Energy companies' readiness for the digital transformation of the purchasing process

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Abstract: *Social and economic developments, the dynamic geopolitical situation, and climate policy changes are exerting an increasingly significant influence on stakeholders in the energy sector. In recent years, the sector has undergone a period of dynamic change, during which there has been a notable increase in awareness of the potential for digital transformation within the sector. A specific process that ensures the security and stability of supply is the purchasing process. The objective of this article is to identify the mechanisms that facilitate and impede the digital transformation of the purchasing process in energy companies in Poland. The research employed a qualitative exploratory methodology based on interviews with procurement executives from Polish energy companies. The findings of the research, together with their subsequent analysis, enabled the identification of ten factors that act as impediments to the digital transformation of the purchasing process in energy companies in Poland. The article puts forward five mechanisms that could assist in overcoming the identified obstacles to transforming the purchasing process. The study emphasizes the significance of implementing effective change management and business digitalisation strategies to facilitate the digital transformation of purchasing process.*

Keywords: *Digital procurement transformation, purchasing, supporting mechanisms, barriers.*

JEL Classification: *M15, M21, O31, O32.*

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Introduction

The digital transformation that has occurred over the past few decades has resulted in significant changes across numerous business sectors. The energy sector has been subject to some of these changes, but recent developments suggest that the digital transformation of the energy sector is intensifying and accelerating. It is becoming increasingly evident and that the operation of the energy sector is becoming critically dependent on digital technologies.

In the recent years, there has been a notable increase in the number of studies examining the impact of digitalisation on the procurement process. The research is conducted from a variety of perspectives, including change management transformation, innovation, sustainability, value chain analysis and the application of agile project management methodologies. In examining the factors influencing the digitalisation of the purchasing process, researchers identify both barriers and opportunities, with a particular focus on social and organisational factors.

Previous studies have analysed specific technologies affecting the purchasing process, including blockchain (Hofbauer & Sangl, 2019;

Özkan et al., 2021), artificial intelligence (Jahani et al., 2021; Roth & Nikolla, 2020), business process automation (van Hoek et al., 2022; Viale & Zouari, 2020) and big data analytics (Srai & Lorentz, 2019). Furthermore, the literature also includes arguments for the necessity of modifying procurement process through digitalisation (Corejova & Chinoracky, 2021; Fallahpour et al., 2021). Additionally, there is also a growing corpus of research examining the impediments to digitalisation, specifically, the factors that impede the implementation of digital technologies in the purchasing process (Cichosz et al., 2020; Xu et al., 2021) and assessing the opportunities and potential benefits of purchasing processes digitalization (Cichosz et al., 2020; Yevu et al., 2021).

The aforementioned works have advanced the knowledge of purchasing process digitalisation, thereby facilitating their digital transformation. However, it was evident that a greater focus on the energy sector was required.

The values presented in Figs. 1–2 serve to substantiate the limited number of publications in the fields of purchasing process digitalisation and procurement digitalisation. Since 2019, there has been a notable increase in interest in the topics of purchasing process digitalisation and procurement digitalisation, which serves to confirm the relevance of the issues discussed in the article. It is notable that a search for the term “energy sector” or “energy company” in the Scopus database did not yield any results, indicating a significant research gap in the digitalisation of the purchasing process in an energy company.

The objective of this research is to address the aforementioned research gap by answering the following research question:

RQ: What mechanisms facilitate and impede the digital transformation of purchasing processin the energy companies in Poland?

Our theoretical perspective is informed by the findings of Lorentz et al. (2021), which identify new states or opportunities driven by the implementation of digital initiatives that enable value creation for the organisation in the purchasing process, as well as improvements in the efficiency of the purchasing process are defined as mechanisms (Lorentz et al., 2021; Srai & Lorentz, 2019).

We base our conclusions on qualitative data from 11 procurement managers from 8 Polish energy companies.

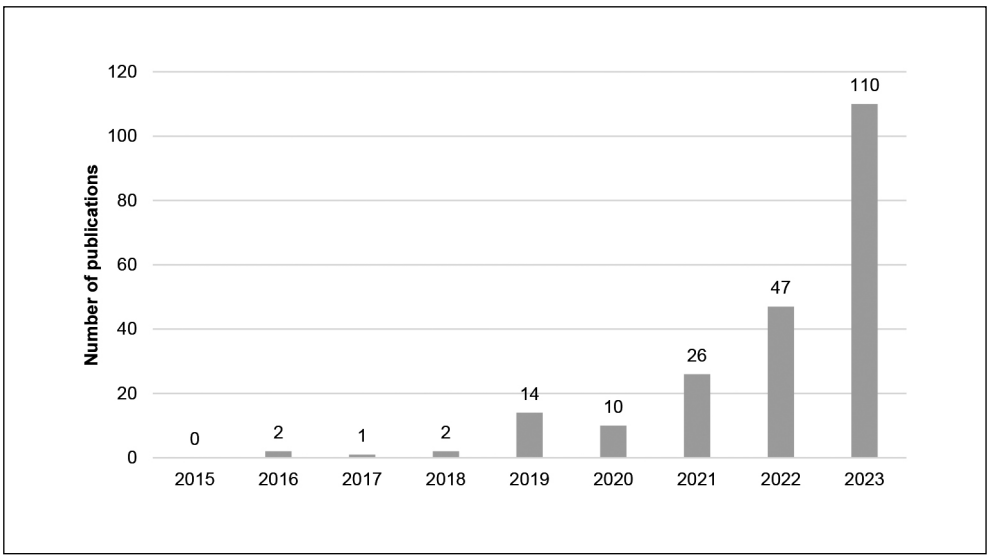

Fig. 1: **Distribution of scientific publications with the keywords “digitalisation” and “purchasing” in the Scopus database in 2015–2023**

Source: Scopus database

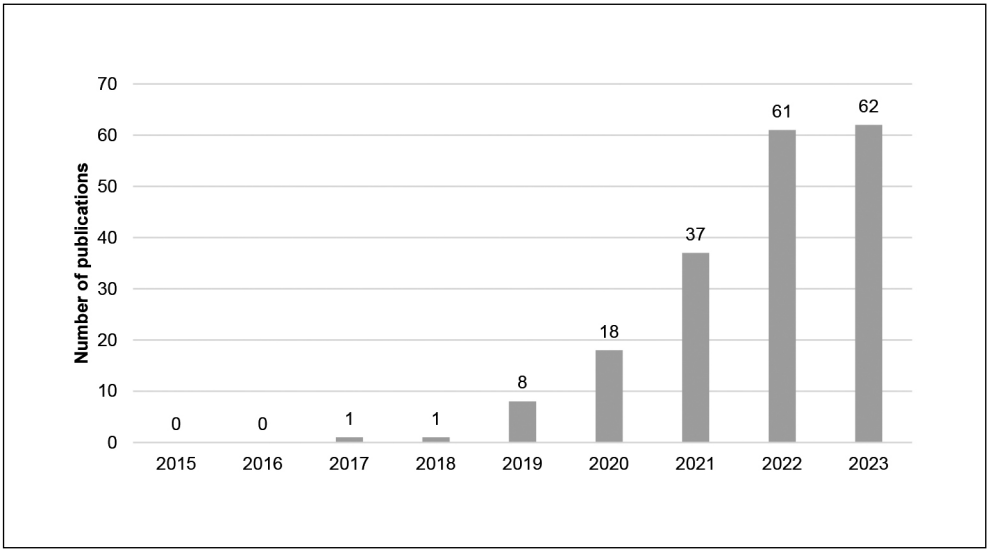

Fig. 2: **Distribution of scientific publications with the keywords "digitalisation" and "procurement" in the Scopus database in 2015–2023**

Source: Scopus database

1. Theoretical background

1.1 Specificity of the purchasing process in the energy sector

In accordance with van Weele (2010), the purchasing process can be defined as the management of an enterprise's external resources in a manner that ensures that the supply of goods, services, production capacity, and knowledge necessary for the operation, maintenance, and management of the enterprise's primary and ancillary is obtained at the most favourable terms (van Weele, 2010).

In the van Weele model, the purchasing management process takes into account the criterion of management levels and is divided into two groups: strategic (tactical) purchasing and operational purchasing. Strategic purchasing encompasses operational strategies and long-term plans. This group encompasses the activities of defining specifications, selecting suppliers, contracting. The role of strategic purchasing is to establish the most favourable circumstances for the execution of operational purchases. Operational purchasing is the activity that ensures the ongoing implementation of the purchasing process, including deliveries. This includes placing an order, monitoring delivery, processing payments, evaluating the implementation, as well as returns management. In this article, we adopt a perspective of the purchasing process that is consistent with that proposed by van Weele (2010).

The purchasing process in energy companies is characterized by a number of distinctive features, which can be attributed to the nature of the business and the specific requirements of the sector. This is primarily attributable to the fact that the energy sector plays a pivotal role in the functioning of the state, society, and economy (Geißler et al., 2021). The energy sector has undergone significant and rapid in recent years. Initially, these changes were driven by the necessity to comply with climate policy requirements. However, now the principal factor influencing change in the sector, including alterations in the energy mix (the structure of energy production according to the criterion of energy carriers), is the necessity to become independent of fossil fuels supplied by Russia in order to guarantee the stabilisation and security of energy supplies (Balsalobre-Lorente et al., 2023).

The energy sector is subject to complex and rigorous regulatory framework governing

the procurement of raw materials, technologies, and services. Therefore, it is incumbent upon energy companies to comply with the relevant safety, quality, and environmental protection regulations and to refrain from engaging in any monopolistic practices (Gołąbeska & Harasimowicz, 2023).

A substantial proportion of transactions within the energy sector entail considerable investment. These contracts are based on long-term agreements that guarantee the continuity and stability of supplies of energy raw material supplies (e.g., gas, coal) or services (e.g., the renovation and modernisation of facilities). Energy companies typically procure substantial quantities of raw materials, equipment, services, and sophisticated technologies, which necessitate sophisticated management processes, particularly in the areas of planning, specialized knowledge, and a comprehensive grasp of technical specifications and industry standards. The energy sector is characterized by a high degree of dependence on commodity prices. Consequently, energy companies must consider the inherent risks associated with the volatility of energy and raw material prices, as well as currency exchange rates, when undertaking purchasing activity. This necessitates the utlilisation of price indexation mechanisms in order to mitigate potential adverse effects.

It is common practice among energy sector entities to seek out new and more efficient technologies and solutions with the aim of guaranteeing the uninterrupted and stable provision of energy. This necessitates the monitoring of trends, the testing of new products, and the collaboration with suppliers of innovative solutions. Furthermore, ensuring the continuity of energy supplies necessitates a focus on the security of raw material supplies and infrastructure. It is thus incumbent upon the purchasing process to take into account the issues pertaining to the various sources of supply and their stabilization. The continuity and stability of energy supplies are contingent upon the minimization of failures within the network. The deployment of new technologies based on artificial intelligence algorithms and advanced forecasting plays an indispensable role in the prediction of failures, thereby enabling a rapid response and the minimization of losses.

In the light of mounting environmental consciousness, energy companies are progressively incorporating environmental and social benchmarks into their supplier selection processes. Consequently, the purchasing process in energy companies necessitates the input of specialists from a range of disciplines to guarantee an effective and sustainable approach to the implementation of the purchasing process. The success of the sector's digital transformation process is contingent upon meticulous preparation and implementation, as these factors directly influence the rate of change.

1.2 Digital transformation of the purchasing process

The majority of researchers concur that digital transformation is accompanied by the advent of a novel business model, shaped by the influence of implemented digital technologies (Śledziewska & Włoch, 2020). It may, therefore, be posited that the advent of digital transformation will result in a shift in the perception of the purchasing process within organizational contexts, whereby it will cease to be regarded as an administrative and clerical function and instead become viewed as a strategic value-generating function (Bienhaus & Haddud, 2018).

In recent years, there has been a growing recognition among organisations of the value of streamlining their purchasing process (Bals et al., 2019; Gottge et al., 2020). These values are most appreciated in the public sector (Kagondu, 2023), the manufacturing sector (Palange et al., 2021), the healthcare sector (Omar et al., 2021) and the financial sector (Edunjobi, 2024). Digitalisation represents is the dominant direction for improving purchasing process (Kulikowska & Wszendybył-Skulska, 2021). The purchasing process digitalisation is associated with enhanced outcomes, particularly at higher levels of maturity within the purchasing function of an organization. The organisation is perceived as a key, strategic one. Consequently, the purchasing process will be regarded as a "profit centre" within the organisation, in contrast to its previous status as a "cost centre" as in the past (Ocicka, 2019). The majority of companies are still in the initial stages of integrating new digitalisation concepts into their procurement process (Bhuiyan et al., 2024).

The tools used to digitize the purchasing process have developed in line with technological advancements, resulting in an increased scope of integration and the degree of automation

within the purchasing process (Glas & Kleemann, 2016). The first tool for the digitalisation of the part of the purchasing process, specifically the stage responsible for planning production material requirements, emerged in the 1960s. The tool was designated by the acronym MRP (material requirements planning). In the subsequent phase of development, the digitalisation tool was also employed to facilitate the planning of fixed asset requirements and, indeed, human resources, leading to the advent of a tool designated MRP II. Subsequently, in the early 1990s, ERP systems were introduced with the objective of providing support for management functions. Integrated ERP systems underwent further evolution, with the development of new system modules and new functionalities being developed. By the early 21st century, enterprise resource planning (ERP) systems had evolved to the point where they could communicate with other information technology (IT) systems, such as a purchasing platform. The principal objective of an ERP system is to facilitate the integration of all departments within an organisation through the utilisation of a unified database. ERP class systems were designed as internal systems, with the primary function of integrating the various functions within the organization. The purchasing process within an ERP system is concerned with the management of orders and expenses. It was not until the advent of ERP II that communication with external partners and integration with their systems became a possibility. The emergence of digital tools for the purchasing process digitalisation, enabling electronic purchasing (e-procurement), was driven by a market need. Consequently, the most recent iterations of ERP systems incorporate embedded digital technologies, including artificial intelligence, machine learning, blockchain, and RPA. In order to address the deficiencies in functionality observed in ERP-class systems, solution have emerged in the form of purchasing platforms. The advent of purchasing platforms has facilitated the electronic organisation of the source of supply electronically (e-sourcing), encompassing electronic negotiations in successive RFX rounds or auctions.

The advent of SMAC/BRAID technologies (social media, mobile technologies, analytics and big data, cloud services/blockchains, robotics, automation of knowledge work, internet of things, digital fabrication) has been identified as a significant development in the field of management (Śledziewska & Włoch, 2020). This has facilitated the accelerated evolution of digital tools for streamlining the purchasing process (Willcocks, 2016). In her analysis of SMAC/BRAID digital technologies, Kulikowska (2023), concluded that the common denominator of these technologies is data and integration, which affects the creation of intelligent process automation (IPA). Tab. 1 illustrates the potential applications of SMAC/BRAID digital technologies in the purchasing process.

Tab. 1: Examples of using SMAC/BRAID technology in the purchasing process – Part 1

Digital technology	Examples of application in the purchasing process
Social media	The utilisation of social media can facilitate the core function of procurement, namely the management of supplier relationships. From the perspective of a source of information about the supplier market and products, social media can be employed to create supplier profiles and to develop a purchasing strategy, i.e., they support the activities of the purchasing management process at the strategic level (Diba et al., 2019).
Mobile technologies	The function role of mobile technologies in the purchasing process is to facilitate the transfer of activities related to acceptance in systems that support the purchasing and procurement process (e.g., ERP system or purchasing platform) or participation in an electronic auction. Such activities can be undertaken in a mobile application, thereby ensuring flexibility and enhanced accessibility, provided that a suitable application is installed. Examples of suitable applications include such as SAP Ariba procurement and oneplace (Dalton et al., 2024).

Tab. 1: Examples of using SMAC/BRAID technology in the purchasing process – Part 2

Digital technology	Examples of application in the purchasing process
Analytics and big data	The application of big data serves to mitigate the potential for uncertainty in the decision-making process. It facilitates the real-time monitoring of the potential risk associated with a specific purchase, including the risk inherent in collaboration with cooperation with a supplier (Umbenhauer et al, 2017; Wyman, 2017). The analysis of both internal and external data obtained through the use of big data technology provides fact-based arguments that are useful in the context of negotiation process. The application of big data analytics facilitates the formulation of effective purchasing strategies by enabling the identification of market trends and potential shifts in the market landscape of prospective suppliers, as well as the prediction of potential risks (Gottge et al., 2020).
Cloud services	The findings of a survey conducted by INDICATOR in 2016 on a sample of 122 organisations corroborate the influence of cloud solutions on the activities of the purchasing process at the operational level. This is evidenced by a reduction in costs associated with by: reducing costs in terms of order fulfilment, complaint handling and returns (Nowicka, 2019).
Blockchain	The potential of utilising blockchain technology in the purchasing process is to automate activities pertaining to contract management through the deployment of "smart contract" functionality. Smart contracts are concluded and executed automatically, without the need for any external control. However, they are trusted by all parties within the blockchain. A smart contract is a sophisticated transaction protocol that provides real-time notification of the occurrence of a condition for the application of pertinent contractual provisions. Examples of such provisions include the application of a discount, the implementation of option rights related to the modification of contract validity periods, and the enforcement of contractual penalties. A prerequisite for the implementation of blockchain technology in the context of smart contracts is the standardisation of the relevant contractual documents. Similarly, activities pertaining to verification and authorisation can be transferred to other documents, such as regulations and procedures. Blockchain technology has the potential to enhance and reinforce the security of identity verification processes, such as those employed in the context of tender submissions or electronic auctions. Other applications of blockchain technology in the purchasing process include: the creation of supply chains (in which the provenance of products or the evolution of production processes can be confirmed), the confirmation of the identity of entities participating in the tendering process and the confirmation of the reliability of data (obtained from disparate sources). Furthermore, blockchain technology can also be utilised in the process of cargo flow and customs clearance. This is due to the fact that it enables the identification of the product's origin, thereby reducing the risk of fraud and counterfeiting (Govindan et al., 2024).
Robotics	The implementation of robotics has the effect of accelerating and streamlining the logistics process of receiving deliveries, which can be considered an activity at the operational level of the purchasing process. Furthermore, the introduction of robotics has the additional benefit of increasing the efficiency of warehouse operations (Jankowska & Łukasiak, 2017).

Tab. 1: Examples of using SMAC/BRAID technology in the purchasing process – Part 3

Digital technology	Examples of application in the purchasing process
Automation of knowledge work	The implementation of RPA technology ensures the high quality processing of data, eliminates the potential for errors due to the influence of the human factor, guarantees an immediate response, and frees employees from performing tedious, repetitive activities. When concentration decreases, the risk of making an error increases, which can result in the poor quality of data in IT systems. As a result, employees are able to dedicate their attention to more complex problems, reducing the time taken to execute orders, and avoiding the necessity to implement new IT tools. Automation occurs within existing systems such as purchasing platforms, ERP systems, thereby enhancing the quality and efficiency of operational processes. Furthermore, it enables the tracking of changes in regulations, for instance, those set out in the Public Procurement Act. In addition, it enables the conducting of audits, such as those pertaining to purchasing, and the verification of the accuracy of data entered into IT systems. RPA technology is responsible for maintaining work continuity and allows staff to be freed up to engage in creative activities. RPA is the most cost-effective and straightforward to implement of the automation technologies. It is applicable to tasks that are time-consuming, routine and information-intensive. It permits the attainment of relatively straightforward productivity gains. RPA technology can be employed in the purchasing process, it can be used to identify purchasing needs, support the purchase-to-pay process (from placing orders to settling invoices and payments), create and process documentation, search for data and information, facilitate internal reporting, perform data analysis, conduct testing, archive data, and detect errors (Martinek-Jaguszewska 2018). Additionally, RPA technology is utilised in the purchasing process to automate the sourcing process, encompassing the creation of an inquiry, supplier qualification, and the management of supplier relationship (Hartley & Sawaya, 2019). The authors Flechsig and Lasch (2021) corroborated the feasibility of utilising RPA technology in the process of monitoring the level of order fulfilment, data management, supervision and reservation of deliveries, KPI reporting, and the updating of e-catalogues. Furthermore, RPA technology can also be utilised used to analyse expenditure and construct a supplier risk map, in addition to providing support for the development of specifications, including technical requirements based on historical data derived from tenders. The deployment of artificial intelligence enables the categorisation of unstructured expenses, costs, contracts, supplier data in real time. Furthermore, the utilisation of machine learning algorithms: forecasting of demand, the prediction of the prices of supplies and services, the prediction of future sources of supply and the acquisition of data from files in PDF format with the support of OCR (optical character recognition) technology (Umbenhauer et al., 2017).
Internet-of-things	The internet of things (IoT) facilitates the automation of shipment tracking and the real-time flow of data and information, thereby enhancing transparency and enabling the prompt identification and response to any anomalies in the process. The internet of things facilitates the exchange of information between business partners (Gottge et al., 2020; Nowicka, 2019), and can also communicate demand, thereby initiating the creation of a supply order. Communication occurs at the machine-to-machine level (Osmonbekov & Johnston, 2018).

Tab. 1: Examples of using SMAC/BRAID technology in the purchasing process – Part 4

Digital technology	Examples of application in the purchasing process
Digital fabrication	The potential of digital fabrication technologies lies in the ability to rapidly prototype, which is an integral part of the process of obtaining sources of supply for production materials – direct materials (Umbenhauer et al., 2017). The effective management of the purchase of spare parts is enabled by digital fabrication (Schrauf & Berttram, 2016), while the positive impact on the management of the company's labour costs has been demonstrated by Lakhman et al. (2023).

Source: own (based on Dalton et al. (2024), Diba et al. (2019), Flechsig and Lasch (2021), Gottge et al. (2020), Govindan et al. (2024), Hartley and Sawaya (2019), Jankowska and Łukasiak (2017), Kulikowska (2023), Lakhman et al. (2023), Martinek-Jaguszewska (2018), Nowicka (2019), Osmonbekov and Johnston (2018), Schrauf and Berttram (2016), Umbenhauer et al. (2017), Wyman (2017))

From the perspective of the analysis of digital technology analysis, it can be concluded that organisations contemplating the utilisation of digital technologies should prioritise the assurance of the quality and security of their critical data and systems. An effective purchasing process will facilitate the implementation of SMAC/BRAID digital technologies, influencing the redesign of the purchasing process and its digital transformation (Bals et al., 2019).

1.3 Mechanisms supporting and inhibiting digital transformation of the purchasing process

The potential for successful digital transformation and effective process digitalisation in an organisation is largely dependent on a number of organisational factors, including the existence of a strategy and vision, the quality of leadership and governance, and the efficacy of management (Światowiec-Szczepańska & Stępień, 2022; THINKTANK, 2023). Many companies lack a clear digital transformation strategy, a solid technology infrastructure, and the full commitment of top management. Additionally, they are discouraged by the high expenditure required to build skills and acquire technology (Dubey et al., 2020; Helo & Hao, 2021). Conversely, organisational factors have a bearing on the other two groups of drivers of digital transformation and process digitalisation, including social factors, which include employees and their competencies (Flechsig & Lasch, 2021) and organisational culture (THINKTANK, 2023). Furthermore, technological factors, which include data, and IT infrastructure (Köppel et al., 2021). In addition, the level of digital adoption (McKinsey, 2018) and the aforementioned factors must be considered.

The application of business process digitalisation tools is not merely a matter of mapping existing processes to their digital equivalents. Rather, it entails a fundamental rethinking of existing processes from perspective of the possibilities offered by digital technologies (Parviainen et al., 2017). The purchasing process digitalisation is contingent upon the present of the requisite conditions, otherwise the endeavour is doomed to failures. Such conditions pertain to implementation barriers, this is to say, they constraints inherent to a given implementation to which an organisation is exposed.

The critical factors identified in the literature that inhibit the digital transformation of business processes, including the purchasing process, can be classified into three dimensions: organisational, social, and technological. The social factor that most impedes digital transformation of organisations is people's resistance to change or their resistance to change per se Flechsig and Lasch (2021) and Światowiec-Szczepańska and Stępień (2022). It is an inherent characteristic of change that it engenders a certain degree of anxiety. The advent of digital transformation gives rise to a certain degree of anxiety among employees, who may be uncertain about their ability to function effectively in this novel environment or possess the requisite competencies (Leonardi & Neeley, 2022). As Rejeb et al. (2018) observe, individuals tend to resist change because they are reluctant to abandon established work routines and to adapt to existing IT systems.

In order for digital transformation to be achieved, it is essential that the fundamental components or the organisation are aligned

and coordinated. The organisational culture, leadership, and the organisation's vision and strategy from a digitalisation perspective will be aligned if they are digitalized. This is corroborated by the evidence that the organizational factors identified by researchers as hindering digital transformation are: a lack of a defined vision and strategy for digitalisation (Flechsig & Lasch, 2021; Światowiec-Szczepańska & Stępień, 2022), a lack of digital organisational culture (Flechsig & Lasch, 2021; Kane et al., 2019) and a lack of digital leadership (Flechsig & Lasch, 2021; Kane et al., 2019; Światowiec-Szczepańska & Stępień, 2022). In addition to the aforementioned organisational barriers to the digital transformation of organisations, researchers have identified a lack of budget or insufficient budget as a financial or economic barrier for organisations (Flechsig & Lasch, 2021; Światowiec-Szczepańska & Stępień, 2022).

From a technological standpoint, the primary impediments to the digitalisation of business processes are the data barrier and the necessity for an adequate IT infrastructure. As algorithms embedded in digital technologies interact with data, ensuring the quality and consistency of that data is of paramount importance for the successful digital transformation of processes (Flechsig & Lasch, 2021). Inadequate data quality increases the probability of erroneous decisions and significant organisational losses (Wieczorkowski & Jurczyk-Bunkowska, 2018). The IT and OT infrastructure of the energy sector is increasingly vulnerable to cyber-attacks, given its status as a critical component of national infrastructure (Nazari & Musilek, 2023). Consequently, ensuring the security of systems, devices, and data has become a top priority for energy companies (Flechsig & Lasch, 2021; Nazari & Musilek, 2023; Wallenburg et al., 2020). Thus, another technological obstacle to digital transformation is the threat of cyber-attacks (Bienhaus & Haddud, 2018). Inadequate preparation of employees for cyber threats can exacerbate their resistance to digital change, resulting in limited confidence in data security. Another technological barrier identified in the literature is the presence of an outdated IT infrastructure that is not compatible with new technologies (Flechsig & Lasch, 2021; Światowiec-Szczepańska & Stępień, 2022).

2. Methodology

The stated research objective, namely to identify the mechanisms that support and hinder the digital transformation of the purchasing process in energy companies in Poland, was achieved through the implementation of a qualitative research approach, based on a case study comprising eleven expert interviews. The appropriateness of the selected research method is substantiated by the fact that the phenomenon under investigation is not yet fully defined and challenging to distinguish from the context in which it manifests (Yin, 2015). This is undoubtedly the digital transformation of the purchasing process in the energy sector (Shumon et al., 2019) and the mechanisms that support and inhibit it. The selection of respondents was purposive, which is consistent with the assumptions underlying the conduct of expert interviews (Stempień & Rostocki, 2013; Yin, 2009). This implies that the interviewee is a subject matter expert with extensive knowledge of the field.

Three criteria were employed in the selection of the research sample from the knowledge and experience category. These included a minimum of eight years of professional experience in purchasing as a manager and a minimum of eight years of professional experience in the Polish energy company and any experience in the implementation of digital initiatives in the purchasing process. Semi-structured face-to-face expert interviews were conducted with 11 purchasing managers from eight Polish energy companies. The decision to cease conducting interviews was informed by the emergence of recurrent categories, a phenomenon known as a category saturation (Suddaby, 2006). The last three interviewees did not present any new categories of implementation barriers. In the majority of cases (i.e., 10) the interviews were conducted online using the MS TEAMS application between January and February 2024. The average duration of an interview was 1 hour and 22 minutes, the average tenure of the research sample in the purchasing area was fifteen years, and the average tenure of the research sample in the energy sector was twenty years. Tab. 2 presents the demographic characteristics of the interviewees and basic interview data.

In order to facilitate the interviews with the targeted managers in an efficient manner, a presentation was prepared and distributed to them at the stage of inviting them to the research. This presentation explained the rationale for the interviews and the meaning

Tab. 2: Interviews with purchasing managers in Polish energy companies

Type of interview	Duration of interview (hod:min)	Number of employees working in purchasing dept.	Position	Experience in purchasing (years)	Experience in energy sector (years)	Experience in digital initiatives implementation (yes/no)
Online	01:19	5/250	Lower level management	12	15	Yes
Online	01:15	6/250	Lower level management	11	17	Yes
Online	00:35	100/250	Senior management	10	15	Yes
Online	01:40	50/250	Lower level management	36	41	Yes
Online	01:51	50/250	Lower level management	20	16	Yes
Online	01:54	17/250	Lower level management	11	15	Yes
Online	00:57	8/250	Lower level management	10	20	Yes
Online	01:19	17/250	Lower level management	8	8	Yes
Writing	01:00	50/250	Senior management	10	31	Yes
Online	01:15	25/150	Senior management	22	23	Yes
Online	01:57	5/250	Senior management	17	23	Yes

Source: own

of the definitions of the terms used in the questions, as well as provided a list of questions that was prepared and sent to them at the stage of inviting them to the research. This allowed the managers to become acquainted with the topics to be discussed during the interviews in advance, thereby facilitating their preparation and ultimately ensuring the interviews were conducted in an efficient manner. The number of participants in the study (i.e., eleven managers) is sufficient for the purposes of exploratory research, as recommended Keränen and Jalkala (2013).

The interview questionnaire, which formed part of a wider study, included questions on the demographic variables of the participants, the digital maturity of the entire organisation, and the degree and vision of digitalisation, automation, and integration of the purchasing process in a Polish energy company. This paper presents an analysis of the interview data on the digital maturity of the surveyed energy companies.

Upon completion of the interviews, the audio files were transcribed. Subsequently, the transcript was subjected to a rigorous examination for accuracy, and any necessary corrections were implemented. A qualitative content analysis was conducted on the individual interviews. This method entails a meticulous reading and interpretation of data in order to identify and delineate themes or segments comprising analogous material. This entails the establishment of expansive and subjective coding categories (Czernek, 2020; Morgan, 1993). The interview material on the digital maturity of energy companies was subjected to two levels of categorization. At the initial level of analysis, the following categories were employed: leadership, digital organisational culture, digital skills, digital change management, data governance/data-driven processes,

digitalisation vision and strategy, and barriers to implementation. At the second level, the following categories were used to identify barriers to implementation: data barrier, lack of digital leadership, excessive bureaucracy and controls, lack of budget, human resistance, the barrier of time and human resources constraints, lack of digital skills, lack of vision for digitalisation, lack of full understanding of the purchasing process on the part of those responsible for implementing the digital initiative, and technical barriers related to security requirements for the energy sector.

3. Results and discussion

A factor analysis of the survey results and coding of the responses identified ten factors inhibiting the digital transformation of the purchasing process in energy companies (Appendix).

The respondents identified the following factors as impeding the digital transformation process of the energy company's purchasing area: human resistance (10 out of 11 responses), lack of budget (7 out of 11 responses), time and human resources barrier (4 out of 11 responses), lack of digital leadership (3 out of 11 responses), data barrier (3 out of 11 responses). Two respondents identified excessive bureaucracy and excessive controls as factors impeding digital transformation. One respondent each identified a lack of digital skills, a lack of vision for digitalisation, and a lack of full understanding of the purchasing process on the part of those responsible for implementing the digital initiative as factors impeding digital transformation. One respondent identified technical barriers related to security requirements for the energy sector as a factor impeding digital transformation. The majority of the factors identified by respondents as impeding the digital transformation process can be classified as organisational in nature. This includes factors such as a lack of budget, time and human resources, a lack of digital leadership, excessive bureaucracy and control, and a lack of vision for digitalisation can be categorized as organisational in nature. In contrast, the factors related to the technological dimension were the least frequently mentioned, namely data barriers and technical barriers linked to security requirements for the energy sector. The resistance and lack of competence exhibited by individuals can be considered social factors (factors with a social dimension). The lack of full understanding of the purchasing process by those responsible for implementing digital solutions represents a factor that straddles the organisational and social dimensions.

The factor most frequently identified by respondents as an obstacle to the implementation of the digitalisation of business processes and the digital transformation of energy companies was found to be people's resistance. The importance of this factor and the high frequency of its occurrence have already been pointed out by previous studies (Flechsig & Lasch, 2021; Rejeb et al., 2018; Światowiec-Szczepańska & Stępień, 2022). The respondents' statements on human resistance to the implementation of the digitalisation of the purchasing process point to various sources of this resistance to change; including lack of a clear vision and strategy, lack of support from superiors, the unfamiliarity with the process on the part of those implementing the transformation processes, as indicated by the respondents' statements below (R – respondent).

"Resistance from the employees involved in the process. People are afraid that it will be to their disadvantage, that they will not be needed, that the system will replace them." (R1)

"There will always be an employee who is "no" and only becomes convinced of a particular digital initiative after implementation." (R2)

"Every time a digital initiative was implemented, there was human resistance at the beginning. People involved in the asked questions: What for, and who needs it? We do not need to use it." (R4)

"Process participants involved in using digital change do not feel a vision for change at the beginning because they do not want change; if something works as it is, it is enough for them because they can navigate it, they are afraid if they can manage it, lack of readiness and willingness to change on the part of people." (R7)

"There is always the question: And why? there is an initial reluctance to change. We do not have a choice; when something is implemented, we accept it for implementation." (R8)

"Lack of vision for digitalisation." (R9)

"When another system is implemented, there is resistance. There is a lack of communication. Why change to an inferior system when there is the prospect of implementing a better system in the near future." (R12)

As evidenced by the respondents' statements presented above, another source of people's resistance to the digital transformation of the purchasing process can be attributed to the lack of clarity surrounding the benefits and limitations of the implemented change (R1, R4, R8). Subsequently, the absence of a digital organisational culture, encompassing a transformation of mindset, was identified as a contributing factor to resistance.

"There will always be an employee who is "no" and only becomes convinced of a particular digital initiative after implementation." (R2)

"There are mainly mental barriers among employees." (R10)

Conversely, the absence of established cybersecurity standards and norms gives rise to concerns about the potential loss of control over the process, as highlighted by respondent 1 (R1) in their statement.

"Resistance is triggered by fear of cyberattacks and negative experiences with digital systems, their functioning or their operational stability (...) and the fear of data loss." (R1)

The reasons for resistance to the digital transformation of the purchasing process in the energy sector, as identified by the respondents may give rise to dysfunctional phenomena within the organisation. If these phenomena persist, they may result in the emergence of organisational pathologies, which could ultimately lead to permanent organisational inefficiency, mismanagement, and waste both in terms of economic resources and potential gains from digitalisation (Młody, 2019).

The primary factor impeding human adaptation to digital transformation is the lack of organisational preparedness for such a transition (Flechsig & Lasch, 2021; Światowiec-Szczepańska & Stępień, 2022; Xu et al., 2021). The assertion is corroborated by the findings of our study. The organisational dimension revealed that respondents identified three key barriers: a lack of budget, a lack of time and a shortage of staff.

"The main barrier is cost. If implementing a digital initiative requires a financial commitment, then there have been situations where implementation has been suspended." (R4)

"More functionality could be implemented for digital initiatives, but funding for this is lacking." (R5)

"A great deal of digital change can still be implemented in the purchasing process; it is only a question of the availability of two resources: time and money." (R7)

"Budget is always a barrier. We limit ourselves to a smaller implementation and are open to further application/system development. Rarely do we back out entirely." (R11)

"There are financial constraints; we cannot afford everything." (R12)

"Preparation, procedure, and training require a time resource in short supply." (R5)

"If time and human resources have to be diverted to other more important tasks, then implementing a digital initiative is not possible; we experienced this recently with the priority of unbundling coal assets." (R11)

"Due to the limited number of FTEs, there is not enough time to implement or train in using new digital tools. The priority is to maintain business continuity." (R12)

The implementation of digital initiatives is associated with the purchase of new IT infrastructure or the development of existing infrastructure, as well as the cost of qualifying specialists or acquiring qualified specialists from the market (Wieczorkowski & Jurczyk-Bunkowska, 2018). In order to invest in digital initiatives it is necessary to plan and secure a specific budget within the material and financial plan.

The respondents indicated that digital transformation is unfeasible or significantly impeded in the energy companies they represent due to the absence of digital leadership. Consequently, the digital organisational culture and essential organisational components and procedures lack coherence and coordination, as evidenced by the following statements of the respondents.

"Lack of management support." (R1)

"The head office purchasing director should promote and support the implementation of digital initiatives. So far, he is holding back." (R2)

"The board will not perform activities in a dedicated IT system. The board office works on paper; specifications are printed, and there is no willingness to digitize in terms of resolutions and orders; hence, there is no translation to other business processes in terms of digitalization. (...) Lack of example from the top in terms of digitalization of the process, if the board office were to procedure activities digitally, it would be easier to implement digitalization in other business processes." (R9)

"It took a very long time to decide on the deployment of cloud tools; the security area

advised against deployments and applied such strictures in this regard that valuations of a solution were unattainable." (R11)

The alignment of organisational culture, leadership, and the organization's vision and strategy in terms of the purchasing process transformation perspective will be achieved when the aforementioned elements are are digital. This is also corroborated by the findings of Kane et al. (2019) and Flechsig and Lasch (2021), which indicate the necessity for a clear vision and strategy for digitalisation, digital culture, and digital leadership as organisational factors that impede the digital transformation of business.

The respondents indicated that the implementation of digital technologies alone does not guarantee the desired outcomes of digitalisation. Consequently, there is minimal emphasis on the expeditious integration digital technologies including cloud computing, machine learning, blockchain, and robotic process automation (RPA), within the energy sector companies. The adoption of digital technologies in isolation does not present a significant obstacle. The respondents identified data barriers as the primary technology-related impediments to business process digitalisation.

"Today, the system is powered by human actions, and unintentional mistakes can happen. An upgrade of the ERP system is planned, where the implementation concept assumes validators and monitors in the system to take care ultimately of the quality of the data recorded so that in the future, we can implement data-driven digital technologies so that there are no data barriers." (R5)

"Lack of attention to hygiene and data quality. What is the use of you will have the best washing machine on the market if you put the worst powder in it." (R9)

The quality and consistency of data are of paramount importance in the digital transformation process, as the algorithms embedded in digital technologies interact with data from a technological perspective. This is corroborated by the findings of the analysis of Flechsig and Lasch (2021). On the other hand, Nazari and Musilek (2023) note that the majority of energy companies contend with the challenge of suboptimal data quality and disparate data sources, which represent a significant technological impediment to the digitalisation of business processes. Inadequate data quality heightens the probability of erroneous decision-making and renders the organisation vulnerable to substantial losses.

The analysis of the data collected during the interviews and based on K. Lewin's theory, has led the authors propose five mechanisms to support the digital transformation of the business processes in energy companies, with the purchasing process serving as an illustrative example. Given that the majority of obstacles to digital transformation in the purchasing process of an energy company are of a socio-organisational nature, it is imperative that energy companies undergo organisational change. In the light of K. Lewin's theory, the objective of organisational change is firstly to eliminate or diminish the inhibiting factors intrinsic to the organisation, and subsequently to reinforce the factors that facilitate a specific change (Błaszczyk, 2005). The proposed mechanisms 1–4 are designed to minimize human resistance and comprise to the implementation of a digital change management process, the implementation of a digital vision and strategy, the development of digital competencies and the introduction of digital leadership. The fifth mechanism, which pertains to the data barrier and concerns the implementation of a data infrastructure management standard.

The first mechanism is the implementation of a digital change management process. The objective of managing the change resulting from the implementation of digital initiatives and, in particular, the implementation of digital transformation, is to eliminate employee resistance to change (Cichosz et al., 2020; Światowiec-Szczepańska & Stępień, 2022) and increase employee engagement in the digital transformation process. The first step is to prepare employees for the forthcoming digital change, which is then followed by the implementation of a digital change management standard. In order to assist with the preparation of employees for the changes that arise from digital transformation, a tool proposed by Leonardi and Neeley (2022) – the employee response matrix for digital transformation (Fig. 3) – can be utilised. The matrix facilitates the identification of the position of employees in the organisational digital transformation process. It is desirable for employees to be situated in the upper right-hand quadrant of the matrix, indicating that they are inspired by the change, believe they can learn new things, acquire new skills and look forward to the transformation.

As posited by the authors of the matrix, the objective of motivating employees to acquire digital competence is to move them out of the zone of feeling overwhelmed or indifferent and into the zone of feeling inspired. This can be achieved by increasing support and acceptance of the forthcoming changes, thereby motivating employees to embrace digital transformation. In order to effectively manage digital change, it is essential to implement key actions. Firstly, it is vital to increase the intensity of messages from senior management that emphasise

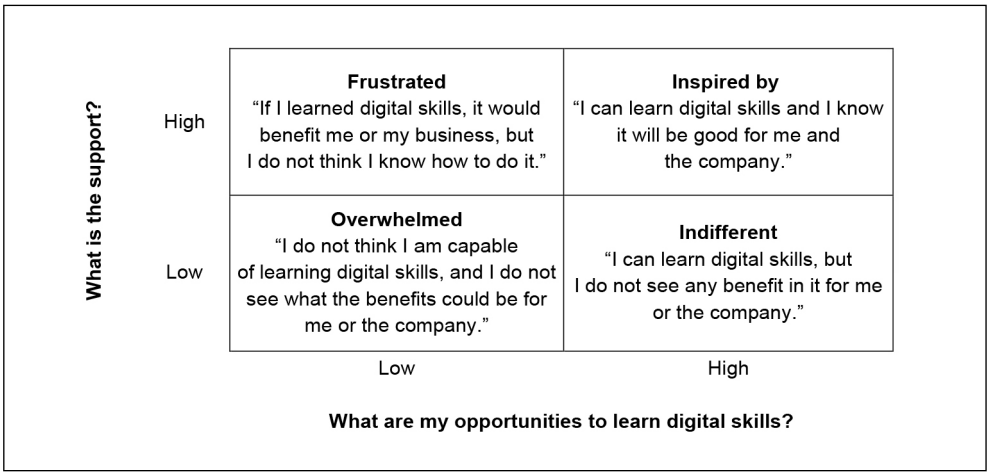

Fig. 3: Employee response matrix to digital transformation

Source: Leonardi and Neeley (2022)

the importance of digital transformation as a new strategic direction. Secondly, an internal marketing campaign should be initiated to create a positive image of the organisation supported by digital technologies. Thirdly, employees must be motivated to see themselves as contributing participants in the digital organisation. In order to effectively manage digital change in an energy company, it is essential to implement a standard based on one of the project management methodologies. Among these, agile methodologies are particularly well-suited to the context of digital transformation.

The second mechanism is the implementation of a digitalisation vision and strategy, i.e., a clear digital transformation plan. A digitalisation strategy outlines the extent of digital transformation, delineating the processes to be automated and integrated, classifying the digital initiatives to be implemented, and establishing the framework and standards for their implementation in a manner that achieves the organisation's strategic goals. It is essential that the digital vision and strategy promote a digital organisational culture that is aligned with the company's overarching vision, mission, and strategy. Organisational culture defines the manner in which a company operates and implements change, and is based on a set of norms, values, and attitudes that are clearly communicated and shared by all stakeholders (Cichosz et al., 2020). A digital organisational culture is defined by a set of values and attitudes that encourage innovation, experimentation, risk-taking, openness to change, customer focus, open communication and information sharing, a focus on agility over control, and an organisational atmosphere that supports ingenuity, creativity and an entrepreneurial approach. A digital organisation should be data-driven, which entails a transformation of the organisational culture to align decision-making processes with data-driven principles and facts, rather than relying on experience and intuition as was the case in the past (Capgemini, 2017; McAfee & Brynjolfsson, 2012).

The third mechanism is the development of digital skills. The term "digital competencies" encompasses a range of skills, including information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), security (including digital comfort and cybersecurity competencies), intellectual property issues, problem solving, and critical thinking (DigComp 2.2, 2022). In practice, however, the digital literacy of employees in all strategic areas of an organisation represents a significant challenge. A case study of companies that have successfully implemented employee training to increase the digital literacy of their workforce identified six effective practices (Leonardi & Neeley, 2022). These are as follows: firstly, setting a training target for the entire organisation; secondly, developing training opportunities that include all positions; thirdly, prioritising a virtual training method so that learning is scalable and universally accessible; fourthly, motivating people to learn through campaigns, nominations, and awards; fifthly, providing digital training to managers so that they understand the offering and motivate employees; and finally supporting projects within the company that introduce digital components that lead to direct applications.

The fourth mechanism is the introduction of digital leadership. The implementation of digital organisational change requires the presence of digital leadership, which, according to Burnes (2004), requires leaders to act in three fundamental ways: firstly, by establishing a vision of digitalisation and involving organisational participants in its realization; secondly, by shaping a digital organisational culture that is conducive to change and continuous performance improvement, and thirdly, by developing new organisational solutions and procedures for change participants to follow in the new digital environment. The promotion and active utilisation of digital solutions by managers can facilitate a positive impact on organisational digital transformation (Rosenberger et al., 2021). This can be achieved through the continuous monitoring of market trends in digital solutions, coupled with a comprehensive understanding of these trends and the capacity to translate technological opportunities into business strategies (Cichosz et al., 2020; Zhang et al., 2022). The information and communication technology (ICT) sector is at the vanguard of digital transformation (OECD, 2024). According to Rueckel et al. (2020), companies that are committed to digital transformation should contemplate modifying their organisational structure by appointing new roles tasked with overseeing digital transformation, such as a chief digital officer (CDO) or a chief information officer (CIO). As emphasized by Wieczorkowski and Jurczyk-Bunkowska (2018), there is a need for appropriate management focused on systemic breakthroughs and minimising the risk of their negative impact.

The fifth mechanism is the implementation of a data infrastructure management standard. The 2023 Data Economy Conference, entitled "Preparing the energy company for processes digitalization," adopted the theme of data as the fuel for energy transformation as its keynote topic. From a societal perspective, digital organisational culture is data-driven; from an organisational perspective, a digital leader should base their decisions based on data and facts rather than experience and intuition. From a technological perspective, the key objective is to identify the most appropriate technological solutions. Firstly, the integration of data and the establishment of a unified database are or significant importance (Köppel et al., 2021; Leyh & Meischner, 2018). The integration of data integration within IT systems will facilitate the exploitation and transformation of data into valuable information, which can then inform business decisions. Secondly, the access to both internal and external data is required, and a standardised process for data collection, storage, and analysis must be established (Bienhaus & Haddud, 2018; Köppel et al., 2021; Wieczorkowski & Jurczyk-Bunkowska, 2018). Thirdly, researchers highlight the significance of data security security (Köppel et al., 2021) and quality in systems (Wieczorkowski & Jurczyk-Bunkowska, 2018). It is imperative to implement robust cybersecurity procedures and solutions to ensure the integrity and accuracy of data stored in IT systems.

Conclusions

The findings of the research, together with their subsequent analysis, enabled the identification of ten factors that are impeding the digital transformation of the purchasing process in energy companies in Poland. Furthermore, the article also puts forth five recommendations for potential mechanisms that could assist

in overcoming identified barriers to the transformation of the purchasing process.

This study highlights the importance of effective digital change management, a comprehensive vision and strategy for business digitalisation, the development of digital skills among employees, and the implementation of robust data infrastructure management practices in the digital transformation of the purchasing process. The implementation of mechanisms that support the digital transformation of business processes is the sole means of unlocking the digital potential of energy companies in Poland. It is currently estimated that energy companies in Poland still require effective digital transformation readiness. As Shaw (2020) asserts, advancement is contingent upon transformation. The implementation of organisational change is a prerequisite for digital progress in energy companies in Poland, progress is only possible with change. Digital progress in energy companies in Poland requires the implementation of organisational change. The key to success in the digital transformation of business processes is the appropriate involvement of employees and management at every stage of the process.

The research findings allow for the proposition that managers or energy companies should be encouraged to pursue a path of transformation in their purchasing processes. This should be done in a considered manner, with due attention paid to the identification of mechanisms that can facilitate the implementation of these changes in a manner that is both evolutionary and effective.

It is not possible to effect positive change in the technological maturity of the energy sector without first identifying and implementing mechanisms that support digital transformation. Moreover, the identification and elimination of impediments to the digital transformation of purchasing processes in the energy sector will facilitate the implementation of mechanisms that support the transition towards modernity.

Limitations. It should be noted that this exploratory study is subject to a number of limitations. The study was conducted on a limited sample of eight Polish energy companies. The surveyed companies are part of large capital groups with a centralized structure, which is consistent with the nature of the energy sector. The purchasing process in the surveyed companies is conducted via IT systems, including a purchasing platform and an ERP system. Process management is also implemented at the organisational level. Therefore, extreme caution should be exercised when attempting to generalize the results of this study to companies operating outside the energy sector. Further research could examine the potential for benchmarking energy companies with entities that have undergone digital transformation, for instance, from the banking sector. It would be beneficial to conduct a comparative analysis of analogous cases of digitalisation of purchasing processes in other countries or sectors in order to enhance the research.

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Appendix

Tab. A1: Barriers to the purchasing digital transformation process in an energy company with the assigned responses of the respondents – Part 1

Type of barrier (second-order code)	Respondent's reply (example of evidence)
Human resistance	"Resistance from management." (R1)
	"Fear-induced resistance to cyber-attack." (R1)
	"Negative experiences with digital systems, their functioning or their stability of operation." (R1)
	"Resistance from the employees involved in the process. People are afraid that it will be to their disadvantage, that they will not be needed, that the system will replace them." (R1)
	"There will always be an employee who is "no" and only becomes convinced of a particular digital initiative after implementation." (R2)
	"I observe resistance among employees who are overloaded with work and lack desire and passion. There are also employees who, due to past experiences of work reorganisation or job demotion, have influenced a reduced willingness to implement initiatives of any kind." (R3)
	"For every implementation of a digital initiative, human resistance was encountered at the beginning. Participants in the process were asking questions: What for, and who needs it, we do not need to use it." (R4)
	"There are people of varying ages, IT sophistication among managers and if the implementation of a digital initiative required adaptation to change, there were times when the person or their area would not benefit from the digital initiative implemented." (R4)
	"Process participants involved in using digital change do not feel a vision for change at the beginning because they do not want change, if something is working as it is, that is enough for them because they can navigate it, they are afraid if they can manage it, there is a lack of readiness and willingness to change on the part of people." (R7)
	"The quality of people's work, the attachment to what is and the lack of verve and willingness to change, the reluctance to change, the attachment to paper." (R9)
	"There are mainly mental barriers among employees." (R10)
	"There is always the question: And why?, there is an initial reluctance to change. We do not have a choice, when something is implemented we accept it for implementation." (R8)
	"Purchasing HQ is a pioneer in digital implementations, however, because it acts as a shared service centre and not as a parent company, this does not have a significant impact on the extent of implementation in the other group companies. For example, digital signatures were implemented in the purchasing CUW earlier, purchasing was at the ready, and other companies in the organisation only used prepared solutions including regulation when there was a pandemic." (R11)
	"When another system is implemented, there is resistance. There is a lack of communication, why to change an inferior system, when there is the prospect of implementing a better system in the near future." (R12)

Tab. A1: Barriers to the purchasing digital transformation process in an energy company with the assigned responses of the respondents – Part 2

Type of barrier (second-order code)	Respondent's reply (example of evidence)
Lack of budget	"Cost is a barrier." (R2) "The main barrier is cost. If the implementation of a digital initiative requires financial commitment, then there have been situations where implementation has been suspended." (R4) "More functionality could be implemented for digital initiatives, but funding for this is lacking." (R5) "A great deal of digital change can still be implemented in the purchasing process, it is only a question of the availability of two resources: time and money." (R7) "Yes, mainly budgetary, mental and the inability of IT services to meet expectations. That is, what we would like to do cannot always be done." (R10) "Budget is always a barrier. As a rule, we limit ourselves to a smaller implementation and are open to further application/system development. Rarely do we back out entirely." (R11) "There are financial constraints, we cannot afford everything." (R12)
Barrier of time and human resources	"Preparation, procedure and training requires a time resource that is in short supply." (R5) "A great deal of digital change can still be implemented in the purchasing process, it is only a question of the availability of two resources: time and money." (R7) "If time and human resources have to be diverted to other more important tasks, then the implementation of a digital initiative is not possible, we experienced this recently with the priority of unbundling coal assets." (R11) "There are limitations in terms of statecraft." (R12) "Due to the limited number of FTEs, there is not enough time to implement or train in the use of new digital tools. The priority is to maintain business continuity." (R12)
Lack of digital leadership	"Lack of management support." (R1) "The director of purchasing from head office should promote and support the implementation of digital initiatives. So far, he is holding back." (R2) "The board will not perform activities in a dedicated IT system. The board office works on paper, specifications are printed, no desire to digitise in terms of resolutions, orders, hence no translation to other business processes in terms of digitisation." (R9) "There is a lack of example from the top in terms of digitising the process, if the management office were to procedure activities digitally then it would be easier to implement digitisation in other business processes." (R9)

Tab. A1: Barriers to the purchasing digital transformation process in an energy company with the assigned responses of the respondents – Part 3

Type of barrier (second-order code)	Respondent's reply (example of evidence)
Data barrier	"There is a concern about data loss." (R1) "Today, the system is powered by human actions and unintentional mistakes can happen. An upgrade of the ERP system is planned, where the implementation concept assumes validators and monitors in the system to take care of the quality of the recorded data ultimately, so that in the future we can implement data-driven digital technologies so that there is no data barrier." (R5) "Lack of attention to hygiene and data quality. What is the use of "You will have the best washing machine on the market if you put the worst powder in it?"." (R9)
Excessive bureaucracy and excessive controls	"Recommendations after an internal control or audit conducted inhibit the implementation of digital initiatives." (R2) "Bureaucracy of board members in other group companies." (R2) "Excessive control and forced entry of additional information in the system relevant only to internal audit." (R2 observed at another group company) "The implementation of a digital initiative can take as long as the approval procedure itself for that digital initiative, there is excessive bureaucracy and "papirology," which demotivates people to come up with further ideas." (R7)
Lack of digital competence	"Due to the lack of digital maturity of employees, electronic signatures are not used everywhere in practice, digital signatures are not worked in a ready-made digital environment, and there are no acceptance paths in the system for managers." (R7)
No vision for digitalisation	"Lack of vision for digitalisation." (R9)
Lack of full understanding of the purchasing process on the part of those responsible for implementing the digital initiative	"Lack of experience in the purchasing process, e.g., related to the reverse procedure in a tender procedure with staff at Head Office, then the digital initiative implemented may be poorly implemented, not anticipating all scenarios, which may result in a longer procedure time." (R2)
Technical barrier related to security requirements for the energy sector	"It took a very long time to decide on the deployment of cloud tools, the security area advised against deployments and applied such strictures in this regard that valuations of a solution were unattainable." (R11)

Source: own