ELIMINATION OF SHADOW DIGITAL TECHNOLOGIES

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Abstract

Digital technologies have affected every industry, and digitalisation has become a strategic priority for business process optimisation. Along with technologies introduced by Industry 4.0, the Covid-19 pandemic has disrupted organisations around the globe. The concept of work from home was introduced, and later the hybrid work model became the new normal. Digitalisation facilitates a foster increase in efficiency and competitiveness of a company, emergence of new business models, and origin of new opportunities for value creation and innovation. The more digital technologies are involved, the higher the associated risks. Even though current and potential advantages of digital transformation are outstanding in process optimisation, only a certain number of companies have realised and developed strategies to gain from the disruptive technologies. Others fail to capitalise upon digital technologies or resist transforming; meanwhile, employees are induced to turn to workaround solutions to support them in their daily processes. Adopting unauthorised devices and software - shadow information technology (IT), such as cloud-based applications, has grown drastically, and companies face increasing information security vulnerabilities. To identify changes and threats brought by the digital transformation of business processes, operations and value chain, the authors propose a conceptual review of disruption by the transformation of the processes. Through a literature review, authors have explored the primary artefacts of the digital transformation and risks related to implementing unauthorised devices and software - shadow IT.

Keywords: *Digital transformation, business process, shadow IT, business model digitalisation*

1. INTRODUCTION

Digitalisation sustainably alters industries and societies; to remain competitive and to address the increasing complexity of customer needs, organisations need systematically exploit the digitalisation potential of their business processes. Digital business transformation enables business processes simplification and optimisation [1] and provides opportunities to improve human resource management and customer communication, thereby increasing a company's competitiveness and efficiency. Automation and optimisation of business processes, productivity and profitability improvements, speeded production, and reduced process errors are consequences of digitalisation [2]. Digital transformation is not about simple integration and applying fit-for-purpose technologies; it is a revolutionary approach to tackling managerial issues such as human resources, business efficiency, and business process redesign [3]. Parvianen et al. [4] have stated a similar idea, that digitalisation is not about turning existing processes into digital versions but rethinking current operations from new perspectives enabled by digital technology. Scholars agree that digitalisation causes disruptive changes in the company's operating environment. Organisations that aim to succeed and adjust to the rapidly changing competitive environment that results from the development of a variety of digital technologies must reveal the potential of digital transformation [5] and rethink their business models and strategies.

Despite emerging practices, research and interest in digital technologies, uncertainty regarding digitalisation may inhibit the development of entrepreneurship and innovation. Due to different barriers, organisations attempting a digital transformation fail to create and unlock potential value from digitalisation [6]. Organisations frequently lack competencies to identify an appropriate starting point for the digital transformation of their organisational structures, strategies, and operations and face difficulties managing the process [7]. Imgrund et al. [8] argue that digital literacy of an organisation implies being aware of the company's digital capabilities, developing a digital agenda, facilitating customer-oriented products and services by obtaining knowledge and resources from all available

information sources, implementing an open-minded culture, which promotes risk-taking, along with having a comprehensive defence strategy. Lack of organisational readiness for change is a classical definition of the underlying causes of digitisation failure over time [9]. According to Capgemini [10], governance, skills, and culture are among the significant challenges preventing organisations from fully capitalising on digital transformation. When companies fail to select suitable digital support tools, employees seek the optional workaround solutions - shadow IT.

Nevertheless, the developing literature that discusses value-creation opportunities exploitation from emerging digital technologies such as IoT, AI, Cloud computing, blockchain and big data provides little support to the understanding of the interfaces between the application of digital technologies and their correlation with the requirements of a particular organisation [11, 12]. Literature fails to provide a defined method for becoming digital [13]. Digital transformation guidelines are often generalised and provide only a theoretical orientation.

In the light of these considerations, the research questions arise - which digital technologies can provide opportunities for optimisation of specific processes of the value chain, what are the conditions for implementing the concrete technology, and what risks are associated with shadow IT? To answer these research questions, the authors aim to set out the comprehensible framework of opportunities and challenges of business process digital transformation. The purpose of the paper is to study the circumstances of business process digital transformation, changes in operations and value chains of organisations, and an understanding of the nature of shadow IT. The following section presents the definitions of the main terms of the paper.

1.1. Industry 4.0: opportunities declared

Every industrial revolution is associated with disruptive changes, which organisations should adjust. A network of people, machines, and information enables continuous value creation. The fourth industrial revolution has brought the opportunity to capitalise on digitalisation, revolutionising how businesses are performed [14]. Business models and processes are becoming increasingly “smart” with the application of Internet of Things (IoT) technologies, intensive data exchange and predictive analytics [15]. Industry 4.0 has presented technologies that connect and integrate physical devices, intelligent machines and human actors, enabling the operations' automation, the transformation of value chains and the modification of business models [16]. Industry 4.0 refers to the complex evolution of the entire management process, production and value creation. It includes technological advances in production equipment (additive manufacturing, automation), innovative connected products (simulation, vertical system integration, cyber security) and the use of the internet of things (IoT) in factories, cloud and mobile computing, artificial intelligence (AI) and augmented reality, data tools and analytics, requiring specific competences of stakeholders at all levels [17].

Industry 4.0 is based on the connectivity of the industrial internet of things, where organisational value chain creation processes, products and services are interconnected and integrated [18] to achieve higher value for customers and employees while adjusting internal and external processes to the emerging needs.

1.2. Digitalisation and digital transformation

Literature does not provide a generally accepted definition of digitalisation; however, some scholars argue that digitalisation as a technology-induced transformation process improves organisational flexibility, agility, and responsiveness by aligning its operations, strategy, business processes, and corporate and IT structures to technological advancements [19]. According to Denner [20], the digitalisation of products and services is a fast-moving, global megatrend that transforms value networks across all industries. Matt et al. describe digitalisation as a pervasive force that involves transformations of key business operations and affects products and processes, as well as organisational structures and management concepts.

There is no commonly agreed definition and set of differences between digitalisation and digital transformation, and scholars continue to use the terms interchangeably without clearly stating what is

understood by specific terms. When analysing literature, the present paper assumed that digitalisation and digital transformation concepts in the studies reviewed mean the same unless stated the opposite.

Henriette et al. [21] define digital transformation as changes in ways of working, roles, and business offerings caused by the adoption of digital technologies in an organisation or the operating environment (including process level, organisation level, business domain level, society level. It affects organisational strategies and challenges existing business models to be reconsidered and disrupted [22]. Existing business models are being optimised and transformed by reconfiguration and extension, but more adjusting competitor devours somes.

Digital transformation allows companies to improve their performance, increase reach and ensure better results using digital innovations [23]. Those bring new actors, structures, practices, values, and beliefs that complement or disrupt existing methods within organisations and industries by affecting all vital organisational processes [24]. A new business model typology based on the smartization of products and services has been introduced. In the world of Industry 4.0 sustainability of business models is being questioned.

Digitalisation impacts operational data collection through sensors with low human intervention, enhancing the efficiency of data sharing among digital units through connected devices [25]. According to Lace et al. [1], a positive correlation exists between digital maturity and a company's sales growth; improvements in digital status provide new distribution channels for sales, leading to positive revenue changes. Correctly chosen and implemented technologies of Industry 4.0 ensure efficient sales and marketing processes.

1.3. Digital innovation

The innovation concept has been popularised and studied by Schumpeter. He described innovations as creative destruction or a process of industrial mutation [26] that continually changes the existing, destroys old and creates new. Innovation is traditionally perceived as a creative disruption, thus presenting a threat to traditional business models, current organisational structures, and well-established business operations [27]. Innovation is the core of transformation, and the concept of digital transformation is closely related to innovation definition. Innovation is understood as a process of a new or substantially improved product, idea, method or business process being implemented or commercialised in the market or organisation, creating a new value for the consumer, competitive advantage in new industries and job positions and forms along with catalysing the economic growth [28]. Digital innovation, in its turn, is understood as implementing the latest digital technologies to existing practices with the aim of optimisation.

A firm's innovation capabilities are its core competency, which can also be magnified or hindered by organisational culture. The ability of an organisation to harness its core capabilities - resources, processes, and culture - positively relates to its ability to realise benefits from digital innovation. [29, 30]

1.4. Business processes

Structured activities aiming to create value for customers and ensure economic benefit are just as innovation interchangeably related to digital transformation. Implementing innovation into business processes to create new value is business process management's main challenge (BPM) challenge. BPM is defined as the "art and science of overseeing how work is performed in an organisation, to ensure consistent outcomes and to take advantage of improvement opportunities" [31]. It constitutes a scope of methods, techniques, and systems to identify, prioritise, analyse, improve, and monitor an organisation's business processes. Benefits of BPM range from increased flexibility, agility, and responsiveness to improvements in innovativeness and customer centricity [32]. Those are similar to the outcomes of digital transformation successful implementation.

Industry 4.0, digital innovation and digital transformation have an impact not only on companies but as well on society (customers). It is crucial to understand how the various digital innovations affect business processes and what kind of challenges and opportunities those exploit. Porter's [33] value chain model represents a set of activities required to create and deliver a particular product or value.

1.5. Shadow information technologies

Shadow IT is the use of information technology systems, devices, software, applications, and services without explicit IT department approval. Since the increasing availability of open-source systems and tools, free of charge cloud-based applications and services, and remote working during and after pandemics, the application of shadow IT has grown exponentially. According to [36], shadow IT increased by 59% just due to Covid-19.

Kapepo et al. [35] have reviewed different definitions of Shadow IT; mainly, those are described as alternative digital tools and systems, accessed by end-users alongside officially supported systems by the organisation [34], as workarounds or feral practices or systems. Workarounds are implemented when employees face challenges dealing with workflow and choose alternative tools.

Reasons for abusing corporate regulations and conscious or unconscious turning to shadow IT include dissatisfaction with established technology support, non-compliance of authorised IT with business purposes, lack of existing system functionalities, attempts of employees to increase their efficiency and selected technology misfits. Employees struggling to do their jobs using authorised services find a better alternative and deploy it themselves to avoid the hassle of a long and frustrating approval process.

Shadow IT provoke threats to organisations, mainly those associated with cybersecurity risks and the following increasing costs. Overall, 54% of IT professionals consider their organisations to be "considerably more at risk of a data breach" due to shadow IT [36]. According to Forbes [37], IBM found that 21% of organisations have experienced a cybersecurity incident due to a non-sanctioned IT resource. Despite that, shadow IT also increases the flexibility of business units [38].

As personal devices such as smartphones, portable USB drivers, or tablets are also considered to shadow IT, it is challenging to calculate associated risk levels due to the impossibility of tracking every device an employee uses. There is no simple way or method to scan organisational assets and extract this data. Organisations shall rethink their digital strategies and follow digitalisation trends to eliminate the habit of using shadow IT among employees and minimise associated security risks. IT departments must support the right information technology for specific purposes; therefore, employees won't endanger sensitive data. Only a few studies have investigated the shadow IT phenomena but still acknowledge this problem in general; those do not specify areas influenced by shadow IT nor examine approaches to address the issue; in the following sections, the authors explore the digital transformation and its aspects in depth, including eliminating shadow IT.

2. MATERIALS AND METHODS

This study, firstly, aimed to define business process digitalisation, its opportunities and challenges. To achieve this goal, the present paper provides an extensive analysis and review of literature on the topic mentioned above in the research domains of business process digital transformation, value chain innovation and digital technologies. The most representative keywords, strict criteria, and classification schemes based on trending studies were used for the literature search. Accordingly, the keywords chosen for the literature search ("digital transformation" OR "digitalisation" AND "business process" OR "value chain") indicate the primary purpose of investigating and analysing the academic literature regarding the extensive topic of the ongoing digital transformation. The selection criteria did not exclude conference papers or editorials due to the topic's novelty and constantly changing pattern. The main criteria for selection were publication year, study aim and focus on the digital transformation of business processes.

In the first stage of the literature analysis, the research questions were defined consistently with the research purpose. Thus, the primary research question that guides the present literature analysis is as follows: How can each value chain process be digitally transformed and what may be the challenges of the action? To answer the main research question, some specifying research objectives were set through the following sub-questions: Which enabling digital transformation technologies are being implemented in businesses? What are the main opportunities those provide? What are the main challenges the technologies create? How may each technology affect the value chain?

The next stage consisted of reading all the selected papers with a twofold objective: ensuring that all the selected publications were consistent with the selection criteria and analysing the patterns within the paper through a coding process. The starting date of the literature search was 2017 since it was found that the focus on digitalisation and digital transformation concept in the literature was higher years 2019 and 2020; in 2020 and 2021, the studies mainly focused on concrete cases. The topic is relatively new and still in constant development, so the older literature could not provide up-to-date information. A data table was designed to collect the information needed, visualise it in the form of dimensions and codes, and highlight similarities and differences among the various research articles. During the review of the selected papers, basic information of the studies was gathered, including main theoretical ideas, aim, methods and significant results. For coding, MC Excel software was used. After coding selected samples and reviewing the developed codes, 38 codes were aggregated into fifteen categories (Table 1). The categories represent the main topic discussed in the papers regarding digital transformation and / or digitalisation. Databases such as Scopus and Web of Science were used; due to the trending topic in scientific research, reviews, and conference papers, authors paid attention to reports from OECD and European Commission. Many results were found to exclusively concern technical aspects of the phenomenon of interest and were related to manufacturing, supply chain, servitisation and business model digital transformation.

Table 1. Underlying categories of main points of research on digital transformation

Categories	Freq	Description
Technology application	50	It reflects an organisation's digital and technological literacy, capability to explore and exploit new technologies, digital maturity, and ability to capitalise on digital transformation.
Digital transformation value	40	Reflects the impact of digital transformation/digitalisation / digital technologies on an organisation's value proposition; Impact on process servitisation.
Business model innovation	39	Reflects organisational capacity and attempts to digital transformation, digital integration of business units, systems and users.
Digitally enabled environment	31	Reflects the external environment affected or disrupted by digital transformation, such as crossing industries, globalisation, market disruption, and changes in demand (due to digitalisation).
Business processes	28	Reflects value chain processes, their disruption and development, such as smart working, smart manufacturing, and smart supply chain.
Digital artefacts	28	Reflects continuously developing sources for new digital units, such as processes, infrastructures, services, and products (enabled by digital technologies).
External collaboration	20	Reflects coopetition, cooperation with shareholders, and support from regulatory and legal issues.
Digitally affected customer experience	19	Reflects strategic initiatives for leveraging digital tools, information and technology for enhanced customer relationships.
Agile operations	18	Reflects strategic initiatives to build flexible, value capturing, customised and performance-driven processes.
Execution of digital strategy	14	Reflects strategic initiatives taken or planned for digital strategy development and implementation.
Financial aspects	11	It reflects an organisation's ability to invest and gain financial benefit from digital transformation.
Organisational structural changes	11	Reflects comprehensive modifications in organisational structures, culture, strategy, collaboration, and operating infrastructure.
Digital leadership	10	Reflects the ability to manage digital transformation and governance that facilitates disruption.
Legacy	10	Reflects all the legacy processes, mindsets, structures, and approaches that are not fit for digital transformation and speed down the change.

Innovation and development	6	Reflects the innovation process enabled by the digital transformation of business.

Table 1 delineates the main scopes of digital transformation and / or digitalisation mentioned in the selected samples and their description. The authors identified fifteen categories of digital transformation affection areas. The categories represent business environment units connected with process digital transformation. This was to understand the areas of digital disruption and elements of digital transformation. The above table summarises the findings from the studies and gives an insight into the areas being affected by digital transformation, digitalisation and digital technologies.

To explore shadow IT, studies found in the Scopus database were studied. Inclusion criteria for article selection were the keywords "Shadow technology" and "Shadow information technology". The selected keywords should appear in the article title or abstract. The search was limited to specific subject areas - "decision science", "social science", "Business, Management and Accounting", and "computer science" only 13 papers satisfied the selection. Due to the minimised number of available articles, it was decided to study professional articles and case studies.

3. RESULTS

Change is the only constant in today's business environment. Mature and emerging digital technologies disrupt the entire supply chain and the interaction and exchange of information therein. Those have created new game fields and unprecedented business opportunities. Integrating the customers' needs and preferences into the development and production processes became the key to success. Quality, fault avoidance, transparency and flexibility across entire process chains are supported by emerging digital technologies. Developing and managing a digital business means realising new business models enabled by digital technologies that disrupt traditional business [5]. An effective digital business model implies that companies understand the effects of digital transformation on the individual, organisational, competitive, and increasingly societal levels. A digital business transformation framework should comprise three dimensions that explain how resources (business model), processes (value chain), and contextual factors lead to the generation of value from digital technology.

Examples of ongoing digital transformation include additive technologies, cloud technologies, IoT, robotics and automated machinery, big data and data analytics, artificial intelligence and machine learning, blockchain, virtual reality and artificial reality, and security enhancement technologies [31]. In the global digital competitive environment, economic units need to make decisions quickly to respond to rapidly changing customer preferences and overtake competitors; that may require a new business strategy, a new business process, or a new value. Digitally mature organisations invest in technologies to expand or build new businesses, not simply to automate existing business processes.

3.1. Benefits from digital transformation

All companies implement software solutions to support their activities, which differs only in the tool choice and digital maturity degree to facilitate interaction, collaboration, and openness. Individual tools provide support for core activities such as process modelling or monitoring. Accordingly, collaborative software comprises social networking functionalities and, thus, goes beyond a pure functional focus. They are equipped with features that facilitate communication among employees; the gamification process could be mentioned, and provide means to generate, share, and discuss personal opinions. Increased productivity, innovation, higher agility across teams, increased employee engagement and collaboration, decrease in operational costs are benefits of applying connected technologies [39]. System integration improves productivity and quality of operations and speeds up information flows. The outcomes of integrated technologies are modernising legacy systems, migrating apps to the cloud, automating business processes, introducing new products and services faster, and improving customer experience.

Digitalisation implies enhancing customer experience by improving the extent of interaction and communication based on digital technologies. Digital transformation means automating tasks and processes.

3.2. Challenges from digital transformation

The challenges an organisation faces when implementing digital transformation are a lack of understanding - of the transformational process, the role of employees, organisational culture, and financial implications [40]. Appear technological challenges – organisations cannot select the right technology, cannot leverage value from digital technologies, and lack access to the technologies. External challenges also appear, such as market disruption, changing demands, lack of policy and skilled personnel. Lack of frameworks and guidelines for the digital transformation process, as well as lack of agility, skills and understanding of technologies, align with lack of clarity and experience result in resistance to change, avoidance of possible opportunities and keeping on the processes that do not correspond with the emerging trends.

3.3. Requirements for digital transformation

Digital transformation does not happen after implementing a single technology but from an architecture built for constant innovation, enabling multiple technologies together repeatedly to create a compelling and consistent customer and employee experience. Creative autonomy is the starting point for business model innovation, process digitalisation and digital compliance [6].

Digital transformation requires radical changes in the organisation's underlying mindset, systems, and tools to innovate parts of or the entire organisation [41]. It represents a significant change in the basic pattern of how organisations create value. Business models and processes must be completely redesigned to achieve the critical benefits disclosed by digital technologies [42]. Digital transformation is not a one-time exercise in a company; it is a continuous adaptation and modernisation to meet the challenges o of the changing business environment. Just like innovations, changes can create new possibilities to do things more effectively or affordably, but they can also be disturbing to a company's current operations, as digitalisation fundamentally changes a company's business opportunities, therefore, playing the leading role in the creative business disruption.

The identified requirements of successful Digital Transformation range from cultural and organisational to strategic and technological aspects [8]. The first condition is developing digital strategy, which clarifies an organization's aims, capabilities and needs. Despite the existing trend that every company and organisation should follow tendencies and consider digital transformation, the first and primary move before acquiring any of the smart technologies is to identify the specific needs of the particular economic unit, company or organisation the needs of customer base, the size of the organisation and the degree of digital disruption should be evaluated before following the trend. Second, it is essential for organizations to be aware of digital innovations and implement an open-minded culture along with digital risk management.

Expertise such as information technology and data-relates skills and competences is crucial to benefit on digital transformation. Organizations should be flexible to respond to the changing market conditions. Organizational flexibility includes adaptability, agility and scalability. Following the digital trends and a consistent implementation of transformational strategy should be aligned with business operations. Organizational capabilities, such as leadership, culture, expertise and governance together with process enablers such as design, performers, infrastructure together with an implementation of digital strategy and awareness, mindset and security may help to adjust on the transformational path.

Companies' digital literacy includes smart acquisition of technologies that intends simulation and projecting of effect produced by digital technology [43] in companies' financial performance and customer experience. According to Kohtamaki et al. [44] information technologies that are easy to bring to practice, produce a direct effect on companies' financial indicators if the deployment costs are low. Technologies, which require higher investments and claim more complexity, require support from different organizational capabilities, therefore causing higher level of implementation difficulty. Smart

servitization is considered a solution to have a significant positive influence on financial performance from digitalisation.

A set of capabilities for digital transformation is required. Resource capability refers to functional competencies that is the ability to perform specific tasks as a result of skills, knowledge and experience. It is not enough to embrace digital innovation such as Big Data and data analytics in appreciation of its potential for competitive advantage, it is requiring exploiting Big Data to generate business value [45]. Process capability refers to ability to build new capabilities other than the human resource such as processes is a part of the firm's bundle of capabilities that generate value. Cultural capability is recognized as an essential and influential factor in analyzing organizations in various contexts, including its importance to establishing competitive and collaborative advantages, and its impact on organizations' long-term performance. Business functions improved by technology adoption are information system architecture, quality assurance, project management, strategic partner management, technology prototyping, information technology programming, business requirements management, enterprise architecture, user experience design, CRM and marketing activities.

3.4. Value chain and digital technologies

Related to the context of digital transformation, internal and external drivers of change define reasons of organizational digital transformation. Those are financial, operational, employees, differentiation, technologies, operating environment, customers, competition, and start-ups. As these are the main elements of value chain creation, they have the bigger impact on organizational development strategies.

Adoption of digital technologies should be accompanied by a redesign of operating processes. The Internet of Things (IoT) is the basis for any digital service offering. Followed by cloud computing and predictive analytics: such digital technologies are the essential tools to enable the

convergence between Industry 4.0 and servitization. By offering digital solutions to the customer and organization is gathering the data generated through customer interactions to create prediction capabilities affecting the processes of the company. Digital technologies can be divided into five macro categories created by nature of the opportunities the technologies provide: additive manufacturing technologies, advanced manufacturing systems (smart, cloud, robotics, IoT, DSC, etc.), ICT (AR, Big Data, Cloud computing, ERP etc.) and digital design tools [7].

To map relationships of value chain processes with digital technologies, as well to show the positive outcomes of those authors have created the conceptual framework (Figure 1.). The framework is based on the Porter's value chain and Frank's et al. [46] presented framework for

digital technologies in manufacturing. Frank et al. has divided technologies into front-end and base technologies. Front-end technologies: Smart Manufacturing, Smart Products, Smart Supply Chain and Smart Working (each of them representing a specific subset of technologies); accordingly base technologies: internet of things, cloud services, big data and analytics (technologies that provide connectivity and intelligence to the front-end technologies).

Industry 4.0 states: products and services are flexibly connected via the internet or other network applications, such as a block chain; digital connectivity enables an automated and self-optimized production of goods and services, including deliveries, without human interventions (self-adapting production systems based on transparency and predictive power); new market models. Figure 1. represents the applicable digital technologies for different activities of value chain, as well the positive outcome of successful implementation and the overview of the main challenges discussed in the literature and publicly available case studies of companies from Mulesoft [39]. It has been concluded that the main sources of value creation are technologies providing automation, individualisation, ambient embeddedness, interaction, and transparency and control.

3.5. Shadow IT

Examples of shadow IT as software are unauthorized collaboration tools such as Slack, Skype, cloud-based systems – Google Docs, Dropbox, or as hardware – personal laptops, tablets, and smartphones. Besides the risks mentioned above, shadow IT can be turned into a benefit – employees use them due to

their user-friendliness, accessibility, and no cost of charge (even though, the software provided by the companies also does not require payments). Not all shadow IT is inherently a threat, but table 2 presents a non-exhaustive list of the most common ones.

Example of Shadow IT	Application of the shadow IT	Associate risk
Cloud applications	File sharing/storage and collaboration	Sensitive data leaks
Personal email	Employees send work documents.	Exposing data to networks that the company's IT department can't monitor
Greynet apps [48]	Instant messaging, web conferences,	Bypassing the approved corporate communication flows via unknown protocols and codes

Table 2. Examples of risks associated with Shadow IT

Aside from security risks, shadow IT provoke waste expenses in case of unknowing purchase of duplicate solutions in different departments of one firm. As it is nearly impossible to eliminate shadow IT, organisations can take action to minimise the risks. Table 3 explains several examples of countermeasures.

Shadow IT countermeasures	Definition
One connected platform	It can reduce duplicated files, old document versions, and unnecessary back-and-forth between employees. It saves time and increases productivity.
Remote monitoring and management and endpoint protection systems	With the hybrid work model, IT departments require real-time visibility into remote and office-based endpoints so they can spot unauthorized software and vulnerabilities.
Data loss prevention tools	To alert the IT team on attempts to cyberattacks, and enable them to take preventive action.
Intrusion prevention system	To monitor network traffic and VPN connections
Support during the digitalisation	To educate employees on digital information technology challenges and opportunities

Table 3. Examples of Shadow IT countermeasures

Apart from countermeasures mentioned above, organizations can also implement network traffic monitoring, firewalls, removal of administrator rights to install software, etc., to better cope with the presence of shadow IT [48]. Educating employees and taking preventative measures to monitor and manage unauthorised applications, cooperation with users and up-to-date digital support can minimize the cybersecurity threat.

Organizations shall make sure all users understand what shadow IT is and the risks it entails by raising cybersecurity awareness and giving them viable options for avoiding it. Shadow IT is a clear sign that organization's current IT tools and processes are not meeting the needs of users.

4. DISCUSSION

The main drivers behind digitalisation are customer demands and changing market environment. As it has been from the beginning of entrepreneurship, the value proposition is mainly influenced by the changes in demand. Among other external drivers of transformation are emerging technologies, globalisation, tightening competition and shortened technology lifecycle; internal triggers are needed for process optimisation – acceleration, automation and smartization.

The problem with digital business transformation relates less to technology and more to managing the organisational challenges created by a technological shift as companies struggle to select the right technology at the right time. Digital transformation arises from a mix of personal and corporate IT environments, and it is the integration of digital technologies and business processes in a digital economy [42].

The present study may contribute to companies looking for a technological upgrade. We proceed with insight into digital technologies' requirements, challenges and opportunities. Most emerging research defines the digital transformation ecosystem without concrete cases. Since there still is a lack of understanding and uncertainty about digital transformation potential, further research requires more empirical evidence of business process digital transformation and a detailed framework of business process digitalisation. It is clear that eliminating shadow IT requires a better understanding of digital capabilities and implementation of a digital strategy.

5. CONCLUSIONS

If a company's collaboration tools for business are outdated and unsupportive of modern ways of work then appears a threat such as a shadow IT. The most effective way to eliminate shadow IT is to provide a solution that is user-friendly and effective.

Shadow IT is a currently misunderstood and relatively unexplored phenomenon. With the digital transformation and remote working tendency, shadow IT has increased among organisations. Cybersecurity threats, data loss or leaks, wasted time, inconsistent business logic, increased expenses etc., are just some of the potential risks that were identified that can have severe impacts on business.

Organisations must rethink their digital transformation strategies and better understand how to cope with emerging digital technologies if they want to stay in line with the ongoing technological evolutions.

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