecting any of its member states.
Intergovernmental organisations – NGO	IFRC	The International Federation of Red Cross and Red Crescent Societies	It coordinates humanitarian relief efforts in crisis-affected countries through national affiliates, and in their absence, through its own staff. Years of experience and extensive resources make it the largest non-governmental humanitarian organisation.
	ICRC	International Red Cross Committee	It protects and assists victims of armed or civil conflict and oversees compliance with international humanitarian law.
	MSF	Médecins sans Frontières	Its operation is focused on providing medical aid, but it has an extremely rich logistical background and experience in treating water sources, building sanitation infrastructure, and providing temporary shelters.
	-	Caritas Internationalis	It promotes, coordinates, and supports humanitarian aid and long-term reconstruction.
	OXFAM	The Oxford Committee for Famine Relief	It provides funds and technical support for emergency and long-term humanitarian assistance during emergencies.

Source: Own elaboration based on PAHO, 2001, pp. 30–34.

Volunteers often come together in informal groups to form grass-roots movements (grass-roots movements) for aid. Only some of the groups formed in this way transform into more

institutionalised ones and regulate the legal status of their *de facto* activities. Therefore, their activities are more flexible, but also less regular. Entities in this group have capital in the form of time devoted to aid and material resources, most often from in-kind or financial collections (Mazur, 2017).

In addition, individuals and legal entities are increasingly involved in humanitarian actions. Having no direct contact with those in need, they carry out relief activities in an indirect way by taking a number of initiatives to provide financial support to directly operating organisations or donating given items for collections (e.g. blankets, firefighting equipment, medicine, food).

Humanitarian logistics

The diversity of emergency situations and the specificity of the conditions in which humanitarian aid organisations have to operate generates an increasing interest in logistics. In practice, this means that aid organisations use the solutions offered by business logistics while recognising the difference and specificity of the activities undertaken, which aim to help those affected by disasters and reduce their suffering. Therefore, the implementation of humanitarian aid tasks is often called "supply chain for life" (Łupicka, 2011), humanitarian logistics (Pokusa, 2022), or humanitarian supply chain (Marcinkowski, 2019).

In the most general terms, humanitarian logistics, or humanitarian action logistics, refers to the activities involved in organising, planning, directing, and checking the efficient flow of materials, finances, and information from their generation to their consumption to meet the needs of recipients in humanitarian action (European Commission, 2021). Therefore, humanitarian organisations focus on performing the logistical tasks of acquiring the information necessary to ensure an adequate supply of goods and services (humanitarian aid – medicine, medical supplies, water, medical care, etc.) Humanitarian logistics refers to the processes and systems involved in mobilising people, resources, skills, and knowledge to help people in need in areas affected by natural disasters or complex emergencies (Lawry-White et al., 2019). The humanitarian supply chain includes the assessment, procurement, storage and transport, and rapid movement of people and materials, and the main goal is to help as many people as possible (Ramezanian & Ghorbani, 2020).

The diversity of emergency situations and the specific conditions of humanitarian organisations equip the logistics of humanitarian actions with a number of non-standard features, and these are primarily:

- enforced speed of action, and thus short time to organise the action;
- the lack of a range of information needed to plan and execute logistics operations;
- limited resources and infrastructure (due to destruction or lack thereof);
- the unpredictability of demand and supply;
- in contrast to the most common approach, i.e. economic logistics, the issue of cost recedes into the background (Jaroszyński, 2011).

Therefore, humanitarian supply chain activities should focus on delivering humanitarian assistance in a coherent and effective manner, through the systematic use of instruments, i.e. strategic planning, data collection and information management, mobilising resources and ensuring accountability, coordinating the functional division of labour in the field, political negotiations, and providing leadership (John et al., 2012). Thus, it is not difficult to agree that the smooth execution of humanitarian action is a challenge of the highest degree of difficulty, and one should

be aware that in the face of unusual and enormous tragedies, it is highly likely that not all those in need will be helped in time.

The effectiveness of the humanitarian action carried out is affected by two issues:

1. It is the matter of the readiness and full commitment of all responsible actors to all actions and appropriate management of the emergency situation. This issue underscores the importance of cooperation among all humanitarian actors, involving the exchange of knowledge and experience as well as the readiness to take appropriate action. This closely involves the monitoring and constant control of areas at risk as well as the creation of an action plan. In addition, all links in the supply chain involved in humanitarian operations become interdependent so that each actor in the supply chain is responsible for supply from the moment the resources are obtained until they reach their destination.
2. All humanitarian aid activities should be guided by three overriding values: humanitarianism, neutrality, and objectivity. Humanitarianism is understood as restoring human dignity and reducing human suffering as well as saving human lives while respecting the individual. The principle of neutrality means "the autonomy of humanitarian and political goals" (Szołtysek, 2010) and thus providing assistance to all those in need, regardless of their affiliation to any group. This principle is particularly applicable during armed conflicts. The principle of impartiality dictates that aid should be provided according to the degree of the urgency of the needs that have arisen and in proportion to them, and not on the basis of any other criterion.

Emerging situation – disasters – require actions in which the main factor in decision-making is the time of providing and reaching help. The activities undertaken so far show that research is unsystematised and does not present a holistic approach, indicating the need for further work to improve the implemented processes (Marcinkowska, 2023).

New technologies in humanitarian organisations

The emergence of the term "new technologies" is associated with the so-called digital revolution or digital transformation, which, due to the specifics and needs of the organisation, should be considered individually. In the literature, "new technologies" are identified with, among other things:

– a collection of technologies and ideas for creating a modern supply chain;
– connecting devices within digital ecosystems, and with deepening integration within horizontal and vertical value chains;
– a conceptual aggregate including the Internet of Things, cloud computing, Big Data analytics, artificial intelligence, and simulation techniques, among others (Placzek, 2018).

Increasingly, aid organisations are recognising the need for a digital transformation involving the implementation of new technologies into their aid efforts. New technologies are first and foremost technological know-how that mark a change in business models. For many entities, this means an evolutionary shift from traditional business models to new models for operating in a digitised world. For humanitarian organisations, changes in business models involve the use of new technologies to increase productivity and efficiency as well as improve processes along the humanitarian chain, and the way organisations communicate and collaborate.

Humanitarian organisations, recognising the need to improve their ongoing relief operations, make decisions to implement new technologies. These are often very difficult decisions due to

financial, technological, or social constraints. Below are some examples of new technologies that humanitarian organisations are trying to implement into their operations through applied humanitarian logistics (Placzek, 2018):

1) **Blockchain technology** (the future of supply chains, it can be called a digital ledger, or electronic ledger responsible for recording the list of transactions that take place within the network). In humanitarian logistics, this technology allows one to: monitor and control shipments in real time; improve information sharing; increase security and transparency; provide the ability to store shipping documents, permits, and contracts; and allow smart contracts (contracts can be converted to computer code, where an asset or currency is transferred to a blockchain-based programme).
2) **The Internet of Things (IoT)**, which is revolutionising the way humanitarian operations are conducted. The IoT creates a network of devices, vehicles, and other objects capable of collecting, processing, and actively exchanging data. In humanitarian logistics, especially in transportation, IoT solutions provide the ability to connect various assets within a supply chain in a meaningful way, and then allow analysis of the data generated from these connections. This, in turn, enhances the efficient operation of warehouse logistics, humanitarian supply organisations, or fleet management. By transmitting data over the Internet, using RFID facilitates and real-time monitoring as well as tracking supplies and assets increases the efficiency of operations and contributes to faster response times. In addition, using sensors and networked devices, the temperature, location and other parameters of cargo can be monitored, enabling rapid response to unforeseen problems that arise (see: Kolenda, 2016).
3) The term **Big Data**, referring to large data sets, which by their complexity must be processed by modern technologies. Big Data technology makes it possible to collect data very quickly and then analyse it to arrive at specific conclusions.
4) **Drones** – unmanned aerial vehicles – which are a method for delivering various types of shipments to places that are hard to get to by other means. The most common use of drones during humanitarian operations is:
   – mapping for crisis areas – this applies to traditional two-dimensional cartography as well as already more complex three-dimensional models;
   – delivery from the sky – delivery of medical supplies, food, water;
   – search for the missing (search and rescue operations) – with the use of thermal imaging cameras, large areas of land can be searched very quickly to find the missing;
   – the safety of the needy – ongoing analysis of the situation so that emergency services know in real time where the worst situation is and where they should go first to be able to take care of their safety; with the help of cameras from the sky, the migration routes of refugees are also tracked, or the roads on which trucks with supplies travel (see: Drony w akcji…, 2019).
5) **Cloud computing** – in logistics (humanitarian logistics) it is a remedy for the problems associated with changing server space requirements. Distributed computing structures allow remote storage and processing of data (see: IT.integro, 2023).
6) **Humanitarian logistics**, which also uses data analysis and artificial intelligence technologies to forecast and plan operations; machine learning algorithms can analyse historical data, weather factors, demographic trends to predict needs and optimise the delivery of humanitarian aid.
7) **Virtual and distributed reality (VR and AR)**, which are the future for humanitarian relief organisations. They are used in virtual training and simulations designed for future and current

humanitarian workers. Through virtual and augmented reality devices, new employees can gain the practical experience needed in emergency situations, allowing them to be better prepared for operations.

8) **Geolocation**, which enables the determination of geographic location using GPS or IP address. It is used in the management of distributed assets, vehicle fleets, and remote teams of employees.
9) **Portals and applications** used to gather in one place information about the activities carried out by all aid organisations in a given territory. These is primarily information on access to medical assistance, sources of drinking water, food, and shelter, but also legal assistance – usually available in two or more languages. The effectiveness of these portals and applications depends on how much the activities of the volunteer groups or organisations in question are reported to their creators and then updated. It is on the action of these entities that the achievement of the economies of scale depends. The more shared, verified information and the more active users, the greater the effectiveness of the tools in question. The capital in this case is the information itself. The possibilities for their flow owing to technology are enormous. The problem which remains is about the effectiveness of their use (Mazur, 2017). We observe that social media platforms have simplified the process of soliciting donations (donation buttons that can be added to pages and integrated into posts) and accelerated the collection of needed relief supplies (e.g. medicine, food, water, and funds) among those interested in helping.

All of the presented examples of new technologies that are being used in humanitarian logistics are extremely important for the easy, fast, and efficient flow of information, finance, and humanitarian supplies. The key to success is the appropriate use of technology while ensuring the security of humanitarian supply chains (including data).

Discussion

The advantages and disadvantages of new technologies

In order to meet the challenges of the modern world, humanitarian organisations are forced to follow current trends in digital reality. Knowledge and use of new technologies allows humanitarian actors to achieve their goals. However, it is important to remember that the adaptation of new technologies in humanitarian logistics brings many advantages, but can also face barriers. Table 2 shows some of the main advantages and barriers associated with the use of new technologies in humanitarian logistics.

Despite these potential barriers, humanitarian organisations are realising the benefits of adapting new technologies and are striving to use them to improve their logistics operations and deliver humanitarian aid effectively and efficiently. New technologies have great potential to improve the efficiency and effectiveness of humanitarian logistics operations.

By understanding how new technologies work and mitigating any potential risks associated with them, humanitarian organisations can benefit from their use in a variety of relief situations. Wise use of new technological solutions allows organisations to operate.

Table 2. The advantages and disadvantages of new technologies in humanitarian logistics

Advantages	Restrictions
• rapid and efficient delivery of humanitarian aid (drones, IoT, mobile apps); • the identification and localisation of locations where assistance is needed; • better inventory management, minimising losses, excluding fraud, tracking shipments (IoT, blockchain); • the optimisation of resource utilisation, the automation of logistics activities (robotics, data analytics, AI); • minimise risks for humanitarian workers and volunteers (drones, AR/VR technology, robots); • provide a venue for efficient communication between all participants in the supply chain; • allow communication with all business partners and donates within a consistent interface and any devices (cloud computing); • enable low-cost and easy data archiving, streamlines billing, and reporting processes (big data, cloud computing).	• high implementation costs associated with the purchase of hardware, software, or staff training; • limited infrastructure, including, for example, telecommunications infrastructure; • the dehumanisation of aid; • the lack of trust due to the potential for military use (drones) or information leakage (cloud computing); • the accumulation of large amounts of data at the same time creates a threat in the form of hacking attacks and causes a questionable sense of security to the type of information shared (Big Data); • complexity and a small number of specialists involved in creating businesses using new technologies (blockchain).

Source: Own elaboration.

Conclusions

New technologies – technologies 4.0 – are used by all types of humanitarian organisations. With their help, intergovernmental organisations collect data on needed aid resources, non-governmental organisations have the ability to spread information on aid opportunities among aid recipients, and volunteers are given the ability to acquire the resources needed to carry out aid activities in order to provide direct assistance. This is a necessity that guarantees the efficiency and effectiveness of humanitarian logistics.

Based on the Technology Report (Nonprofit Tech for Good, 2019), one can infer what the future of new technologies in humanitarian logistics will be. In the survey, NGOs were asked to answer how they understand the above-mentioned new technologies (Figure 1).

Figure 1 shows that, in general, NGOs have a good understanding of new technologies, regardless of the continent on which they operate. The differences that occur may be due to, among other things, technological sophistication, access to adequate infrastructure, and the difficulty of attracting employees with skills and competencies in the area of new technologies. Due to the complexity and small number of specialists involved in creating "businesses" using this technology, blockchain shows the greatest lack of understanding (60%).

The effectiveness of the used new technologies varies depending on the type of emergency and current changes in the areas covered by relief efforts. No less so than the impact of new technologies on relief efforts to date is mostly about using the existing solutions in new realities. The use of new technologies by humanitarian organisations generates the need to constantly adapt business models to the way they operate in the growing complexity and uncertainty of emergencies.

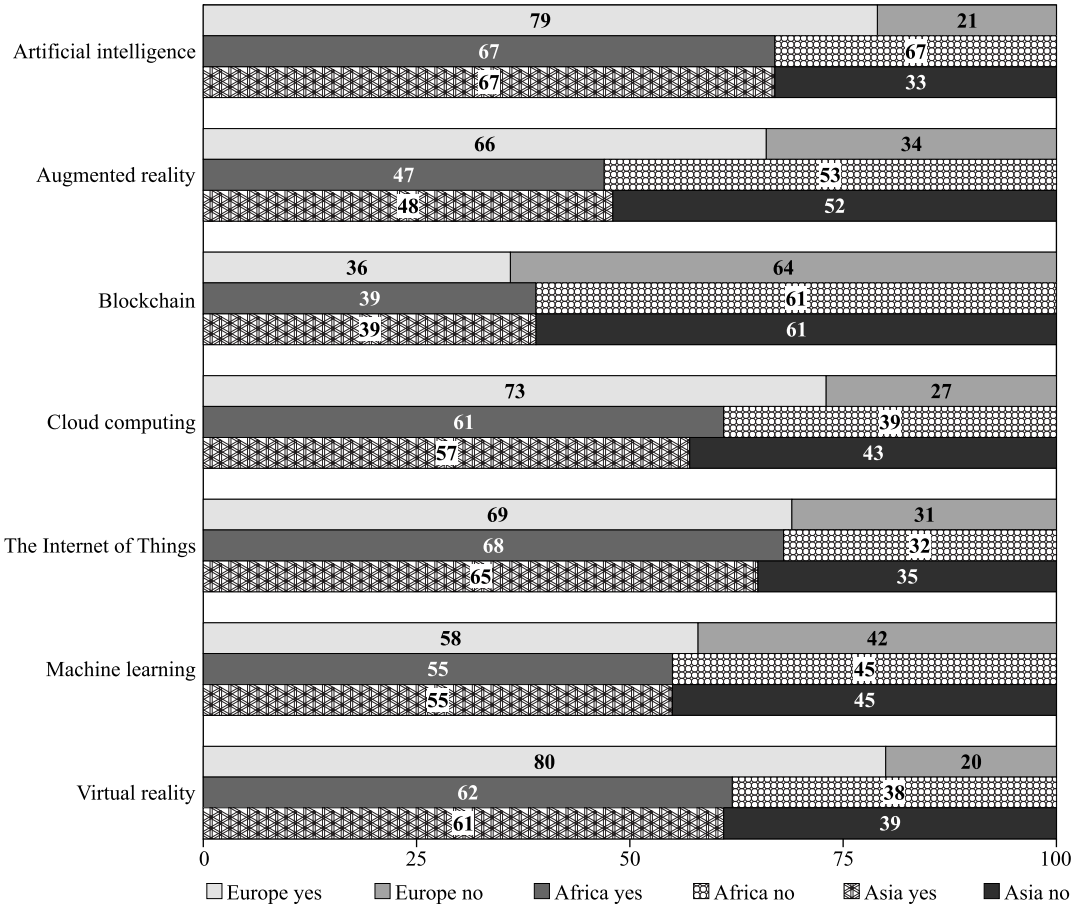

Figure 1. How well NGOs understand new technologies (in %)

Source: Own compilation based on Nonprofit Tech for Good, 2019.

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Lean Management and Sustainable Development at Universities: Needs and the Possibilities of Implementation Within the Context of Strategic Provisions

Abstract

Objective: The aim of this article is to evaluate how university strategies align with sustainable development principles and integrate Lean Management for continuous improvement. The main research problem was finding the answer to the question: to what extent do the provisions (strategic goals) contained in the university's strategies relate to the concept of sustainable development and fit into the main idea of Lean Management, i.e. continuous improvement? The paper presents the partial results of the research project aimed at proposing a model for implementing Lean Management (LM) at a university and a self-assessment form of the effectiveness and efficiency of the methods and tools used by the university (as part of LM).

Research Design & Methods: The research methods used were a combination of qualitative content analysis, comparative analysis, and literature review to explore the integration of sustainable development and Lean Management concepts within university strategies. The data sources were strategic plans, sustainability reports, and other relevant documents from the Monash University, the Warsaw School of Economics (SGH), and other institutions.

Findings: Modern strategies of universities very often refer to the need to constantly adapt their offer (research, teaching) to contemporary social and economic needs. By balancing the development of universities, strategies and planned activities fit into the concept of sustainable local, regional, national, and global development. Therefore, it is important to recognise universities' current needs and possibilities regarding implementing sustainable development as part of research carried out in the academic environment and to search for effective and efficient methods and tools that will serve it.

Implications/Recommendations: The research advocates for universities to adapt strategies to meet contemporary societal needs, emphasising sustainable development and Lean Management principles. Addressing wastefulness and promoting continuous improvement encourages the integration of Lean Management into university strategies, aligning with sustainability goals and enhancing organisational efficiency.

Contribution/Value Added: The article recognises universities' current needs and the possibilities for implementing sustainable development and searching for adequate methods and tools for these challenges.

Article classification: research article

Keywords: lean management, university, sustainable development, strategic management, strategy, efficiency, governance

JEL classification: I2

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Introduction

The main research problem was answering the question: to what degree do the provisions (strategic goals) contained in university strategies relate to the sustainable development concept and fit the main Lean Management idea, namely continuous development? The article falls in line with the need to define the current needs and abilities of universities to implement sustainable development and search for methods and tools to meet these challenges.

The objective of this article is to evaluate how university strategies align with sustainable development principles and integrate Lean Management for continuous improvement. It covers the partial results of the research that the author has been conducting as part of a research project financed by the Angelus Silesius State University, entitled "Lean Management at universities – implementation possibilities in the context of contemporary conditions and the changing stakeholder needs" (2022–2024). The project's main outcome will be a proposed model of LM implementation at the university and a self-appraisal form to assess the effectiveness and efficiency of methods and tools applied by the university (as part of Lean).

The article presents the fundamental premises behind LM implementation at universities, examples of strategic provisions at selected universities, as well as actions related to sustainable development and the Lean Management idea. The author intended to indicate areas, objectives, or actions already existing in university strategies that are compliant both with the concept of sustainable development and the LM concept of continuous improvement.

It presents the fundamental premises behind LM implementation at universities and provides examples of strategic provisions at selected universities as well as actions related to sustainable development and the Lean Management idea. The research results indicate numerous areas, objectives, or actions that already exist in university strategies that comply with sustainable development and the LM concept of continuous improvement.

Literature review

The sustainable development of higher education

In connection with the numerous challenges that universities face, their contemporary management model, including that of their university-society relationship, is changing (Avella, 2017; Gento et al., 2021). Activities aimed at Environmental, Social and Governance (ESG) have been observed in business and many academic centres. In November 2017, 23 universities signed the University Social Responsibility Declaration (Gałat, 2018). It emphasises the particular role of a university as a place of creating and forwarding knowledge on the surrounding reality, which obliges it to consider and apply principles of social responsibility in all areas of activity and disseminate these principles among stakeholders. The objective of this relatively new initiative is the sustainable development of higher education in Poland, including ensuring high-quality research and education, as well as comprehensive development of the academic community. The signatories to the Declaration formally undertook to:

1) cultivate academic values written down in, among others, "Academic's Code of Ethics", diligence, objectivity, independence, openness and transparency, in particular;
2) shape social and civic attitudes of future elites, favouring community development, creativity, openness, and communication, as well as social sensitivity and work culture;

3) disseminate the idea of equality, diversity, tolerance, as well as respecting and protecting human rights in relation to the entire academic community and its environment;
4) expand curricula with issues in the field of ethics and corporate social responsibility, sustainable development, and social innovations;
5) complete projects that implement social responsibility principles, in particular those regarding managing diversity in the workplace, employee volunteering, promoting ethical principles, multi-sectoral cooperation, and socially-engaged marketing;
6) undertake research and deployment work that may contribute to solving significant social problems in cooperation with other academic centres worldwide, the enterprise sector, public administration, and NGOs;
7) develop domestic and international inter-university cooperation that enables adapting and strengthening the best practices in terms of university social responsibility;
8) take care of the university organisational order, with university management based on social responsibility foundations (both in strategic documents and the resulting activities), aimed at the comprehensive development of the academic community and effective implementation of the university's mission;
9) ensure the transparency of the university activities through, among others, measuring results, promoting and disseminating the accomplishments, and indicating a person or team to coordinate these actions;
10) operate in such a manner so as to minimise the negative impact of the activities conducted by the academic community and its stakeholders on the natural environment, in all of its aspects;
11) consult the stakeholders with respect to the priorities of the university social responsibility policy and notify of its outcomes;
12) follow the principles of ethics and responsibility in the teaching and research process in order to provide stakeholders with optimum conditions to utilise the knowledge, intellectual capital, and the university's achievements (Deklaracja, 2018).

The Scientific Social Responsibility Congress – "Science for You" – was held in Kraków in April 2019. It involved extending the list of Declaration signatories with 60 more universities (currently 83 in total). These are universities with various teaching profiles and scientific disciplines, such as economic, humanistic, and artistic universities. The signatories include both public and private universities, colleges, technical universities, academies, and vocational schools (educating mainly based on practical profiles). The wording of the Declaration was drawn up by the Ministry of Investments and Development, in cooperation with the Ministry of Science and Higher Education (currently the Ministry of Education and Science) and experts from a Working Group for the Social Responsibility of University, which operate as part of a Team for Sustainable Development and Corporate Social Responsibility – as a subsidiary body of the Ministry of Investments and Development (Nowi sygnatariusze, 2019).

The provisions in the Declarations clearly show that university presidents, vice-presidents, and chancellors who signed the document see a need or even a necessity to take multifaceted actions for their sustainable development – continuous improvement. This continuous improvement is nothing else but the main idea of the Lean Management (LM) concept that is falsely associated with the "leaning" of the entire organisation, painful especially to the employees (llaoui & Benmoussa, 2020). People contesting the legitimacy of LM implementation within an academic environment often emphasise, repeating like a mantra, that a university is not an enterprise, that nothing is manufactured "here", and profit is not the objective (implying that we do not have to observe

the economic balance and be effective). The process-based approach that forces the university administrators to implement many changes – including these related to the organisational structure and its greater flexibility – is often misunderstood in the academic community (Mcguire et al., 2008; Radnor, 2008; Osborne et al., 2012; Maciąg, 2016b; Wiśniewska & Grudowski, 2016; Wyciślak, 2017; Ribeiro et al., 2019; Vasilieva et al., 2021). Many authors of scientific publications (Wawak, 2017; Maciąg, 2018; Grudowski & Wiśniewska, 2019; Piasecka et al., 2021; Grudowski, 2021; Adam et al., 2021; Yeh, Arthaud-Day & Turvey-Welch, 2021) and practitioners who have to make difficult management decision every day, including organisational or investment-related, do not agree with this critical (or even pessimistic) reasoning with respect to LM implementation initiatives.

Lean Management concept at a university – premises

The concept of Lean Management, usually referred to as Lean, is an enterprise management philosophy developed based on the TPS (Toyota Production System) principles. Its founding father was T. Ohno, who wrote in his book entitled *The Toyota Production System* that "…today, the market direction is determined by the customers or users, depending on the value stream, who, you might say, extract the products they need in the most convenient quantities and time" (2008). As part of the TPS, Ohno distinguished seven wastefulness categories:

1) overproduction – which is the production of greater quantities that is required by customers or for the implementation of a subsequent process (Ohno called it the worst type of wastefulness since it forces all of its other forms);
2) downtime – during which employees wait for something necessary for them to continue working;
3) transport – as unnecessary movement of a product or parts;
4) excessive processes – as an excessive amount of work on a product, e.g. due to poor process engineering;
5) stock – excess of finished products, work in progress, subassemblies, raw materials and materials, relative to customer demand;
6) movement – as unnecessary employee movements, e.g. bending down, reaching for something remote, looking for something;
7) defects – understood as the production of a faulty product that will later require, e.g. repair work (will entail losses) (Ohno, 2008).

At the turn of the 20th and 21st centuries, LM became a universal concept, present in offices, banks, or health care. Implementations of such techniques as: 5S, standardised work, visual management or value stream mapping (e.g. in the office, customer service process) were becoming more and more frequent (Loher, 2012; Detyna, 2016; Hafidzoh et al., 2016; Adzhienko et al., 2021). The popularity of "Lean" management techniques in human resources management, finances, and customer service is growing (Benuyenah, 2021). Key Lean requirements include leadership and commitment of all employees – so that each effort put in process improvement contributes to saved time, movements, or lower stress. According to D. Locher (2012), it is then when the "feeling of authorship replaces (…) learned helplessness common in many facilities, and questions about the perpetrator – focus on the process".

Proper and effective implementation of LM assumptions and goals requires the management staff and team members to be familiar with and understand the basic concepts and definitions.

Table 1 shows selected terms and concepts that are crucial for its correct implementation and deployment.

Table 1. Selected terms and concepts used in Lean Management

Concepts terms	Brief characteristics
Automatic maintenance	A practice, which involves employees take care of their own equipment (devices they work with)
Unit	A work area or workstation that is usually arranged as the letter "U" or "L" – to facilitate operation by a single employee
5S	A concept that constitutes the grounds for Kaizen, LM and Total Quality Management (TQM), aimed at systematically striving to create and maintain a clean and orderly work environment. 5S means: Selection (Jap. *Seiri*), Set (Jap. *Seiton*), Shine (Jap. *Seiso*), Standardize (Jap. *Seiketsu*) and Sustain (Jap. *Shitsuke*).
5 × Why?	The process of asking the "why?" questions five times. – for correct recognition of the true causes behind a given issue. A tool useful, e.g. during team work, which involves drawing up a cause-and-effect Ishikawa diagram (so-called "fishbone diagram").
Gemba	In Japanese, it literally means "a real place". In the LM context, understood as a workplace, where value is created
Hosbin kanri	In Japanese, it literally means "policy deployment" – understood as setting goals and implementing solutions using a set of selected management tools and methods
Jidoka	A principle, according to which management or a process must be suspended immediately upon detecting a defect or hazard that cannot be remedied (repaired) straight away
Just in Time	The "just in time" concept – according to which the materials and processes are delivered (implemented) in due time and in the right quantities – pursuant to actual demand
Kaizen	In Japanese, "kai" literally means "a change", and "zen" – "good". The term *Kaizen* is understood as continuous improvement. Solving problems at the workplace may be simplified (*Quick Kaizen*) or extended (*Kobetsu Kaizen*)
Kanban	Literally, "kan" in Japanese means "to see", and "ban" means "a card". It is a system for signalling the demand (needs) from a "downstream process" to an "upstream process", using cards, badges, baskets or other visual indicators. According to this system, work at a given position depends on the needs reported by another station that is directly associated with it, it is the so-called "suction" system – where an action is a response to demand reported by customers (including internal, which are the employees)
Muda	Means "wastefulness". A sign of wastefulness may be, e.g., work or expenditure not related to the right process. According to Masaaki Imai, *muda* refers to actions that do not generate added value. The seven fundamental *muda* categories include overproduction, stock, shortages, redundant activities, process errors, waiting and unnecessary transport.
PDCA	It is a cycle of improvement (streamlining) activities, in line with the concept by W. Edwards Deming – so-called "Deming wheel of quality": *Plan – Do – Check – Act*. A universal tool that can be successfully used when implementing various tasks, e.g., project management. PDCA is the pillar of, among others, TQM.
TQM	It is a philosophy of "total" quality management, often described as a concept of comprehensive quality management. The essence of TMS comes down to an approach that emphasizes the importance of each employee within the continuous quality improvement process. The system-based and process-based approaches are crucial in TQM; the role of the customer (external and internal) is also stressed
Value stream mapping	A conceptual representation of the entire process, since the appearance of a demand, until it is fulfilled. Value stream mapping is a process of drawing the flow of materials and information in order to define signs of wastefulness and take corrective (remedial) actions.

Source: Own study based on: Gajewski, 2007; Lareau, 2009; Stoller, 2015; Singh & Singh, 2015; Detyna, 2018; Randhawa & Ahuja, 2017; Wonarski 2017; Gajdzik, 2017; Spychalski, 2017; Imai, 2018.

Signs of wastefulness may be revealed in practically all processes, regardless of the sector of the economy. According to the data of the Kaizen Institute and the Fraunhofer Institute, the *muda* category in the services sector covers as much as 27% to 38% of the weekly working time (Imai, 2018). Losses typical of higher education may be classified into four main categories, namely time, system, processes, and employees (Maciąg, 2016b; Detyna, 2018). Selected examples of wastefulness and losses in these areas are shown in Table 2 – it is a reference to the classification by M. Imai (2018).

Table 2. The classification of wastefulness and losses encountered in higher education – selected examples

Wastefulness and losses at universities
System
– organisation structure not adapted to the needs and possibilities;
– over-formalisation;
– ineffective work environment, including technology;
– the lack of consistency between strategic, tactical, and operational goals;
– unrealistic strategic objectives;
– imprecisely defined objectives;
– the lack of appropriate tools for measuring goal achievement progress;
– organisational chaos;
– failure to adapt the university's offer to actual needs of the students and other stakeholder groups;
– waste of space;
– ineffective use of the owned infrastructure;
– reckless and unjustified purchases (e.g. equipment, software, etc.);
– the lack of good communication between the employees and the university's organisational units;
– the lack of information;
– the lack of activity coordination;
– the duplication of competences.
Processes
– the lack of value stream analysis;
– the lack of knowledge of processes crucial to the university;
– the lack of proper and careful activity (stage) planning within individual processes;
– excess of processes;
– excess of work, e.g. per a specific employee;
– unnecessary physical effort for the implementation of various tasks, due to, e.g., poorly designed processes;
– improper and ineffective procedures;
– mistakes in assigning and implementing tasks;
– redundant stock of materials and items;
– the lack of clear and unambiguous procedures in terms of making corrective (remedial) or preventive decisions;
– communication interference;
– competence-related conflicts – blurring of responsibility;
– human errors;
– redundant supplies.

Table 2 – continued

Employees
– the lack of leadership;
– the lack of actual change leaders;
– the lack of commitment of administration, as well as research and teaching staff;
– the lack of creativity;
– the lack of know-how;
– unproductive conflicts;
– the lack of communication between university management, administration, and the research and teaching staff;
– unproductive meetings and assemblies;
– inconsistency in actions (so-called 'flash in the pan');
– professional burnout;
– the lack of the willingness to help and support new initiatives;
– the lack of the understanding of organisational goals;
– lack of understanding of hierarchical relations;
– difficulties with pushing through a bottom-up initiative;
– the lack of actual dialogue between management and employees;
– the lack of motivation to work and commit;
– employee absence.
Time
– excessive waiting time (e.g. for signatures, colleagues, new software);
– excessive searching time (e.g. for documents, files, information);
– information over-abundance;
– inactivity – downtime in the implementation of specific tasks associated with interference;
– seeking the attention of hard-to-reach staff (e.g. management personnel);
– participation in prolonged and ineffective meetings (e.g. assemblies, trainings);
– ordering excessive information including e-mails, spam, advertisements, etc.;
– clarification of poorly assigned, unclear, and often misworded tasks;
– observance of overly complicated and unnecessary procedures, which require bureaucratic actions;
– unnecessary transport (movement) of people, items, and documents, e.g. to a photocopier or scanner.

Source: Own elaboration.

Given the continuous improvement of the processes, management and the quality of educational services, as well as the minimisation of wastefulness, university administrators should define (identify) potential sources of errors and the lack of effective actions (Ciarniene & Vienazindiene, 2014; Bacoup et al., 2015; Tutko, 2016; Detyna, 2018; Alefari Salonitis & Xu, 2017; Piasecka et al., 2021; Grudowski, 2021; Adam et al., 2021; Gómez-Molina & Moyano-Fuentes, 2021; Klein et al., 2021). The Kaizen Institute proposed a rather universal model of Kaizen reforms for the public sector, which, according to the author, can be successfully used in the higher education environment. Four stages are crucial for the success of the improvement actions (the so-called 4P Model):

1) Stage I – People Involvement – where employee commitment, including top-tier management, and employee training in terms of implemented Lean concepts play the main role; this stage also involves, among others, assigning Kaizen leaders;

2) Stage II – Physical Workplace Improvement – is the improvement of workplace conditions, based on the application of, e.g., the 5S method, visual management, and is aimed at identifying and eliminating *muda*;
3) Stage III – Process Improvement – is the improvement of processes (their streamlining, improving efficiency and effectiveness, etc.);
4) Stage IV – Policy Review – which involves the verification of adopted solutions (Imai, 2018). The 4P model, which corresponds to the specificity of higher education, is shown in Figure 1.

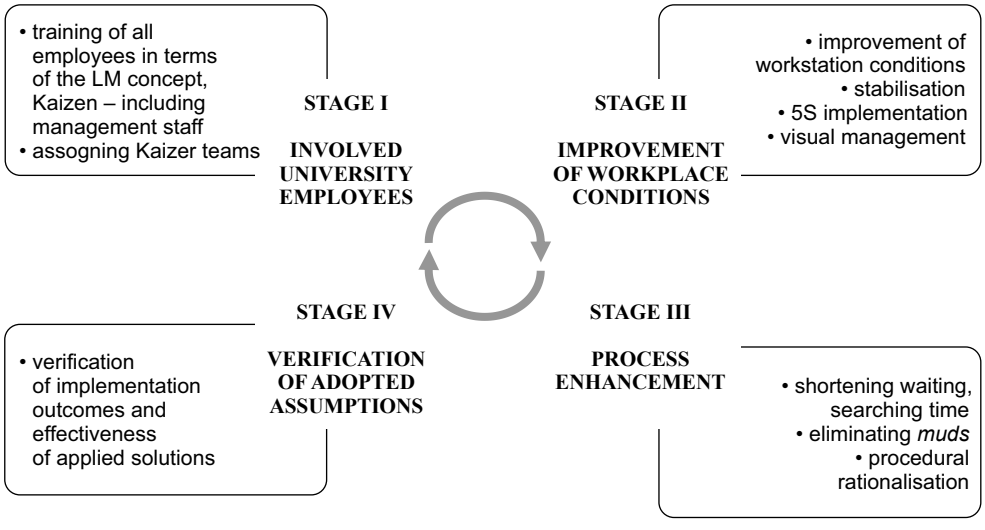

Figure 1. 4P model at a university

Source: Own study based on Detyna, 2018.

The basic stages leading to Lean implementation include:
– stabilisation – aimed at creating predictable and repeatable results. It also requires identifying causes behind process instability, which often results (in the course of implementing service processes) from misunderstanding customer needs;
– standardisation – involves developing practices consistently observed by the employees. The basic standardisation areas include work simplification and rationalisation;
– visualisation – to create conditions where a workplace will "speak" to the employees. One of the most effective means of communication is visual communication. For this purpose, e.g., work instructions, prioritisation principles, etc. are put in visible places;
– continuous improvement – includes encouraging employees to improve upon the work they perform. The continuous improvement philosophy should become a part of the organisational culture and apply to all system elements and processes (Locher, 2019).

Material and methods

The objective of the article was achieved through a literature review as well as analysing and critically evaluating development strategies of sample universities. The research approach combined qualitative content analysis, comparative examination, and a literature review to

investigate how sustainable development and Lean Management concepts are integrated into university strategies. The university documentation such as strategic plans, sustainability reports, and other relevant documents from the Monash University and the Warsaw School of Economics (SGH) were examined. The analysis identified specific provisions, goals, and actions related to sustainable development, social responsibility, and Lean Management within the strategic documents.

Results and discussion

The analysis identified specific provisions, goals, and actions related to sustainable development, social responsibility, and Lean Management within the strategic documents. It included categorising and summarising the content related to these themes, as presented in Table 3.

According to M. Dąbrowski (Chancellor of the Warsaw School of Economics – SGH), the social responsibility of Polish enterprises and their actions related to sustainable development have an increasing impact both on their business success and valuation. He believes that "[t]he Warsaw School of Economics has been functioning, from an operational perspective, as an enterprise; maintaining numerous buildings and their technical infrastructure, providing also supporting services for its employees and students, so that they could conduct their daily tasks". Besides the educational and scientific activities, universities conduct operational and business activities that should bring added value and a positive financial result. Universities cooperate but also compete with each other in many fields (similarly to enterprises). This is why SGH has been analysing technical processes in terms of sustainable development and optimising the functioning of its infrastructure, as well as external services and subcontractor operations since 2018. This university was covered by an external audit in 2020, aimed at evaluating the activities for sustainable development. Sustainable development indicators for the coming years are also being determined (Cygonek & Dąbrowski, 2021).

Examples of similar actions can also be found at the Monash University, where a statement that the university is operating for the benefit of ESR development, including social responsibility, was introduced to the strategic provisions in 2016. At the same time, the need to improve all processes conducted within the university – teaching, organisational, and research – is highlighted (Environmental, Social and Governance, 2021; Monash University's Strategic Plan, 2021).

Examples of provisions in university strategies and actions related to sustainable development and the Lean Management idea are shown in Table 3.

Study results show that universities are more and more eager to have their strategies refer to the concept of sustainable development. However, they rarely contain a direct reference to the Lean concept. Strategic initiatives and priorities of a university most often do not refer to developing process management, activity flexibility, team work, or effectiveness. In numerous strategies, the issue related to university administration – and its management and organisational actions – is omitted or almost neglected. Attention is usually focused on teaching and research processes, which is natural in a way, since these two areas are the functional domain of a university. The research conducted by the author indicates that, despite the observed many changes in the approach to university management, we can still witness a relatively low awareness in terms of the impact of auxiliary processes (HR, financial, recruitment, etc.) on university results (including its effectiveness).

Table 3. Examples of strategic provisions of universities and actions related to sustainable development and the Lean Management idea

University	Reference of strategic provisions to the sustainable development concept	Actions as part of implementing the university strategy, in line with the main idea of Lean Management – continuous improvement
Monash University	• indication that the university is a global pioneer in sustainable development and social responsibility, • goals and actions for ESG development stressed in the university's strategy, • emphasizing that the results of university operation are significantly impacted by the correct use of its educational and research resources, proper coordination of its activities and cooperation with external institutions, • indication of sustainable development goals (SDGs), • strong correlation with the United Nations Framework for Sustainable Development, • inclusion of CSR and ESG into the student teaching concept, • emphasized importance of continuous academic leadership in ESG and sustainable development through research, • commitment to an approach based on circular economy and optimal use of resources, • integration of ESG actions with other university processes, • emphasized importance of investments oriented at social outcomes,	• development of principles to govern the use of funds for the university's investment portfolio, in line with Monash values and ethics, • activities aimed at improving the organizational order, including process improvement, • proactive, multifaceted approach to environmental, social and management aspects, • use of scientific and technical expert opinions supporting SDGs and problem solving, • screening of university investments and influencing investment managers through active engagement in environmental, social and management issues, • clear monitoring and reporting, • activities improving planning, implementation, monitoring and reporting processes, • optimized use of held resources, • reuse of resources, • actions aimed at tackling wastefulness, • integration of reports on the impact of ESG activities on the university's results, • continuous process improvement,
Warsaw School of Economics (SGH)	• priority for CSR issues within the university's strategy • use of ESG factors as one of the tools for building a university development policy, • sustainable development strategy as one of the key cross-cutting strategies, planned for implementation, together with the main strategy, • SGH strategy was based on extensive consultation with university stakeholders, • emphasized growth of the importance of relationships with university stakeholders – internal and external, • strategic initiatives and priorities concerning work condition improvement, professional development, as well as continuous improvement of university infrastructure, • internal relationships that are the backbone of creating an educational offer, conducting research and establishing external relations that are considered the pillar of the university's strategy, • fundamental values in SGH strategy are truth, professionalism, honesty, respect and cooperation, • the strategy covers such areas as relations with the environment and management, • social responsibility is one of the four cross-cutting dimensions of strategic areas,	• analysis of technical processes in terms of sustainable development, • optimization of university infrastructure operation, • outsourcing services and contracting subcontractors, • conducting an external audit evaluating the activities for sustainable development, • developing sustainable development indicators for the coming years, • activities for improving ESG indicators, • activities of the Rector's Committee for Social Responsibility of SGH, • striving for the sustainable development of the university operating as an "enterprise", • implemented procedures concerning investment prioritization, taking into account the needs of the academic community, • self-assessment of the implementation of the provisions in the University Social Responsibility Declaration, • currently, preparing for the first university social responsibility report (2022), • systematic digitization of administrative processes.

Source: Own study based on: Monash University's Strategic Plan 2021–2030 Impact 2030, 2021; Strategia Społecznej Odpowiedzialności SGH, 2021; Strategia rozwoju Szkoły Głównej Handlowej w Warszawie na lata 2022–2032, 2021; Cygonek & Dąbrowski, 2021; Environmental, Social and Governance, 2021.

Universities that are considering Lean implementation should remember about the holistic nature of this approach (Halling, 2013; Rymaszewska, 2014; Kumar, 2015; Jedynak, 2015; Maciąg, 2016a; Yorkstone, 2016; Stańczyk, 2017; Maciąg, 2018; Detyna, 2019; Krdžalić et al., 2020) and the principles known from the TQM concept and the 9001:2015 standard:

– customer-orientation (among others, students, employees);
– leadership;
– commitment of all employees;
– process-based approach;
– continuous improvement – designing enhancements and preventing negative impacts of conducted activities;
– evidence-based decision-making;
– good mutual relationships with partners (stakeholders).

Actual observance of these principles requires constantly raising the awareness of all university employees in terms of importance, as well as continuously improving system conditions (including organisational structure optimisation), which significantly determine the efficiency of processes implemented within any organisation.

Conclusions

Modern university strategies often refer to the need for continuous adaptation of its offer (research, teaching) to contemporary social and economic needs. Strategies and planned actions, through balancing university development, fall in line with the concept of local, regional, domestic, and global sustainable development. This is why making efforts aimed at identifying the current needs and possibilities of a university in terms of implementing sustainable development ideas is crucial. At the same time, it is important to search for efficient methods and tools to be applied for this purpose. The author believes that it is worth promoting the Kaizen as idea of continuous improvement at universities – which is the essence of Lean Management. This is supported by, among others, the experience of universities that have adapted LM to their own needs and possibilities – it is an inspiration for them to rationalise taken actions that take into account both social and economic aspects. Tackling manifestations of wastefulness concerning university resources is particularly important today, i.e. in the era of a global conflict caused by the war in Ukraine and the complicated, hard-to-predict social and economic situation in the world.

The results presented in this article may encourage some universities to implement the LM idea. All this because coherence between the concept of sustainable development, including CSR (being accounted for in university strategies more and more often) and the main LM idea – continuous improvement – is clear.

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New Technologies in Crisis Management

Abstract

Objective: Modern technologies are increasingly important in managing a public organisation. This also applies to the very sensitive area of crisis management, the effectiveness of which directly affects the health and lives of citizens. This article aims to analyse the literature on the subject of the use of modern technologies in crisis management.

Research Design & Methods: The article uses literature review as a research method.

Findings: The analysis of the obtained results indicates that the use of modern technologies in crisis management is a current research topic. At the same time, the application layer shows the potential of using modern technologies.

Implications/Recommendations: Future research should focus on determining the acceptance of modern technology in the organisation. At the same time, it seems important to analyse the conditions for the optional implementation of modern solutions in the organisation.

Article classification: theoretical/review paper

Keywords: emergency management, public management, new technology, ICTs

JEL classification: H7

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Introduction

The example of Poland was chosen, because the Supreme Audit Office (NIK, 2017) points to many years of neglect, resulting in disregard for the importance of preparing plans, procedures, and structures in the event of threats. Due to the fact that the financial resources of local governments are very limited, local government authorities refrain from creating departments responsible for crisis management and place such units e.g. in the promotion departments of a commune or a poviat (NIK, 2017, p. 10). Additionally, the lack of regulations specifying the competencies of people employed in the structures of crisis management centres results in poor substantive preparation of employees, in particular at the district and municipal levels (NIK, 2017, p. 11). According to NIK (2017, p. 9), actions should be taken to regulate crisis management issues, because currently many actions are improvised, based only on *ad hoc* decisions, which may significantly reduce their effectiveness. Preparation for action, also using new technology, is crucial and makes it possible to take control of the crisis more efficiently.

The crisis management process is beginning to be of paramount importance, especially when there is a loss of control over the course and development of events, and the decision-making process is disrupted (Ziarko & Walas-Trębacz, 2010). The civilisation progress can cause the occurrence of various undesirable situations, such as industrial failures, construction disasters, traffic accidents, public order disturbances, or terrorist acts. In addition to natural threats, which have been intensifying recently, they can be a potential source of a crisis situation that negatively affects the level of human security (Wróblewski, 2014).

Crisis responders, to manage them efficiently, should take into account the following issues (Council Regulation (EEC) No 793/93 of 23 March 1993):

- time of action (especially as a reaction to a crisis situation);
- uncertainty;
- difficulties in estimating the effects of actions;
- action in a state of danger;
- the lack or excess of contradictory information (so-called information chaos);
- a shortened decision-making process.

Inter-organisational trust and appropriate cooperation between these entities are also important (Marciniak, 2023). According to Witkowski and Marcinkowski (2022), the main benefit of cooperation is synergy, i.e. additional effects that are greater than the sum of the effects of activities carried out individually. In order to achieve additional synergistic effects of interaction, it is necessary to shape the relationship between individual links based on trust and the proportional sharing of risks and benefits between them (Witkowski & Marcinkowski, 2022).

Also, the local community should trust crisis management entities and believe that in the face of a threat they will be able to provide them with aid, medical services, and necessary transport. As Bengtsson and Brommesson (2022) note, trust can be shaped by personal experience or by information about the performance and/or ability of a particular agent, but it is a subjective phenomenon based on perception, i.e. an attitude towards another agent. Therefore, interpersonal as well as organisational and institutional relationships can be treated as psychological contracts which, unlike formal contracts, are subjective in the sense that one party's understanding of a contract may not be shared by the other (Bengtsson & Brommesson, 2022). Moreover, Choi and Wehde (2020) conducted research that indicates that community trust in emergency management bodies may influence their response to tornado warnings. Thus, the risk associated with disasters can

be significantly reduced if residents are well-prepared, follow the recommendations of local authorities, and trust them.

An important element supporting activities in crisis management is modern technologies that help to achieve the agility and transparency of activities. Currently, it is impossible to imagine management processes without information collection and processing technology, i.e. database technology. A database is a collection of related data. By data, in this case, we mean known facts that can be recorded and have a specific meaning (Elmasri & Navathe, 2019). Other innovative technological solutions, such as drones, are also being introduced internationally. Many major disasters damage transport infrastructure and leave people without access to adequate means of transport and essential medicines and supplies. Such situations generate the development of drone-based delivery systems to improve logistics operations in crisis management (Rejeb et al., 2021). Not limited to the existing road networks, drones can deliver urgently needed assistance packages in a short period of time (Ghelichi et al., 2022).

Public organisations are increasingly willing to use technological solutions that improve their operations. In this view, the purpose of this article is to analyse the possibilities of using modern technologies in the area of crisis management. To achieve this goal, literature review was used as a research method.

Material and methods as well as goals and research methods

This article aims to analyse the literature on the subject of the use of modern technologies in crisis management. The used research method is critical literature review. The critical literature review is used at the initial stage of research, when the researched area is not precisely defined and the descriptions in scientific publications are scattered (Mays et al., 2001). As Tricco, Lillie, Zarin, O'Brien, Colquhoun, Levac, and Straus (2018, p. 1) point out, it is a type of knowledge synthesis carried out in such a way as to record research material about the topic and identify the main concepts, theories, sources, and knowledge gaps. The advantage of analysing and criticising literature in the context of researching projects in crisis management is the collection of knowledge dispersed in many legal acts, publications, and books.

The databases that are mainly used include: BazHum, CEJSH, Web of Science, and Scopus. The main keywords were: "emergency management", "crisis management", "disaster management", "threats in crisis management", "hazards in crisis management", "threats in disaster management", "hazards in emergency management", "crisis management system", "technologies in crisis management", "technologies in emergency management", and "technologies in disaster management".

Literature review

A typology of threats – international and national approach

Due to the unlimited types of crises, Hamidovic (2012) proposes two main categories: industrial and natural crises. Natural crises arise from acts of nature, and industrial crises are situations where organised industrial activity causes serious damage to human life, property, and the environment. Economic damage caused by disasters generates direct and indirect costs. Direct costs are costs related to physical damage to infrastructure, crops, farms, livestock, as well

as social infrastructure such as hospitals, schools, homes, bridges, etc. Costs related to the loss or damage to tangible items usually contribute to direct costs. Indirect costs are costs related to the disruption of the flow of goods and services in the supply chain. Additionally, disruptions to services such as telecommunications or water supply can have a huge economic impact. Indirect costs also include the cost of medical expenses (Shaw & Krishnamurthy, 2009).

Among natural disasters, water causes the greatest statistical loss of human property. This is because people have always tried to settle in areas with good water availability. As a result, thousands of objects, villages, and towns appeared in the river valleys and floodplains, and over the millennia these towns became densely built-up, which is conducive to the occurrence of floods. It should be noted that practically every year there are floods on a regional and local scale, causing significant losses. Extreme phenomena related to water, i.e. droughts and floods, are a fairly common problem in Poland. The catastrophic flood in Poland in July 1997 caused 55 fatalities and material losses estimated at 12.8 billion PLN. In turn, in the dramatic flood in May and June 2010, 20 people died and material losses amounted to 10 billion PLN (Żmudzka, 2004). The lack of water also causes serious losses. This applies primarily to agriculture, where the variability of thermal and precipitation conditions leads to a decrease in yields (Żmudzka, 2004).

Flooding has a number of consequences. The main effects of the flood include (Ciekanowski, 2011): the loss of human and animal life; flooded roads, railways, bridges, arable land, sewage treatment plants, septic tanks, as well as municipal and industrial waste dumps; destroyed and damaged engineering and technical facilities, e.g. flood embankments; release of pathogenic bacteria and epidemiological risk such as salmonellosis, typhoid fever, bacillary dysentery, tetanus, hepatitis A, diarrhoea, staph poisoning (dead animals, cemeteries); emission of significant amounts of chemical substances and heavy metals, plant protection products, fertilisers, petroleum products, toxic chemicals, and many others into the atmosphere; significant material, health, and moral losses. The effects of the flood are very extensive and multi-faceted, and carry a number of natural, economic, and social consequences.

In general, in Poland, the most common cause of natural disasters involves extreme weather-related phenomena (frost, heat waves, droughts, forest fires, gales, storms, heavy rains, floods, hailstorms, heavy snowfall, landslides, snow and mud avalanches, fog, rime, ice, and lightning strikes). There are also seismic hazards in Poland, as evidenced not only by numerous micro-tremors in mining areas, but also by stronger tremors observed on 21 September 2004 in the north-eastern border of the Republic of Poland, with the epicentre in the Kaliningrad region (Kundzewicz & Matczak, 2010).

In addition to threats caused by natural factors, dangerous industrial events occur in Poland. The Chief Inspectorate for Environmental Protection, as of 2018, lists 255 plants with increased risk (ZZR) and 184 plants with a high risk of a serious industrial accident (Main Inspectorate for Environmental Protection, 2018). In addition, not only increased and high-risk plants can cause a serious accident, but also non-Seves plants, to which they belong (Centralny Instytut Ochrony Pracy, 2019), i.e. plants that have not been included in the ZZR category due to the relatively lower number of substances than established in the qualification criteria (the so-called „sub-threshold" quantities), and plants with large amounts of substances classified as corrosive, including acids and alkalis, harmful, irritating and other, not included in the qualification criteria.

Threats arising from transport incidents also constitute an important part of the existing dangers related to industrial and commercial activities in Poland (Michalik & Gajek, 2008). The reasons for such events may be different, e.g. human error, poor technical condition of the vehicle or

emergency equipment, poor technical condition of roads, the lack of monitoring. Water transport turned out to be the safest of all (Bęczkowska, 2015).

In the world, the nature of threats is slightly different from that in Poland, but currently, the high mobility of societies creates circumstances to participate in many unforeseen events outside the country. The World Economic Forum (2022) lists the most important threats in the world:

- climate crisis;
- social crisis;
- growing number of cyberattacks;
- uneven global economic recovery;
- chronic and antibiotic resistant diseases.

The threats of climate change and cybercrime are frequently discussed in the media. Global warming is progressing dynamically and, as a result, many small island countries (e.g. Kiribati, the Maldives, Tuvalu) are threatened by sea level rise, which inevitably accompanies warming. Countries that are located at higher latitudes stand to gain from the consequences of climate change, while most developing countries will lose out. A new type of "climate" refugees will emerge (Kundzewicz & Juda-Rezler, 2010). Today, many scientists point out that due to global environmental changes, the Earth could enter a new geological epoch dominated by humanity – Anthropocene. It is the first epoch that has been distinguished during its duration, and not after its end, based on geological research (Lewis & Maslin, 2015). Conflicts over natural resources are also a problem, as researchers Szyjko (2012) and Marczuk (2014) point out, and in some parts of the world there is already competition for water.

Cybercrime and computer crime, although they do not belong to the catalogue of Polish statutory expressions in the current legal state, are listed among the greatest threats related to crime in the world. It is estimated that the total value of global losses incurred as a result of cybercrime is 388 billion USD annually and is even comparable to the value of the entire drug market (Wasilewski, 2017). Studies indicate that almost a billion people fall victim to illegal activities on the Internet every year. It has been calculated that there are about 14 victims of this type of unlawful activity per second (Wasilewski, 2017).

In the face of countless threats, both natural and civilisational, each country should take care of a well-organised crisis management system, i.e. having appropriate solutions, procedures, and resources to prevent crisis situations and react immediately in the event of their occurrence.

The crisis management system in Poland

Crisis management can include military and non-military measures to address the full spectrum of crises – before, during, and after conflicts. Operations use the right combination of political and military tools in order to manage crises in an increasingly complex security environment (The North Atlantic Treaty Organisation, 2022). Khorram-Manesh (2017) states that crisis management is taking immediate and appropriate actions in the face of a threat under time pressure as well as the lack of appropriate and accurate information. Such activities should be planned. The lack of strategic crisis management plans may lead to a serious crisis and, consequently, to the destruction of the state system.

The current crisis management system in Poland is relatively young and has been operating for 16 years with the entry into force of the Crisis Management Act of 26 April 2007 (Kamiński, 2016). The main purpose of introducing the Crisis Management Act was to establish a system

of procedures for public administration bodies, owing to which it will be possible to make specific decisions in the event of crisis events (Kamiński, 2016). In the initial period of the occurrence of a given event, the threat may not meet the conditions for introducing any of the states of emergency (the state of natural disaster, the state of emergency, or martial law). Therefore, it would be justified at this stage to implement special mechanisms that would ensure the effective monitoring of threats, their elimination, or at least significant limitations (Kamiński, 2016). The legislative motive for crisis management was to supplement the already existing national security management system with the principles of preparing state structures in the scope not regulated in states of emergency (Kamiński, 2016).

The system in Poland is multidimensional and consists of the following components (Government Centre for Security):

1) crisis management bodies:
   – national level: Council of Ministers, Prime Minister;
   – ministerial level: Minister in charge of the government administration department, Head of the central authority;
   – voivodeship level: Voivode;
   – district level: district organisation;
   – commune level: commune head, mayor, president of the city;
2) consultative and advisory bodies:
   – national level: Government Crisis Management Team;
   – departmental level: Crisis Management Team (ministry, central office);
   – voivodeship level: Voivodeship Crisis Management Team;
   – district level: District Crisis Management Team;
   – municipal level: Municipal Crisis Management Team;
3) 24-hour crisis management centres:
   – national level: Government Centre for Security;
   – departmental level: Crisis Management Centre (ministry, central office);
   – voivodeship level: Voivodeship Crisis Management Centre;
   – district level: District Crisis Management Centre;
   – commune level: Commune Crisis Management Team, Commune (municipal) Crisis Management Centres, or an organisational unit of the Commune (city) Office competent for crisis management.

The crisis management system was developed because of a catalogue of rules determining its organisation, including (Lidwa, Krzeszowski & Więcek. 2010): the principle of the primacy of the territorial system; a one-person management principle for governance and accountability; the principle of adequacy of the level of management; the principle of universal response, meaning the involvement of institutions and entities operating in the area affected by the threat; and the principle of single responsibility of the management bodies. The crisis management system focuses on the principle of the primacy of the territorial system, i.e. the main burden of decisions and responsibility lies with the authority acting at a given level of the territorial division of the country where the crisis has occurred (Wróblewski et al., 2014).

Nejgebauer's research (2022) indicates that the quality of decisions made in crisis management can be enhanced owing to modern technologies. According to Gudzbeler and Nepalski (2015), the improvement of communication and the effectiveness of actions can be achieved owing to an integrated simulation platform for crisis management entities. Studies by Durugbo and colleagues

(2022) also highlight the role of innovation in relation to digital, integrated and adapted public services, initiatives, and systems. However, Polish entities building the crisis management system do not have the appropriate equipment and systems that would increase the scope of control, cooperation, communication, as well as the quality of decisions being made. Although the TELDAT organisation has prepared a crisis management system 'Jaśmin', which could strengthen actions during crisis management in Poland, it is not used in response to the existing crisis situations (see: www.teldat.com).

The use of modern technologies in the area of crisis management

Modern technologies related to the 4th Industrial Revolution have significantly changed the functioning of not only private but also public organisations. The use of modern technologies in the implementation of public sector tasks has become inevitable to better meet the growing expectations of stakeholders, also in the area of crisis management. The use of modern technologies in crisis management seems particularly important from the point of view of the importance of tasks performed by crisis management and the negative effects of the materialisation of risks covered by crisis management. For this reason, it was considered reasonable to extend the research interest of the authors to the possibilities of using modern technologies in crisis management. The aim of the conducted research was to determine what technologies are used in crisis management. Literature review was used as the research method (Zdonek et al., 2016; Lenart-Gansiniec, 2021). The used keywords were as follows: ICT, emergency management, crisis management, new technology. The focus was on full-text scientific articles in English or Polish available in the following databases of scientific publications: EBSQO, Scopus, ProQuest, Web of Science, Google Scholar.

As the analysed literature on the subject indicates, technological progress has significantly changed the way of crisis management in all its stages, from identifying, monitoring, responding to crises, towards removing the effects of crises. Modern technologies are increasingly playing a key role in crisis management, providing tools and platforms for effective communication, data collection, analysis, and decision-making.

One of the most important technologies in the socioeconomic functioning of society and organisations is currently information and communication technologies (ICTs) such as social media platforms, mobile applications, crisis mapping tools, virtual cooperation platforms, shared databases, and communication channels. ICTs facilitate the rapid dissemination of information during a crisis, enabling real-time communication between crisis management teams, emergency services, government agencies, and the public, helping to coordinate response efforts, provide updates, and gather situational awareness (Wociechowicz et al., 2012; Hu & Kapucu, 2014; Abgarowicz et al., 2015; Chaturvedi et al., 2015; Rysz, 2017; Reuter et al., 2018; Saroj & Pal, 2020; Fazeli et al., 2021; Kaur et al., 2022). ICTs have also greatly improved the effectiveness of emergency notification systems, which can be via SMS, mobile apps, social media, and broadcasting systems, which significantly improves the speed at which important information such as evacuation orders, safety guidelines, and updates during a crisis is disseminated. These systems help reach large numbers of people quickly and increase public safety. Gjøsæter, Radianti, and Chen (2021) also point out that when building crisis management systems, the special needs of digitally-excluded people, e.g. the elderly or the disabled, should be considered so that they do not remain outside the system and thus without the possibility of receiving assistance due to the lack

of digital skills. ICT tools primarily increase situational awareness, improve coordination, and provide a synchronised response between the various stakeholders involved in crisis management (Łachacz, 2022). However, as pointed out by Jennings and colleagues (2017), the use of modern ICT technologies is supported by the existence of independent IT departments in units responsible for crisis management, both in operational management, risk communication, and social media.

The use of modern technologies also allows the mapping and visualisation of crisis situations, which provides a comprehensive picture of the situation. Geographic information systems (GIS) and satellite imagery can be used to map the affected areas, identify critical infrastructure, and track response efforts (Pietryka, 2021). The GIS technology combines spatial data and mapping tools to provide a visual representation of emergencies. It aids in mapping affected areas, identifying critical infrastructure, assessing resource allocation, monitoring the movement of emergency personnel, as well as assessing risks (Rezvani et al., 2023). GIS also assists with situational awareness and decision-making by providing a comprehensive overview of an emergency situation.

ICTs also play a vital role in the post-crisis recovery phase (Mohan & Mittal, 2020). They enable the collection and analysis of data related to damage, loss assessment, and reconstruction needs. ICT tools support the coordination of aid distribution, the tracking of recovery progress, and the involvement of affected communities. In addition, technologies such as cloud computing and data backup help ensure the resilience of critical information and systems in the face of future crises.

The literature on the subject also points to the possibility of using modern technologies such as Big Data, the Internet of Things, artificial intelligence, or virtual reality in crisis management (Pietryka, 2021; Mehraeen et al., 2020). Big Data analytics can help identify patterns, trends, and anomalies, enabling more accurate risk assessment, resource allocation, and decision-making during a crisis, and has the potential to increase engagement in prevention (Al-Ma'aitah, 2020; Drosio & Stanek, 2017; Iglesias et al., 2020). In turn, the Internet of Things (IoT) – i.e. sensors embedded in infrastructure, buildings, and equipment – can provide real-time data on various parameters such as temperature, humidity, air quality, and structural integrity (Ogórek & Zaskórski, 2018). This data can improve the monitoring and early detection of emergencies, enabling timely interventions and preventive actions. AI algorithms can analyse large amounts of data, identify patterns, and make predictions in real time (Dugdale et al., 2019). They can help crisis managers assess the severity of the situation, anticipate future developments, and optimise resource allocation for effective response and recovery.

Discussion

Nowadays, the word 'crisis' is one of the most frequently used terms, because it is part of our everyday life. Individual citizens, families, institutions, organisations, the state, and the world are going through a crisis. The life of every human being is characterised by constant changes as a result of critical events, because we live in an uncertain environment, where, apart from positive values, there are also negative ones that cause a state of internal imbalance, crises, and crisis situations (Otwinowski, 2010).

Therefore, one of the priority functions of the modern state is to guarantee citizens the basic conditions of protection against possible and real dangers related to the occurrence of natural disasters and other similar events caused by forces of nature, technical failures, or military actions (Sobolewski, 2021).

It is important that all crisis management entities are ready to act, because the diversity and complexity of modern reality leads to more and more frequent events that disrupt the security of citizens. To protect them, crisis management entities need to undertake planning and executive actions in the face of a threat in order to ensure the highest quality of distributed assistance.

Regarding modern technology, an interesting area of future research may be the analysis of conditions for the implementation of new technologies in crisis management or, more broadly, in the public sector. As pointed out by Jennings and colleagues (2017), one of the important conditions is the individual attitude of employees of public organisations to new technologies. It directs research attention towards the concept of the Unified Theory of Acceptance and Use of Technology (UTAUT), which assumes the existence of four determinants influencing the intention to use a new technology. These are: performance expectancy, effort expectancy, social influence, and facilitating conditions (Soltysik-Piorunkiewicz & Zdonek, 2015; Venkatesh et al., 2003; Venkatesh, 2022). Performance expectations is the belief that the use of a given technology will help to achieve benefits or higher performance in accomplishing important tasks. Effort expectancy is the degree of difficulty in using a given technology. Social influence is the degree of a person's belief that people important to them would also use the technology. Facilitating conditions means the degree to which a person is convinced that an appropriate technical and organisational infrastructure exists to provide support during a difficulty with using technology. These determinants influence users' intentions to use modern technology.

Conclusions

The aim of this study was to assess the current state and effectiveness of crisis management in Poland, with a focus on the use of modern technologies. The empirical findings revealed significant deficiencies in preparedness and response mechanisms due to insufficient financial resources and poorly-defined regulations. These deficiencies often result in improvised and *ad hoc* responses that compromise the effectiveness of crisis management. The research highlights the importance of trust, inter-organisational cooperation, and the use of advanced technologies such as GIS, drones, and ICTs in improving emergency response capabilities. The results suggest that the integration of modern technologies significantly improves data collection, situational awareness, and coordination between crisis management actors.

At the application level, the conducted research points to the need for increased investment in modern technologies in order to improve situational awareness and operational efficiency during crises. At the same time, regular training programmes for crisis management personnel should be introduced to improve their technical skills and ensure that they are well-prepared to use advanced tools and technologies.

Due to the character of the used methodology, one of the limitations of this research is the risk that the results may quickly become outdated. Technological progress is currently so rapid that the publication processes of scientific articles cannot fully reflect the timeliness or dynamics of the use of modern technologies in crisis management. This calls for further research using multiple approaches to examine, among other things, the impact of emerging technologies on the effectiveness and efficiency of crisis management. An interesting line of research might also be to examine the factors influencing the adoption of modern technologies in public sector crisis management, using a framework such as the Unified Theory of Acceptance and Use of Technology (UTAUT). A research line focusing on citizen participation in crisis management

through ICTs would also be of interest. By addressing these areas, future research can provide more comprehensive insights into optimising emergency management practices and policies to ensure better preparedness and response to both natural and human-made disasters.

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Journal of Public Governance

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Journal of Public Governance (formerly *Zarządzanie Publiczne / Public Governance*) is a quarterly published since 2007. It is intended for experts and researchers who specialise in public issues, including political decision-makers and students. It offers a forum for debates between academics and practitioners interested not only in the theoretical foundations of public governance but also in the opportunities for its practical application. The quarterly is international in scope, which is reflected in the nature of research issues (they involve matters of interest to academic circles worldwide), the contributing authors (a significant proportion of them comes from different countries), and the composition of its Programme Board as well as the make-up of the team of reviewers (it includes international research and academic centres).

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A significant proportion of texts published by our journal is devoted to the analysis of the mechanisms of public governance at national and regional government levels (respectively), relevant to the administrative culture predominant in Central and Eastern European countries with a particular focus on the programming, implementation, and evaluation of public policies. The texts:

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