INFORMATIZATION MEASUREMENT SCALE: METHODS AND TOOLS FOR ASSESSING THE LEVEL OF DIGITAL MATURITY

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Dawid Tomczak

Nicolaus Copernicus University in Toruń
e-mail: dawtomczak@gmail.com

Abstract:

Purpose: The purpose is to review the main methods and tools for assessing organizations' digital maturity and to present real-world applications of the questionnaire.

Methodology/approach: This publication presents the most effective methods of determining the level of informatization, such as the Digital Technology Readiness Assessment – Questionnaire, TOGAF® Standard, as well as reveals real-world examples of how to use the questionnaire based on the research sample of 220 respondents.

Findings: Nowadays, in rapidly changing business environments, informatization is a key factor determining organizations' competitiveness. Measuring the level of digitization and informatization is fundamental for businesses to identify areas that require improvements and assess digital maturity.

Implications/Limitations: Institutions can evaluate and improve their digital maturity by creating techniques and instruments to quantify informatization. Limitations include an emphasis on Polish market professionals and a restriction on cross-cultural generalizability.

Originality/value: This research uniquely combines Counterproductive Work Behaviour Questionnare with TOGAF model and analyzes whether correlation between the main variables exists.

Keywords: informatization, digitalization, informatization measurement scale, digital maturity model

Paper type: Research paper

1. Introduction

In the digital transformation era, organizations are doing their best to successfully implement high-end technology to facilitate business processes, increase operational efficiency, and boost competitiveness. Informatization, defined as the implementation of the so-called ICT (information and communication technologies), has become a top priority for many companies worldwide and in the public sector in the European Union. However, managing informatization properly requires the right tools and assessment methods. Studies conducted by Kuzionko-Ochrymiuk, Szanter and Niedzielski (2023) present that the level of informatization

of public administration services in Poland has significant disproportions between individual voivodeships. Recent research shows that Poland's use of e-government services has been steadily growing, which is consistent with EU digital priorities and reflects the nation's advancements in informatization. Nonetheless, there are still notable regional variations in these services' growth, which are impacted by intricate socioeconomic and infrastructure issues. Enhancing digital skills, strategically investing in underdeveloped areas, and fortifying the role of local governments are all essential to advancing sustainable informatization (Kuzionko–Ochrymiuk, Szanter & Niedzielski, 2023).

In the modern day of big data and the Internet private sector, informatization has emerged as a key driver of increased productivity, creativity, and competitiveness. Traditional business models are changing as a result of the deep integration of digital technology, which is pushing businesses toward data-driven decision-making and more intelligent operations. Private businesses should adopt complete informatization strategies to promote sustainable growth, invest in technology infrastructure and talent development, and raise digital awareness in order to further this process (Zhang, Tao & Wang, 2022).

Measuring the level of informatization is crucial to understand an organization's technological maturity, identify its strengths and weaknesses, and finally, develop the best strategies for further growth.

Comprehensive knowledge of how digital technologies alter social, economic, and organizational systems is lacking in current informatization research, as are unified theoretical frameworks and consistent assessment techniques. Addressing disparities in access and ability, incorporating new technologies, and investigating the ethical, cultural, and sustainable aspects of information technology are also left unattended.

The primary purpose of this publication is to review the main assessment methods for organizational informatization maturity including the assessment based on the Digital Technology Readiness Assessment – Questionnaire, TOGAF® Standard, and to present the real-life applications of the questionnaire. In the following chapters, the author focused on literature study in the context of theoretical foundations of informatization, technology maturity models, and limitations and theoretical gaps in the existing literature. In this case, the author examined Digital Technology Readiness Assessment – Questionnaire and Counterproductive Work Behaviour Checklist and analyzed whether correlation between the main variables exists.

2. Theoretical foundations of informatization

2.1. Informatization: definition and importance

Informatization is the process of implementing and using information and communication technologies (ICT) in various areas of organization's operation. It includes not only the infrastructure itself, but also processes, human resources, and organizational culture. Informatization is a key element of digital transformation as it rebuilds and improves traditional business and operational models.

Informatization is an integral part of the modern business environment. It is also a key part of organizational and social transformation in the digital era (Brzozowska, Grabińska & Imiołczyk, 2016). In the following paragraphs, the definition of informatization will be further explained. Its influence on various areas of business environments will also be discussed.

2.1.1. How informatization affects operational efficiency

According to Plekhanov, Franke and Netland (2023), informatization is one of the most crucial factors affecting an organization's operational efficiency. Businesses are granted an incredible opportunity to boost the efficiency of their operational processes by implementing modern information and communication technologies. The key elements of such an impact are the automation of business processes, resource utilization optimization, and improving both internal and external communication (Plekhanov, Franke & Netland, 2023).

According to Wirkus and Wilczewski (2007), the introduction of digital auctions, together with a digitized tender service and the electronic supply chain system, resulted in supply chain savings of 48% on average in Polish local governments in 2005, with the highest number of 65% in the Cracow district. On the other hand, a simple informatization of only one element – the digitized tender platform – enabled the Polish Security Printing Works Inc. to reduce the average purchase price by 19% (Wirkus & Wilczewski, 2007).

Going further, a 2023 report from Deloitte – *Unleashing value from digital transformation: Paths and pitfalls* – emphasizes the critical role of digital transformation in the process of improving operational efficiency in the public sector. Deloitte puts emphasis on using modern technologies such as AI (Artificial Intelligence), data analysis, and process automation, to facilitate the delivery of public services and increase citizens' commitment. Automation of business processes is an excellent way for companies to eliminate routine, strenuous tasks, mainly because the task completion time is shortened, and human errors are reduced.

Furthermore, resource optimization leads to better use of available resources, which, in consequence, reduces waste and improves work efficiency (Deloitte Insights, 2023). An interesting example may be ERP systems (Enterprise Resource

Planning systems) that integrate key business processes within an organization, enabling better resource management (including materials, finances, and personnel). There is a case of Lafarge Nida Gips Polska. This company integrated three ERP systems into one platform (AX4 developed by AXIT Polska) and, in turn, reduced the cost and time in handling shipment processes by approximately 80% (Wirkus & Wilczewski, 2007).

Improving internal and external communication is also essential for the operational efficiency of an organization. Advanced, modern communication tools such as online collaboration spaces, chats, and videoconferencing software enable employees to exchange information, share updates, solve problems together, and make decisions much faster. Better communication with both business partners and customers speeds up business processes, increases customer satisfaction, and allows companies to build stronger relationships in both private and public sectors.

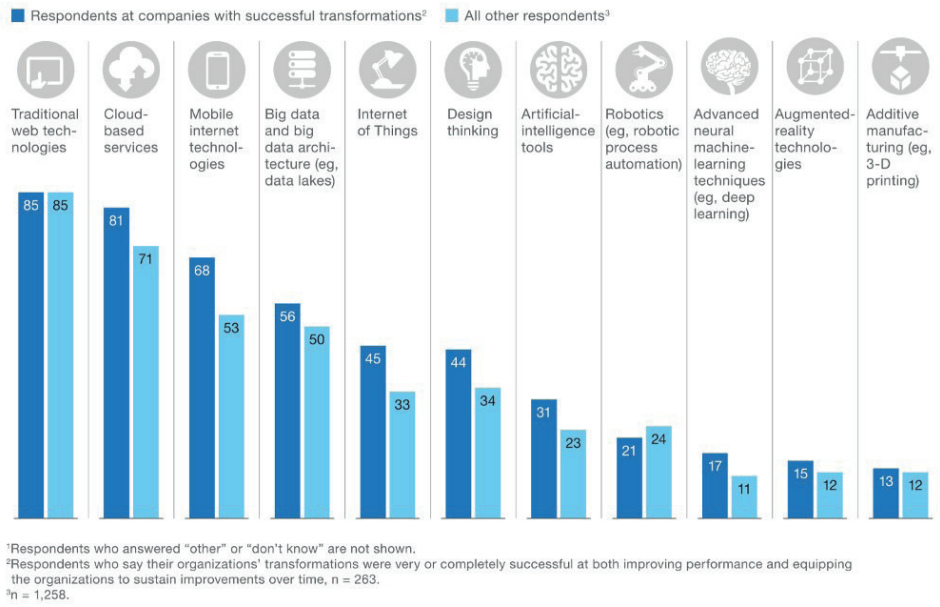
As Shuhua Monica Liu and Qianli Yuan (2015) emphasize, the growing use of Web 2.0, social media, and mobile information and communication technologies can significantly affect the way public services are delivered and change the level of citizens' commitment (Shuhua & Qianli, 2015).

As stated in a 2018 McKinsey & Company report, implementing digital technology into an organization's operational processes may result in increased efficiency and better effectiveness. The research conducted by McKinsey shows that companies that use digital technologies in their operational activities can quickly outperform their competitors regarding efficiency. However, only 20% of those digital transformations successfully keep the increased efficiency level in the next few years.

It is crucial to remember that success factors vary depending on the organization's size. Respondents from companies with fewer than 100 employees are 2.7 times more likely to report a successful digital transformation than respondents from companies with more than 50,000 employees (McKinsey & Company, 2018).

Implementing high-end technology solutions that boost operational efficiency requires meticulous planning and preparation. The process often requires much more than just technology – changes in corporate culture may also be necessary. However, the benefits of improving operational efficiency are considered significant and can indisputably help organizations increase competitiveness and achieve the company's strategic goals.

According to the McKinsey report, the more modern solutions from the list below an organization implements, the more likely it is to consider the digital transformation successful (McKinsey & Company, 2018).



[1]Respondents who answered "other" or "don't know" are not shown.
[2]Respondents who say their organizations' transformations were very or completely successful at both improving performance and equipping the organizations to sustain improvements over time, n = 263.
[3]n = 1,258.

Figure 1. Digital technologies, tools, and methods currently used by organizations

Source: McKinsey and Company, 2018

2.1.2. Enabling new business models

Not only does informatization support existing business models, but it also opens the door to discovering completely new ways of working and generating value. Recently introduced technologies, such as artificial intelligence, the Internet of Things, blockchain, and big data, enable organizations to take advantage of new opportunities, expand to new markets, and find innovative solutions.

According to the 2023 World Economic Forum report "Digital Transition Framework: an action plan for public-private collaboration", digital technologies have been revolutionizing how business is done. Therefore, entrepreneurs can quickly adapt to rapidly changing market conditions and growing customer expectations. Businesses worldwide have been increasingly using advanced analytics tools to better understand what their customers need and adjust their products and services to customer preferences. The data presented in the report is a solid proof that businesses that effectively use digital solutions to create new business models achieve significantly higher growth and profitability than their competitors. The examples may include marketplace platforms that connect service providers and clients, and subscription business models that allow companies to generate recurring profits through subscription fees (World Economic Forum, 2023).

Innovative business models supported by informatization can transform traditional industries and create completely new economic ecosystems. A great example may be the healthcare sector. Introducing telemedicine and telecare

has enabled patients to access high-quality medical care anywhere and anytime (Hjelm, 2006).

The informatization of more markets creates powerful opportunities for organizations. They can create new business models, increase their market share, introduce more innovative products and services, and discover new sources of revenue. The ability to adapt to changing customer needs and market conditions has become nothing but crucial for a company to be successful (World Economic Forum, 2023).

2.1.3. Changing the corporate culture and the way companies work

The process of informatization often requires a deep transformation of organizational culture and ways of working. New tools and technologies strongly affect the existing processes and relationships between employees. They require adaptation and modification of some behaviors and habits. Therefore, successfully implementing informatization requires much more than just the technical implementation of new solutions. It also, or potentially, needs employees to be involved in creating a new environment that is open to change.

Adapting employees to new technologies

The research conducted by Goncalves and Goncalves (2012) emphasizes that one of the biggest challenges in the informatization process is adapting employees to new technologies. New tools and systems are something employees do not know and find difficult to understand. This may result in resistance and reluctance to change. Therefore, it is essential to provide the necessary support, such as training and digital education opportunities, to ensure employees can smoothly acquire new skills and understand the latest tools (Goncalves & Goncalves, 2012).

Creating openness to change

According to the research conducted by Damawan and Azizah (2019), organizations that successfully implement changes actively promote a culture of openness to change and innovation. Employees of such organizations can freely express their opinions, propose their ideas, and experiment with new solutions. Creating such a corporate culture requires both the management and all employees to be involved. Continuous dialogue and internal communication are key to success (Damawan & Azizah, 2019).

Effective change management

Effective change management is a key element of successful informatization. This is mainly because it enables organizations a smooth transition from the existing models and methods to new, fully automated systems. Through appropriate planning and committed, supporting employees, change management is a way to

reduce disruptions of daily operations and resistance to new things, as well as increasing the acceptance and commitment of teams during the transformation process. This leads to faster achievement of business benefits such as increased efficiency, improved service quality, and boosted market competitiveness. There are various approaches to change management and the most often used are the following:

- Lewin's Model – includes three stages of change:
  - o Unfreeze: preparing for a desired change through challenging existing practices and approaches.
  - Change: implementing the desired change (technologies, processes, ways of doing things).
  - Refreeze: solidifying and adopting the desired change through introducing new procedures and best practices (Burnes, 2006).
- ADKAR model that focuses on the individual aspect of change management. It consists of five stages:
  - Awareness: making individuals aware of why the change is necessary.
  - Desire: fostering a willingness to participate in the change and support it.
  - Knowledge: providing information and training to individuals.
  - Ability: ensuring that individuals can apply the change in real-world situations.
  - Reinforcement: ensuring individuals follow new processes and behaviors (Hiatt, 2006).
- Kotter's 8 Steps for Leading Change – an 8-step change management model that focuses on making the changes sustainable:
  - Create a sense of urgency: inspiring people to act and be motivated by a compelling future vision.
  - Build a guiding coalition: creating a network of committed people who will lead, coordinate, and communicate its activities.
  - Form a strategic vision: clarifying the differences between the past and the future and gaining support from other teams or coworkers.
  - Enlist a volunteer army: bringing together a critical mass around a common opportunity so that people want to contribute individually.
  - Enable action by removing barriers: removing the obstacles that delay processes or create roadblocks to progress.
  - Generate short-term wins: breaking down tasks into smaller pieces that are more motivating and, at the same time, easier to track.
  - Sustain acceleration: increasing credibility by being relentless until the vision becomes a reality.
  - Institute change: identifying new behaviors, systems, processes, and ways of working and ensuring they will continue (Kotter, 2024).

- McKinsey 7S Model – the model is based on seven shared values that align and support each other to achieve effective change. This approach enables organizations to understand all aspects that should be considered during the change process. The model provides a comprehensive approach to change management. It consists of seven elements:
  - Strategy
  - Structure
  - Systems
  - Skills
  - Staff
  - Style
  - Shared values (Channon & Caldart, 2014).
- The Bridges Transition Model – a 3-stage model that focuses on the emotional aspects of change:
  - Ending, losing, and letting go: the first stage starts when people identify what they are losing and learn how to manage these losses. They decide what to leave behind and what they should keep. Those can be relationships, processes, locations, etc.
  - The neutral zone: during this stage, people go through a transition period. The old state of things no longer exists but the new one is not fully functioning yet. The neutral zone is when critical organizational changes occur, as well as people's behavior patterns evolve.
  - The new beginning: the third stage enables people to establish new roles, understand the primary purpose, and discover how to contribute to change and participate in it the most effectively (Bridges & Bridges, 2019).

2.2. Informatization implementation process

In order for the process to be successful, organizations should consider several aspects and apply best practices such as:

- Establishing a transparent vision and goals that are to be achieved through informatization. The entire organization, no matter the level, should be informed so that all stakeholders and employees understand the purpose of the change and the benefits it will bring.
  - Before implementing changes, organizations should thoroughly analyze their current state of technology, business processes, and employee competencies. This is crucial to identify the pain points and potential roadblocks. The analysis can then become the basis for a detailed implementation plan. Such a plan includes a schedule with milestones, resources that are necessary to succeed, as well as the description of roles and responsibilities of each stakeholder involved

in the process. The plan must be realistic and flexible enough to adjust to potential changes and challenges quickly.
  - One of the key elements of effective change management is communication. Organizations should regularly update employees on the implementation progress, changes, and the benefits a new technology has brought. In order to effectively utilize new technologies and processes, employees need proper training and support. It is crucial that training materials are tailored to the needs of particular groups and cover both technical and business aspects of the change. Without proper preparation, even the best-planned change implementation is likely to fail.
- Effective change management requires continuous monitoring at any stage of the implementation process. Organizations should regularly verify whether goals and schedules are on the right track and instantly identify any issues and delays. This allows for quick decision-making and responding to challenges. The monitoring process should cover both technical aspects and employee reactions to change. Introducing technological changes often requires a change in the organizational culture. Thus, organizations must foster a culture that embraces changes, innovations, and continuous improvement. This includes rewarding employees for commitment to the change implementation process and encouraging positive attitudes and cross-team collaboration. A supporting organizational culture is essential for achieving long-term success. The success of change strongly depends on the support of the top management. Leaders should actively support the implementation process, participate in the dialogue with employees, and make strategic, change-oriented decisions. With their commitment, they should become role models who significantly impact employee attitudes and willingness to adapt.
- After the implementation stage, it is crucial to evaluate the effect of the change, as well as integrate new processes and technologies into the daily operations. The evaluation is a great way to learn from experience and improve processes up to speed continuously. Organizations should be able to assess the level of goal completion and identify areas for further improvement. Change integration may include introducing new procedures and standards, as well as continuous monitoring and improvement.

Informatization in most cases involves risk of errors and unexpected issues. In fact, organizations must be able to identify potential threats and develop strategies to deal with these threats. This may include contingency planning, allocation of additional resources, or implementation of extra control measures.

Risk management must become a company's integral part of the implementation plan (Nastase, Giuclea & Bold, 2012).

2.3. Limitations and theoretical gaps in the existing literature

One of the hallmarks of the twenty-first century is the process of informatization, or the revolutionary incorporation of digital technologies into institutional, economic, and societal structures. Although many people agree that it is relevant in practice, its theoretical underpinnings are nonetheless disjointed and ambiguous. Four significant gaps in the literature are identified in this section: (1) a lack of conceptual clarity; (2) a lack of socio-technical integration; (3) limited longitudinal and evolutionary theorization; and (4) a lack of relevance to developing environments. Building strong, inclusive, and portable theoretical models of informatization requires addressing these issues.

Lack of conceptual clarity. There is not a single, accepted definition of informatization, despite the term being used often. The idea is applied differently by academics from a variety of disciplines, including sociology, education, policy studies, and information systems, frequently without establishing a shared theoretical foundation. This definitional ambiguity makes it more difficult to create a cohesive research agenda and impedes multidisciplinary discussion (Nambisan et al., 2017). Theoretical advancement in the discipline stays fragmented in the absence of conceptual alignment (Nambisan, Wright & Feldman, 2019).

Lack of socio-technical integration. Informatization is frequently examined from a technical perspective, which emphasizes systems and infrastructure, or from a social perspective, which focuses on behavior and the influence of institutions. Cordella and Paletti (2019) argue that a comprehensive knowledge of the ways in which ICTs interact with organizational and societal systems is compromised when these elements are separated. According to recent research, integrated socio-technical frameworks are necessary to reflect how social systems and technology have co-evolved (Holmstrom, 2018).

Limited longitudinal and evolutionary theorization. Instead of treating informatization as a continuous and adaptive process, numerous studies consider it a discrete, one-time operation. These static viewpoints ignore the institutional path dependencies, feedback mechanisms, and temporal dynamics that influence digital transformations across time (Monteiro et al., 2022). As a result, long-term trends or unanticipated results that arise in practice are difficult for current theories to account for.

Lack of relevance to developing environments. Assumptions from developed, highly digitalized societies – like reliable infrastructure, digital proficiency, and institutional capacity – are frequently reflected in theoretical models of informatization. In underdeveloped or economically disadvantaged regions, where sociopolitical and infrastructure issues are more complicated, these

presumptions tend to rarely stand accurate (Masiero & Bailur, 2021). As a result, many current theories are not applicable or relevant in the less developed nations of the world. Context-sensitive models that address local realities, informality, and structural inequality are becoming more and more demanded by scientists (Osei–Tutu, Kissi & Desmond, 2019).

These four theoretical gaps – limited application to emerging contexts, poor socio-technical integration, conceptual ambiguity, and lack of longitudinal insight – emphasize the need for more thorough, dynamic, and inclusive approaches to the study of informatization. Research in the future must transcend limited or context-specific models in order to create theories that are both globally applicable and analytically acceptable.

3. Technology maturity models

Technology maturity models (the level of informatization) are frameworks that allow for the fair assessment of how advanced an organization is when it comes to technology. The most commonly used are the following models:

- Capability Maturity Model Integration (CMMI) – an advanced framework of processes and behaviors that enables organizations to streamline processes and foster more productive behaviors that reduce risk in software, product, and service development. The model consists of six levels:
  - Maturity level 0: Incomplete – processes are not managed, and all tasks are ad hoc. Work may or may not be performed.
  - Maturity level 1: Initial – tasks are performed in an unpredictable manner, delays often occur, and overspending is common.
  - Maturity level 2: Managed – tasks are managed at the project level. Work is planned, performed, and monitored. Progress is tracked.
  - Maturity level 3: Defined – tasks are performed proactively. Organizational standards that serve as guidelines between, e.g., projects and programs.
  - Maturity level 4: Quantitatively Managed – tasks are measured and controlled. The organization is data-driven. There are quantitative goals that are predictable and adjusted to the needs of both internal and external stakeholders.
  - Maturity level 5: Optimizing – all activities are stable and, at the same time, flexible. The organization focuses on continuous improvement. It can quickly respond to new opportunities and changes (Mahmood, 2015).
- Control Objectives for Information and Related Technologies (COBIT) – a framework that provides a comprehensive business review of IT management. It enables organizations to properly manage risk, optimize

available resources, and align IT systems with business goals. COBIT provides guidance on aligning both organizational and IT strategies. It serves as a reference guide for management processes and IT management, providing a list of 37 processes and five principles for organizations to follow. The framework is also aligned with ISO and the ITIL standards (Hanafi, Wibowo & Rahayu, 2020).

- ISO/IEC 15504 (SPICE) – an international reference model for assessing business processes by assigning scores to individual items. SPICE enables organizations to determine the quality of their business processes and capabilities. SPICE contains a set of requirements for PRM (process reference models) and PAM (process assessment models), together with assessment criteria and methods. ISO/IEC 15504 defines a process dimension and a capability dimension. For each process, SPICE defines a capability level on the scale from "Incomplete" to "Optimizing". Since 2015, ISO has been gradually transferring the existing set of guidelines to a new standard: ISO/IEC 33001:2015. The process is now 90% complete (ISO, 2015).
- Digital Technology Readiness Assessment (DTRA) – Questionnaire, TOGAF® Standard: an evaluation of the technical maturity model developed within The Open Group Architecture Framework (TOGAF). The primary purpose of the DTRA framework is to evaluate digital technology readiness by analyzing processes, technical infrastructure, employee competencies, IT management, and organizational culture. The questionnaire consists of 43 statements respondents related to using the Lickert scale. The statements cover the following categories: vision, sponsorship and direction, IT capability, culture, scope and scale, business rationale, implementation approach, business model adaptability, skills and competence, technology maturity, ecosystem, governance and compliance, value realization, policy and regulations, and funding and resources.

3.1. Key indicators and metrics

The technical maturity evaluation is based on the following indicators and metrics:

Model	Application	Maturity levels/Evaluation criteria	Organizations
Capability Maturity Model Integration (CMMI)	Process evaluation and improvement	Maturity levels: Incomplete, Initial, Managed, Defined, Quantitatively Managed, Defined	IT industry

Model	Application	Maturity levels/Evaluation criteria	Organizations
Control Objectives for Information and Related Technologies (COBIT)	IT management	Defined goals and checkpoints for IT processes	IT industry
ISO/IEC 15504 (SPICE)	Business process evaluation and improvement	The model is based on six levels from Incomplete to Optimizing	The model aims to be as universal as possible. It is supposed to be applied to any type of organization
Digital Technology Readiness Assessment – Questionnaire (DTRA), TOGAF® Standard	Digital technology readiness evaluation	Evaluation criteria include technical infrastructure, IT management processes, employee competencies, and organizational culture	Organizations that have already implemented (or are about to implement) digital technologies into daily operations

Table 1. Indicators and metrics of maturity evaluation models (informatization in organizations).

Source: own work

4. Methodology

This study empirically tested the suggested theoretical model and the relationship between the primary variables using a quantitative research approach through a questionnaire survey.

4.1 Questionnaire for quantitative research

The following were used to construct the questionnaire:

- Digital Technology Readiness Assessment – Questionnaire, TOGAF® Standard.
- Counterproductive Behavior Scale in Organizations (CWB-C) (32 items), (Suzy Fox & Paul E. Spector, transl. by Elżbieta Sanecka, 2020).

The questionnaire was adapted for the purposes of the study as follows:

- Translation from English into Polish of the Digital Technology Readiness Assessment – Questionnaire, TOGAF® Standard using the reverse translation method.
- Standardization of the response scale from 7 to 5 options in the Digital Technology Readiness Assessment – Questionnaire, TOGAF® Standard.
- Addition of feminine endings to questions from the Counterproductive Work Behavior Scale (CWB-C) (32 items), (Suzy Fox and Paul E. Spector, transl. by Elżbieta Sanecka, 2020).
- Addition of a cover page and introduction.

4.2. Data Collection

The study, which focused on working professionals from different organizations, was carried out in Poland in January 2024. Data was collected at multiple occasions. Data was acquired utilizing the Google Forms platform and the computer-assisted web interviewing system.

The system was used to issue survey invitations in order to guarantee widespread accessibility within the target group of people. 220 of the 239 questionnaires that were gathered were deemed valid after being examined for completeness and consistency. It was decided that the sample size was enough for the intended statistical analysis.

5. Results – practical application of technology maturity assessment

DTRA (Digital Technology Readiness Assessment) implementation – a case study based on a research sample with the adapted scale – 5 options instead of 7 as in the original questionnaire.

The responses are distributed as follows in the table below.

	Percentage				
	Agree	**Some-what agree**	**Neutral**	**Some-what disagree**	**Disagree**
2.1. The organization has clarity on how the digital technology adoption will enable growth and provide a sustained competitive edge.	41.82	30.91	17.73	6.82	2.73
2.2. The organization has defined a time period in which to achieve the desired state with the adoption of digital technology.	27.27	30.91	26.36	8.18	7.27
2.3. The organization fully understands the consequence of not adopting digital technology.	39.09	32.73	21.82	4.55	1.82
2.4. The organization has identified and onboarded the executive sponsor/sponsoring department and other key stakeholders.	21.82	28.64	29.55	11.36	8.64
2.5. The benefits of digital technology are understood by the executive sponsor and other key stakeholders.	28.64	32.73	31.36	4.09	3.18
2.6. The organization has defined the strategy, built an adoption roadmap, and secured a funding commitment.	26.82	33.18	28.18	5.45	6.36
2.7. The IT department has the independent ability to assess the digital technology fitment, utilization, and adoption process through the architecture board.	23.64	35	29.09	6.36	5.91

Table 2. Digital Technology Readiness Assessment – questionnaire

Source: own work

	Percentage				
	Agree	**Some-what agree**	**Neutral**	**Some-what disagree**	**Disagree**
2.8. The IT department has the internal skills to drive a Proof of Concept (PoC) and pilot followed by the organization-wide adoption of digital technology.	32.27	30	25.91	6.36	5.45
2.9. New digital technology helps the organization to align with the technology roadmap defined by the IT strategy.	31.36	31.36	26.82	6.36	4.09
2.10. The organization plans and experiments with emerging technologies regularly.	27.27	34.09	25	8.64	5
2.11. The organization embraces change with minimal resistance to tackle obsolescence.	28.18	37.73	25	4.09	5
2.12. The organization has a structured organization change management process.	26.82	36.36	22.73	10	4.09
2.13. The organization has a clearly-defined scope for digital technology adoption.	31.82	32.73	24.55	5.45	5.45
2.14. The organization has a clear understanding of areas where new technology should be adopted and areas where it may impact positively.	30.91	40.45	20	4.09	4.55
2.15. The organization has a clear understanding of the expected outcomes and ways to achieve them with the defined scope.	32.73	37.27	21.36	5	3.64
2.16. The organization has a clear understanding of key drivers for embarking on the new digital technology adoption journey.	33.64	35.45	23.18	3.64	4.09
2.17. The organization has a vision of the expected benefits.	37.27	34.55	20.91	4.55	2.73
2.18. The organization has clarity on the competitive advantage that the adoption of digital technology would bring.	33.64	34.55	22.73	4.55	4.55
2.19. The impact of digital technology on the existing ecosystem is outlined; integration points and outcome-based objectives are clearly defined.	23.18	35	29.55	6.36	5.91
2.20. The organization has well-defined business and IT change management processes that are followed with discipline and governed by the respective change assessment board.	20.91	33.64	30.45	9.55	5.45

Table 2. continued

	Percentage				
	Agree	**Some-what agree**	**Neutral**	**Some-what disagree**	**Disagree**
2.21. The organization has a well-defined way of experimentation or implementation for any given digital technology.	23.18	31.82	28.64	9.55	6.82
2.22. The business model and services are flexible and able to adopt new digital technology to gain business benefits.	27.27	35	25.91	5	6.82
2.23. The organization has the turnaround time advantage to acclimatize and enhance the business model according to changing customer demands.	18.64	39.09	30	8.18	4.09
2.24. New digital technology helps to modify or define the organization business model and services that can provide growth and competitive advantages.	31.36	34.55	24.09	5	5
2.25. The organization has the right skills and competence to negotiate the steep learning curve needed for adoption.	28.18	35	24.55	6.36	5.91
2.26. The organization's management understands the vision and has the competence to enable the journey towards Digital Transformation.	28.64	37.27	23.18	5.45	5.45
2.27. The digital technology skill is readily available in the market to allow organizations to quickly ramp-up and raise the capability.	26.36	40.45	25.91	4.09	3.18
2.28. The technology is at an acceptable maturity level and curve that can be adopted at scale by the organization.	27.27	34.09	27.73	7.27	3.64
2.29. The technology has clearly-stated principles and clear use-cases which will drive adoption and usage in enterprises.	27.27	37.27	27.27	5.45	2.73
2.30. There is an availability of an ecosystem and partners (in the value chain) who support the adoption.	20.91	38.18	33.18	4.55	3.18
2.31. The ecosystem is matured enough with respect to standards, protocols, open source availability, and completeness of solution.	21.36	34.55	30.91	10	3.18

	Percentage				
	Agree	**Some-what agree**	**Neutral**	**Some-what disagree**	**Disagree**
2.32. The organization has planned accountability and ownership with partners with respect to digital technology.	24.55	34.09	29.55	7.27	4.55
2.33. The organization meets all the regulatory and geographical compliances for the intended use-cases.	29.55	35	25	6.82	3.64
2.34. The organization has a well-defined process to govern security and technology-specific challenges to fully utilize the digital technology capability.	24.09	39.09	25.45	7.73	3.64
2.35. The organization has well-defined, formulated, tested, and practical approaches on regulating the adoption of new digital technology.	27.27	32.73	27.73	7.73	4.55
2.36. The organization has a clear understanding of the target user to create a positive impact with digital adoption.	29.09	37.27	23.18	6.82	3.64
2.37. The organization has an outlined methodology to understand the way to quantify Return on Investment (ROI).	26.82	35	27.73	6.36	4.09
2.38. The organization has outlined clear Key Performance Indicators (KPIs) to effectively measure the value coming out of the new digital technology.	22.73	31.82	33.18	5.91	6.36
2.39. The government regulations are conducive for the organization to adopt the digital technology.	22.73	32.73	30.91	9.55	4.09
2.40. Policies by the government would act as a catalyst for the adoption and create a positive chain reaction in the ecosystem.	20.91	31.82	36.36	6.82	4.09
2.41. The organization has the right funding and budgets allocated for the Digital Transformation program and subsequent rollouts.	25	38.64	25.45	6.82	4.09
2.42. The organization has top-down funding/investors and support for the planned digital adoption.	19.09	34.55	30	10.91	5.45
2.43. The organization has resources (time, material, people, etc.) to enable the digital technology adoption.	28.18	40.91	20.91	5	5

Table 2. continued

How often have you done each of the following things at your present job?	Percentage				
	Never	Once or Twice	Once or Twice per Month	Once or Twice per Week	Every day
3.1. Purposely wasted your employer's materials/supplies.	76.36	14.55	7.73	0.91	0.45
3.2. Purposely did your work incorrectly.	77.27	15.45	3.64	3.64	0
3.3. Came to work late without permission.	42.27	38.64	15.91	2.27	0.91
3.4. Stayed home from work and said you were sick when you were not.	65.45	30	3.18	1.36	0
3.5. Purposely damaged a piece of equipment or property.	87.73	6.36	2.73	2.73	0.45
3.6. Purposely dirtied or littered your place of work.	85.45	7.73	5.45	1.36	0
3.7. Stolen something belonging to your employer.	83.64	10.91	5	0.45	0
3.8. Started or continued a damaging or harmful rumor at work.	80.91	11.82	5	2.27	0
3.9. Been nasty or rude to a client or customer.	57.73	29.09	10.45	2.73	0
3.10. Purposely worked slowly when things needed to get done.	65	24.09	8.18	2.73	0
3.11. Taken a longer break than you were allowed to take.	48.18	32.73	12.73	4.55	1.82
3.12. Purposely failed to follow instructions.	69.09	21.36	7.73	1.82	0
3.13. Left work earlier than you were allowed to.	55.91	30.45	10.91	2.73	0
3.14. Insulted someone about their job performance.	73.64	20	4.09	2.27	0
3.15. Made fun of someone's personal life.	77.73	13.64	5.91	2.73	0
3.16. Took supplies or tools home without permission.	75	16.82	5.91	2.27	0
3.17. Put in to be paid for more hours than you worked.	82.27	10.45	4.55	2.73	0
3.18. Took money from your employer without permission.	87.27	7.27	3.64	0.91	0.91
3.19. Ignored someone at work.	57.73	27.73	11.36	2.73	0.45
3.20. Blamed someone at work for error you made.	75.91	16.36	5.91	1.36	0.45
3.21. Started an argument with someone at work.	58.18	32.73	7.27	1.36	0.45
3.22. Stole something belonging to someone at work.	86.36	6.36	5.91	0.91	0.45

Table 3. Counterproductive work behavior checklist

Source: own work

How often have you done each of the following things at your present job?	Percentage				
	Never	Once or Twice	Once or Twice per Month	Once or Twice per Week	Every day
3.23. Verbally abused someone at work.	65.45	25.91	7.27	1.36	0
3.24. Made an obscene gesture (the finger) to someone at work.	73.18	18.18	6.36	2.27	0
3.25. Threatened someone at work with violence.	86.82	7.73	3.64	1.36	0.45
3.26. Threatened someone at work, but not physically.	84.55	8.64	5.45	1.36	0
3.27. Said something obscene to someone at work to make them feel bad.	75.45	15.45	7.27	1.36	0.45
3.28. Did something to make someone at work look bad.	81.36	13.18	4.09	0.91	0.45
3.29. Played a mean prank to embarrass someone at work.	76.82	15.91	5.45	1.36	0.45
3.30. Looked at someone at work's private mail/property without permission.	85.91	7.27	4.55	1.36	0.91
3.31. Hit or pushed someone at work.	86.36	8.64	2.27	2.27	0.45
3.32. Insulted or made fun of someone at work.	71.82	20.91	5.45	0.91	0.91

Table 3. continued

5.1. Consistency analysis

In order to conduct an analysis using Machine Learning models, a consistency analysis of similar questions has been conducted. For this purpose, Cronbach's Alpha analysis and the PCA – Principal Component Analysis were used. The results are presented in the table below.

	PCA Var	Cronbach's Alpha value
Abuse	0,619633402	0,960986
Production deviance	0,740593353	0,822459
Sabotage	0,756348832	0,836517
Theft	0,768611487	0,92204
Withdrawal	0,624260478	0,777175
Vision	0,684668311	0,759652
Sponsorship and direction	0,730701029	0,809709
IT capabilities	0,81223467	0,883835
Culture	0,729861759	0,813703

Table 4. A consistency analysis based on PCA Var and Cronbach's Alpha value

Source: own work

	PCA Var	Cronbach's Alpha value
Scope and scale	0,82451358	0,892792
Business justification	0,821399168	0,89065
Approach to implementation	0,819169944	0,888801
Adaptability of the business model	0,764051917	0,843531
Skills and competencies	0,765255237	0,836566
Maturity of technology	0,763340743	0,843781
Ecosystem	0,832918941	0,796546
Governance and compliance	0,743205062	0,884482
Value realization	0,784404389	0,861702
Policies and regulations	0,847924347	0,819839
Funds and resources	0,755279015	0,837899

Table 4. continued

All values indicate that the provided responses (within one group) are highly consistent. Due to their high consistency, the first component obtained from the Principal Component Analysis was used for further analysis.

5.2. Component correlation

Before the formal analysis, a correlation matrix was created. The formal analysis is supposed to identify the relationship between the questions on informatization and counterproductivity. The correlation matrix between the question components is presented in the table below.

	Abuse	Production deviance	Sabotage	Theft	Withdrawal
Vision	0,007301	0,018466	0,025948	-0,01851	0,055076
Sponsorship and direction	-0,01014	0,0341	-0,02377	-0,03369	0,03503
IT capabilities	-0,00464	0,04276	0,045416	0,019554	-0,01412
Culture	0,03929	0,095045	0,116941	0,059713	0,080694
Scope and scale	0,021434	0,073285	0,091256	0,026976	0,032386
Business justification	0,075728	0,068943	0,118667	0,0791	0,027668
Approach to implementation	-0,00273	0,023329	0,023696	-0,00838	0,061811
Adaptability of the business model	0,041589	0,09596	0,132113	0,060281	0,069622
Skills and competencies	-0,00563	0,061711	0,047215	-0,00048	0,031351

Table 5. The correlation matrix between the question components

Source: own work

	Abuse	Production deviance	Sabotage	Theft	Withdrawal
Maturity of technology	0,002547	0,074456	0,080575	0,072932	0,004207
Ecosystem	-0,0404	0,022928	0,005498	0,011951	-0,04605
Governance and compliance	-0,00613	0,040511	0,031234	-0,00395	0,057585
Value realization	-0,00505	0,04827	0,042006	0,005082	0,03678
Policies and regulations	-0,03726	0,002108	-0,02785	-0,03545	0,047975
Funds and resources	-0,02749	0,021998	-0,01427	-0,03155	0,032631

Table 5. continued

The obtained values indicate that the correlation between the components is close to 0. This may suggest that there is no dependence between informatization and counterproductivity. Therefore, Machine Learning models are impossible to create.

5.3. Extra trees – extremely randomized tree model

Further analysis was conducted using the Extra tree algorithm. Three tables were created for each category of counterproductive behavior.

Unfortunately, no satisfactory model was obtained. For each attribute, R2 is close to 0. The highest value of -0.00712 for "Policies and regulations" is presented in the table below.

Extra tree model parameters						
	ccp_alpha	max_depth	min_samples_leaf	min_samples_split	min_weight_fraction_leaf	n_estimators
0	0.03105938	17	5	98	0.112848523	327

Table 6. Extra tree model parameters

Source: own work

	0
Max error	3.708553364
MAE (mean absolute error)	1.108737996
MSE (mean squared error)	1.855249055
R2	-0.007119949
MAPE (mean absolute percentage error)	1.002793093

Table 7. The goodness of fit index (GFI)

Source: own work

Obtained relevancy of attributes					
	Abuse	Production deviance	Sabotage	Theft	Withdrawal
0	**1**	**0**	**0**	**0**	**0**

Table 8. Obtained relevancy of attributes

Source: own work

5.4. Exploratory factor analysis

Before the analysis, all items were grouped according to the following key suggested by the author of the scale:

Subscale	Items to sum
Abuse	8, 9, 14, 15, 19, 20, 21, 23-32
Production deviance	2, 10, 12
Sabotage	1, 5, 6
Theft	7, 16, 17, 18, 22
Withdrawal	3, 4, 11, 13

Table 9. Items grouped based on the subscale

Source: Spector, 2002

Unfortunately, the analysis' results showed weak dependencies between items. Therefore, the results were divided into four dimensions based on similar features. The table below lists the results.

	Dimension 1	Dimension 2	Dimension 3	Dimension 4
10.1. The organization has clarity on how the digital technology adoption will enable growth and provide a sustained competitive edge.	0.563528833	0.388791065	0.209833	0.244573
10.2. The organization has defined a time period in which to achieve the desired state with the adoption of digital technology.	0.24458021	0.541753325	0.372006	0.160424
10.3. The organization fully understands the consequence of not adopting digital technology.	0.625230047	0.214825512	0.200933	0.181102
10.4. The organization has identified and onboarded the executive sponsor/sponsoring department and other key stakeholders.	0.148865222	0.661273724	0.398853	0.088282
10.5. The benefits of digital technology are understood by the executive sponsor and other key stakeholders.	0.437618084	0.447228967	0.338563	0.164741

Table 10. The results divided into four dimensions based on similar features

Source: own work

	Dimension 1	Dimension 2	Dimension 3	Dimension 4
10.6. The organization has defined the strategy, built an adoption roadmap, and secured a funding commitment.	0.460725673	0.474171069	0.467702	0.180157
10.7. The IT department has the independent ability to assess the digital technology fitment, utilization, and adoption process through the architecture board.	0.23451844	0.373744897	0.635621	0.282117
10.8. The IT department has the internal skills to drive a Proof of Concept (PoC) and pilot followed by the organization-wide adoption of digital technology.	0.371603977	0.293136168	0.614185	0.320323
10.9. New digital technology helps the organization to align with the technology roadmap defined by the IT strategy.	0.372244549	0.263128822	0.675622	0.213546
10.10. The organization plans and experiments with emerging technologies regularly.	0.352171797	0.303645	0.57978	0.251406
10.11. The organization embraces change with minimal resistance to tackle obsolescence.	0.446530431	0.166837842	0.418959	0.306427
10.12. The organization has a structured organization change management process.	0.434746162	0.353250578	0.45302	0.26091
10.13. The organization has a clearly-defined scope for digital technology adoption.	0.513321329	0.351705036	0.533325	0.199632
10.14. The organization has a clear understanding of areas where new technology should be adopted and areas where it may impact positively.	0.588498374	0.217987799	0.489704	0.277855
10.15. The organization has a clear understanding of the expected outcomes and ways to achieve them with the defined scope.	0.657401466	0.120426074	0.47597	0.295963
10.16. The organization has a clear understanding of key drivers for embarking on the new digital technology adoption journey.	0.65267199	0.239732031	0.462659	0.293776
10.17. The organization has a vision of the expected benefits.	0.667890956	0.239484909	0.272678	0.223052

Table 10. continued

	Dimension 1	Dimension 2	Dimension 3	Dimension 4
10.18. The organization has clarity on the competitive advantage that the adoption of digital technology would bring.	0.696159053	0.204628998	0.333687	0.176515
10.19. The impact of digital technology on the existing ecosystem is outlined; integration points and outcome-based objectives are clearly defined.	0.504577907	0.437300861	0.364516	0.313626
10.20. The organization has well--defined business and IT change management processes that are followed with discipline and governed by the respective change assessment board.	0.367328879	0.341251649	0.495911	0.455394
10.21. The organization has a well-defined way of experimentation or implementation for any given digital technology.	0.40729687	0.417173766	0.446434	0.385471
10.22. The business model and services are flexible and able to adopt new digital technology to gain business benefits.	0.621731378	0.245519349	0.368211	0.333594
10.23. The organization has the turnaround time advantage to acclimatize and enhance the business model according to changing customer demands.	0.449502151	0.298274877	0.426246	0.365973
10.24. New digital technology helps to modify or define the organization business model and services that can provide growth and competitive advantages.	0.601841704	0.252983404	0.370679	0.248618
10.25. The organization has the right skills and competence to negotiate the steep learning curve needed for adoption.	0.627702323	0.315484379	0.334616	0.334455
10.26. The organization's management understands the vision and has the competence to enable the journey towards Digital Transformation.	0.650837504	0.275477368	0.326517	0.308235
10.27. The digital technology skill is readily available in the market to allow organizations to quickly ramp-up and raise the capability.	0.422512826	0.210683309	0.194852	0.533597

	Dimension 1	Dimension 2	Dimension 3	Dimension 4
10.28. The technology is at an acceptable maturity level and curve that can be adopted at scale by the organization.	0.4415588	0.078464328	0.327884	0.584435
10.29. The technology has clearly-stated principles and clear use-cases which will drive adoption and usage in enterprises.	0.431494044	0.333256632	0.244396	0.535086
10.30. There is an availability of an ecosystem and partners (in the value chain) who support the adoption.	0.23714141	0.347425628	0.292284	0.626039
10.31. The ecosystem is matured enough with respect to standards, protocols, open source availability, and completeness of solution.	0.282082058	0.310087248	0.22375	0.652194
10.32. The organization has planned accountability and ownership with partners with respect to digital technology.	0.344665064	0.406931686	0.251257	0.52167
10.33. The organization meets all the regulatory and geographical compliances for the intended use-cases.	0.578786623	0.224448225	0.260227	0.392314
10.34. The organization has a well-defined process to govern security and technology-specific challenges to fully utilize the digital technology capability.	0.547238553	0.301823355	0.28545	0.443271
10.35. The organization has well-defined, formulated, tested, and practical approaches on regulating the adoption of new digital technology.	0.566275613	0.371282306	0.247418	0.419229
10.36. The organization has a clear understanding of the target user to create a positive impact with digital adoption.	0.6218628	0.283622259	0.114078	0.414341
10.37. The organization has an outlined methodology to understand the way to quantify Return on Investment (ROI).	0.580384215	0.392803046	0.251939	0.344881
10.38. The organization has outlined clear Key Performance Indicators (KPIs) to effectively measure the value coming out of the new digital technology.	0.369198871	0.541333464	0.337732	0.420933

Table 10. continued

	Dimension 1	Dimension 2	Dimension 3	Dimension 4
10.39. The government regulations are conducive for the organization to adopt the digital technology.	0.208377754	0.535351409	0.187766	0.441702
10.40. Policies by the government would act as a catalyst for the adoption and create a positive chain reaction in the ecosystem.	0.230731999	0.640838386	0.219348	0.306824
10.41. The organization has the right funding and budgets allocated for the Digital Transformation program and subsequent rollouts.	0.538679675	0.524702296	0.075524	0.280074
10.42. The organization has top-down funding/investors and support for the planned digital adoption.	0.24047343	0.688962419	0.136839	0.243214
10.43. The organization has resources (time, material, people, etc.) to enable the digital technology adoption.	0.544589512	0.435503926	0.276463	0.285191

Table 10. continued

What served as criteria were scores starting from 0.4. The following common elements were found:

- Dimension 1: the emphasis is on the implementation aspects and the results. The standard part is the benefits resulting from the adoption of digital technology, as well as the vision of future benefits. One can also observe the emphasis on competitive advantage and opportunities for profit growth that the organization can achieve by meeting strategic targets set by the vision.
- Dimension 2: the main common aspects are those focused on the implementation planning process and the resource analysis necessary to complete the entire process. Internal indicators, the structure of the organization, and the strategy are also highlighted. Finally, there is also a high focus on external factors such as government policy and investors.
- Dimension 3: this dimension focuses on the implementation phase. The units responsible such as the change assessment committee, the infrastructure council, and the IT department are listed. All steps (parts of each implementation stage) such as, e.g., proof of concept, piloting, and experimentation phase are described.
- Dimension 4: it emphasizes the business case for the project and the assessment of the readiness of both the business environment and the

organization itself for the implementation phase. The crucial aspects are the following: a defined management process, security and technology issues, ecosystem availability, readiness to use the full potential after implementation (use cases), available resources, technologies, and maturity for implementation, as well as whether all interested stakeholders are ready for implementation.

Despite combining items from the informatization-related area into four dimensions, a strong correlation between the main variables was not possible.

7. Discussion

To the best of the author's knowledge, this study is unique and has not been previously conducted in this specific configuration. It represents an original contribution by examining the selected variables and their interrelations in a way not explored in earlier research.

The results clearly show that correlations between counterproductive behaviors and informatization are weak. Such results are widespread for studies that examine behaviors people do not necessarily want to share with others. According to Fisher (1993), people tend to present themselves in the best possible light. Therefore, they avoid responding in a way that may challenge their reputation (Fisher, 1993). This phenomenon is called "fear of negative evaluation". Thus, the respondents could have avoided choosing responses that confirmed their illegal, addiction-related, or morally questionable activities.

Tourangeau and Yan (2007) suggest that to prevent such behavior, researchers, in addition to providing respondents with anonymity, may also use, e.g., indirect questions. These may reduce the resistance to giving an honest answer (Tourangeau & Yan, 2007).

Another aspect Hippler and Schwarz (1987) emphasize is the construction of questions. This issue has been studied since the 1940s, when surveys became a dominant source of data acquisition in empirical social research (Hippler & Schwarz, 1987). Therefore, one should consider experimenting with different constructions of questionnaire elements. For example, using a CWB-C scale introduced by S. Fox and P. Spector 20 years ago for measuring can be helpful.

Respondents in longer questionnaires often show a decline in attention and engagement, leading to less reliable responses in the final sections of the survey (Herzog & Bachman, 1981). This phenomenon, known as survey fatigue, can result in an increase in missing data, random or schematic responses. Survey tiredness is a serious risk to data quality, particularly in online surveys and multi-page questionnaires, as noted by Porter, Whitcomb and Weitzer (2004). Respondents are more prone to give flimsy, repetitive, or insufficient responses when they are fatigued or disinterested, which compromises the quality and dependability of the information gathered. Toward the end of lengthy questionnaires, when desire and

attention tend to wane, this effect tends to become more pronounced, resulting in measurement error and decreased answer accuracy.

Interpreting complex or abstract items – especially those that describe organizational systems or technological processes – requires more mental work. Higher cognitive load may lead to more satisficing behavior, in which respondents select the first acceptable response rather than the most accurate one (Tourangeau, Rips & Rasinski, 2002). Uneven measurement error may have been introduced by informatization items that were more conceptually difficult than behavioral CWB items, which would have decreased the observed correlation.

Finally, one should also consider the aspect of identification with given social groups, values, and ideologies described by Brewer and Gardner (1996). These factors may affect the responses given regarding counterproductive behaviors. People who identify with a given social group may be more disposed to present themselves in a better light despite their harmful behavior.

7. Limitations and Future Research

One of the most critical aspects of managing an organization's digital transformation is the technology readiness assessment. Methods based on ISO/IEC 15504, COBIT, and DTRA provide various techniques for analyzing and improving technological processes. Despite all challenges, such an assessment allows organizations to identify potential improvements and develop the best strategy for further technology implementation and usage. Future research should focus on assessment process automation, integrating methods, as well as analyzing the impact of new technologies.

- Assessment process automation: the development of automation technologies and Artificial Intelligence creates new opportunities for fully automating technology readiness assessment. Future research should focus on developing tools and algorithms that enable fully automated data analysis and reporting.
- Integration of assessment methods: another research direction could be the development of maximally integrated evaluation frameworks that combine different techniques and models such as ISO/IEC 15504, CMMI, COBIT, and DTRA. Such an approach may allow for a more comprehensive and coherent assessment of an organization's technology maturity.
- Assessing the impact of emerging technologies: as new technologies, such as artificial intelligence, the Internet of Things, (IoT), and blockchain emerge, new methods need to be developed to properly assess an organization's readiness to implement them. Future research should focus on analyzing the impact of these technologies on an organization's technology maturity.

The recommendation for further research is to use a different model to study counterproductive behaviors or informatization. Alternatively, a distinct group of respondents (e.g., people related to the IT industry or people who are more honest and accurate while responding to the questionnaire). Additionally, the author's suggestion is to shorten the questionnaire by, e.g., using fewer items in the questionnaire on counterproductive behaviors.

Some researchers predict that societies are moving into a post-informatization period, in which intelligent transformation or smart governance will become more important and informatization will be taken for granted. Potential topics for further research are: Which indicators signal the shift from an information-based society to a smart one? When automation and artificial intelligence take over public services? How does informatization change?

References:

Brewer, I., & Gardner, W. L. (1996). Who Is This "We"? Levels of Collective Identity and Self Representations. *Journal of Personality and Social Psychology*, *71*(1), 83–93. https://doi.org/10.1037/0022-3514.71.1.83

Bridges, W., & Bridges, S. (2019). *Transitions: Making Sense of Life's Changes*, revised anniversary edition.

Brzozowska, A, Grabińska A., & Imiołczyk, J. (2016). Informatyzacja jako element zrównoważonego rozwoju kraju. *Zeszyty Naukowe Politechniki Częstochowskiej*, *Zarządzanie*, *23*, 56–64. https://doi.org/10.17512/znpcz.2016.3.1.06

Burnes, B. (2006). Kurt Lewin and the Planned Approach to Change: A Re-appraisal. *Journal of Management Studies*, *41*, 977–1002. https://doi.org/10.1111/j.1467-6486.2004.00463.x

Channon, D. F., & Caldart, A. A. (2014). *McKinsey 7S model. Wiley Encyclopaedia of Management*. John Wiley & Sons, Ltd.

Cordella, A., & Paletti, A. (2019). Government as a platform, orchestration, and public value creation: The Italian case. *Government Information Quarterly*, *36*(4), 101409. https://doi.org/10.1016/j.giq.2019.101409

Damawan, A. H., & Azizah, S. (2019). Resistance to Change: Causes and Strategies as an Organizational Challenge, Advances in Social Science, Education and Humanities Research. Vol. 395, 5th ASEAN Conference on Psychology, Counseling, and Humanities (ACPCH 2019).

Deloitte Insights. (2023). *Unleashing value from digital transformation: Paths and pitfalls*. Available at: https://www2.deloitte.com/us/en/insights/topics/digital-transformation/digital-transformation-value-roi.html. Accessed 14 January 2025.

Fisher, R. J. (1993). Social Desirability Bias and the Validity of Indirect Questioning. *Journal of Consumer Research*, *20*(2), 303–315. https://psycnet.apa.org/doi/10.1086/209351

Goncalves, J. M. & Goncalves, R. P. S. (2012). *Overcoming Resistance to Changes in Information Technology Organizations*, CENTERIS 2012 – Conference on ENTER-

prise Information Systems / HCIST 2012 – International Conference on Health and Social Care Information Systems and Technologies.

Hanafi, R., Wibowo, A. & Rahayu, A. (2020). *Organization and IT Strategic Alignment, Determination of IT Process Priorities using COBIT 5*, 2020 International Conference on Advancement in Data Science, E-learning and Information Systems (ICADEIS).

Herzog, A. & Bachman, J. (1981). Effects of questionnaire length on response quality. *Public Opinion Quarterly*, *45*(4), 549–559. https://doi.org/10.1086/268687

Hiatt, J. (2006). *ADKAR: A Model for Change in Business, Government, and Our Community*. Prosci Research.

Hippler, H., Schwarz, N. & Sudman, S. (Eds.). (1987). *Social Information Processing and Survey Methodology.* Springer-Verlag Publishing. https://psycnet.apa.org/doi/10.1007/978-1-4612-4798-2

Hjelm, N. M. (2006). *Introduction to Telemedicine, second edition – Benefits and drawbacks of telemedicine,* CRC Press.

Holmstrom, J. (2018). Recombination in digital innovation: Challenges, opportunities, and the importance of a theoretical framework. *Information and Organization*, *28*(2), 107–110. https://doi.org/10.1016/j.infoandorg.2018.04.002

ISO. (2015), *Information technology – Process assessment – Concepts and terminology*. Edition 1. Available at: https://www.iso.org/standard/54175.html. Accessed 14 January 2025.

Kotter. (2024), *The 8 Steps for Leading Change* available at: https://www.kotterinc.com/methodology/8-steps/. Accessed 14 January 2025.

Kuzionko-Ochrymiuk, E., Szanter, R. & Niedzielski, P. (2023). Level of informatization of public administration services in the voivodeships of Poland in 2014–2022. *ASEJ Scientific Journal*, *27*(40). https://doi.org/10.19192/wsfip.sj4.2023.17

Liu, S.M. & Yuan, Q. (2015). The Evolution of Information and Communication Technology in Public Administration. *Public Administration for Development*, *35*(2), 140–151. https://doi.org/10.1002/pad.1717

Mahmood, S. (2015). *Capability maturity model integration CMMI*. The Virtual University of Pakistan. https://blogs.helixops.ai/cmmi-capability-maturity-model-integration/

Masiero, S. & Bailur, S. (2021). Digital identity for development: The quest for justice and a research agenda. *Information Technology for Development*, *27*(1), 1–12. https://doi.org/10.1080/02681102.2021.1859669

McKinsey & Company. (2018). *Unlocking success in digital transformations*. Available at: https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/unlocking-success-in-digital-transformations#/. Accessed 14 January 2025.

Monteiro, A., Vale, J., Leite, E., Lis, M. & Kurowska–Pysz, J. (2022). The impact of information systems and non-financial information on company success. *International Journal of Accounting Information Systems*, 45, 100557. https://doi.org/10.1016/j.accinf.2022.100557

Nambisan, S., Wright, M. & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, *48*(8), 103773. https://doi.org/10.1016/j.respol.2019.03.018

Nastase, M., Guiclea, M. & Bold, O. (2012). The Impact of Change Management in Organizations – a Survey of Methods and Techniques for a Successful Change.

Revista de Management Comparat International, *13*(1), 5–16. https://www.rmci.ase.ro/no13vol1/01.pdf

Osei–Tutu, E., Kissi, E. & Desmond A. (2019). Evaluating critical factors for the implementation of e-procurement in Ghana. *International Journal of Procurement Management*, *12*(1), 1–14. https://doi.org/10.1504/IJPM.2019.096994

Plekhanov, D., Franke, H. & Netland, T. H. (2023). Digital transformation: A review and research agenda. *European Management Journal*, *41*(6), 821–844. https://doi.org/10.1016/j.emj.2022.09.007.

Porter, S., Whitcomb, E. & Weitzer, W. (2004). Multiple Surveys of Students and Survey Fatigue. *New Directions for Institutional Research*, *121*, 0271–0579. https://doi.org/10.1002/ir.101

Spector, P. (2002). *Counterpoductive Work Behavior Checklist CWB-C.* Available at: https://paulspector.com/assessments/pauls-no-cost-assessments/counterproductive-work-behavior-checklist-cwb-c/. Accessed 14 January 2025.

Tourangeau, R., Rips, L. & Rasinski K. (2002). The Psychology of Survey Response. *Journal of the American Statistical Association*, *97*(457), 358–359. https://doi.org/10.2307/3085796

Tourangeau, R. & Yan, T. (2007). Sensitive Questions in Surveys. *Psychological Bulletin*, *133*(5), 859–883. https://doi.org/10.1037/0033-2909.133.5.859

Wirkus, M. & Wilczewski, M. (2007). Informatyzacja zaopatrzenia jako jeden ze sposobów na obniżenie kosztów działania przedsiębiorstwa. *Przegląd Organizacji*, *3*(806), 40–44. https://doi.org/10.33141/po.2007.03.11

World Economic Forum White Papers. (2023). *Digital Transition Framework: An action plan for public-private collaboration.* Available at https://www.weforum.org/publications/digital-transition-framework-an-action-plan-for-public-private-collaboration/. Accessed 14 January 2025.