DIGITALIZATION

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Abstract

Digitalization is a powerful engine for economic growth in the world. In 2018, digitally transformed firms represented 13.5 billion US dollars of global GDP and, towards the end of 2023, they are expected to represent 53.3 billion US dollars, over half of the general nominal GDP (Statista, Nominal GDP driven by digitally transformed and other enterprises worldwide 2018–2023. The main objective of this study is to provide information (highlighting principal research topics and research agendas) from the literature on state-of-the-art digitalization within firms through a Systematic Literature Review (SLR). In all, 119 review articles on the most mature functional areas of the firm are analyzed: management, marketing, and finance and accounting, published in the WOS over the period 2018-April 2022. In this study, key relevant tendencies are identified in the most mature areas of the firm, which are the impact of digital technologies on the analysis of consumer behavior; digitalization and green innovation within organizations; and blockchain technology applied to financial services. The main contributions of this work are as follows: (1) to provide the most complete and up-to-date review of digitalization from a global perspective, summarizing the current state of knowledge within an integrated framework; (2) to reduce the complexity of digitalization by offering structure and clarity; and (3) to offer links between digitalization and established points of view in the literature on management, marketing, finance, and accounting. The novelty of this paper is centered on a joint analysis of digitalization, digital transformation, and digital technologies, taking into account the most mature functional areas of the firm.

Key words: article, methods digitalization, function, management, finance, technology.

Аннотация

Цифровизация является мощным двигателем экономического роста в мире. В 2018 году доля компаний, прошедших цифровую трансформацию, в мировом ВВП составила 13,5 млрд долларов США, а к концу 2023 года ожидается, что они составят 53,3 млрд долларов США, что составляет более половины общего номинального ВВП (Статистика, номинальный ВВП,

обусловленный цифровой трансформацией и другими предприятиями по всему миру в 2018-2023 годах). Основная цель данного исследования - предоставить информацию (с выделением основных исследовательских тем и программ исследований) из литературы о современной цифровизации в компаниях посредством систематического обзора литературы (SLR). Всего проанализировано 119 обзорных статей по наиболее развитым функциональным областям фирмы: менеджменту, маркетингу, финансам и бухгалтерскому учету, опубликованных в WOS за период с 2018 по апрель 2022 года. В этом исследовании определены ключевые актуальные тенденции в наиболее зрелых областях деятельности фирмы, а именно влияние цифровых технологий на анализ поведения потребителей; цифровизация и "зеленые" инновации в организациях; а также технология блокчейн, применяемая к финансовым услугам. Основные результаты этой работы заключаются в следующем: (1) предоставить наиболее полный и актуальный обзор цифровизации с глобальной точки зрения, обобщающий текущее состояние знаний в рамках интегрированной структуры; (2) снизить сложность процесса цифровизации за счет обеспечения структуры и ясности; и (3) предложить связь между цифровизацией и устоявшимися точками зрения в литературе по менеджменту, маркетингу, финансам и бухгалтерскому учету. Новизна данной статьи заключается в совместном анализе цифровизации, цифровой трансформации и цифровых технологий с учетом наиболее зрелых функциональных областей фирмы.

Ключевые слова: статья, методы, цифровизация, функции, менеджмент, финансы, технологии.

Annotatsiya

Raqamlashtirish dunyoda iqtisodiy o'sish uchun kuchli vosita hisoblanadi. 2018 yilda raqamli ravishda o'zgartirilgan firmalar global YaIMning 13,5 milliard AQSh dollarini tashkil etdi va 2023 yil oxiriga kelib ular 53,3 milliard AQSh dollarini tashkil etishi kutilmoqda, bu umumiy nominal YaIMning yarmidan ko'pi (Statista, raqamli o'zgartirilgan va dunyodagi boshqa korxonalar tomonidan boshqariladigan Nominal YAIM 2018-2023. Ushbu tadqiqotning asosiy maqsadi tizimli adabiyotlarni ko'rib chiqish (SLR) orqali firmalar ichida zamonaviy raqamlashtirish bo'yicha adabiyotlardan ma'lumot (asosiy tadqiqot mavzulari va tadqiqot kun tartibini ta'kidlash). Umuman olganda, firmaning eng etuk funktsional yo'nalishlari bo'yicha 119 ta sharh maqolalari tahlil qilinadi: menejment, marketing va moliya va buxgalteriya hisobi, 2018-2022 yil aprel oylarida vosda nashr etilgan. Ushbu tadqiqotda raqamli texnologiyalarning iste'molchilarning xatti-harakatlarini tahlil qilishga ta'siri bo'lgan firmaning eng etuk sohalarida asosiy tegishli tendentsiyalar aniqlanadi; tashkilotlarda raqamlashtirish va yashil innovatsiyalar; va moliyaviy

xizmatlarga qo'llaniladigan blockchain texnologiyasi. Ushbu ishning asosiy hissalari quyidagilardan iborat: (1) raqamlashtirishni global nuqtai nazardan eng to'liq va dolzarb ko'rib chiqishni ta'minlash, bilimlarning hozirgi holatini yaxlit doirada umumlashtirish; (2) tuzilish va ravshanlikni taklif qilish orqali raqamlashtirishning murakkabligini kamaytirish; va (3) menejment, marketing, moliya va buxgalteriya hisobi bo'yicha adabiyotlarda raqamlashtirish va belgilangan nuqtai nazarlar o'rtasidagi aloqalarni taklif qilish. Ushbu maqolaning yangiligi firmaning eng etuk funktsional sohalarini hisobga olgan holda raqamlashtirish, raqamli transformatsiya va raqamli texnologiyalarni birgalikda tahlil qilishga qaratilgan.

Kalit so'zlar: maqola, metodlar, raqamlashtirish, funktsiya, menejment, moliya, texnologiya.

Introduction

Process of digitizing, that is, the conversion of analog data (e.g., images, video, text) into digital format (The Oxford English Dictionary 2019; Gartner 2019a). Also, Brennen and Kreiss (2016) define digitization as the material process of converting individual analog streams of information into digital bits. Digitization is a process of converting information from the normal form into a digital (computerized) format. This format presents data that is represented as bits or bytes. Digitalization of business helps to improve the efficiency of its process, consistency, and quality. Digital technologies have already altered the world in which we live. Globally, we are more connected than ever before. Our personal digital footprint makes available increasing amounts of data about ourselves and the lives of others, all the while raising questions about our privacy, security and identity. Over the past few decades, global industries not only have faced technological changes that have led to opportunities such as greater flexibility, reactivity and product individualization, but also have presented diverse challenges such as rapid technological change, increased complexity and changing customer preferences and legal requirements. This has led to challenging situations in a corporate context: manifold new technological opportunities are perceived, but people are uncertain how to use and implement them simultaneously in terms of product and service offers (Lerch and Gotsch, 2015). The situation in the field of digitalization and business model innovation (BMI) is interesting because the influence of digitalization on the business model (BM) is fuzzy, and the exploitation of technological opportunities – also from a strategic viewpoint – is challenging. Digitization (i.e. the process of converting analogue data into digital data sets) is the framework for digitalization, which is defined as the exploitation of digital opportunities. Digital transformation is then defined as the process that is used to restructure economies, institutions and society on a system level (Brennen and Kreiss, 2016; Unruh and Kiron, 2017). While the latter embraces changes on all societal levels,

digitalization by means of combining different technologies (e.g. cloud technologies, sensors, big data, 3D printing) opens unforeseen possibilities and offers the potential to create radically new products, services and BM (Matzler et al., 2016). These innovations could lead to new forms of cooperation between companies or the modification of relationships with customers and employees.

Types of Digitization

On-Demand Digitization (aka Ad Hoc Digitization): Objects (or parts of objects) are digitized when a stakeholder (e.g. patron, researcher, curator), requests it

Programmatic Digitization (aka Systematic Digitization): Collections are digitized in their entirety, in a planned manner.

Forensic Digitization: an object is digitized before, during, and/or after some event such as a conservation repair/cleaning process, or an external loan.

The practical requirement to provide On Demand Digitization is obvious to anyone who has run a digitization program. Most stakeholders cannot wait for a particular object's turn in a programmatic schedule, especially when the scale of the collection means the programmatic schedule is projected out many years (or even decades). A digitization program must provide for procedures and workflows to provide On Demand Digitization with turnaround time that will sufficiently meet the needs of their stakeholders. The benefits of systematic digitization are obvious, but the scale of this benefit may not be. When it comes to digitizing a Cultural Heritage collection, the whole is often greater than the sum of its parts. By completing an entire collection, the stakeholders are provided a complete deliverable digital collection rather than piecemeal elements of one. Moreover, the pre-planning and efficiency in programmatic digitization can radically reduce the per-object cost of digitization provided high quality hardware and software are used [see Collating By Required Capture Window]. "Before we adopted the BC100 we were capturing around 10 plates per hour. Using the BC100 we now capture around 300 per hour. This allows us to digitize entire books (editors note: this is Programmatic Digitization), rather than just a few plates from each (editors note: this is On Demand Digitization), as we did with our previous slower system. Just as importantly, the BC100 captures a higher level of detail, which is important because our natural history plates have lots of small detail, important to the understanding of the object. With the images from the BC100 the viewer can zoom in to examine details, such as an insect, the coloring of a bird's wings, botanical drawings, or a huge foldout map. Increasing both speed and quality has been a boon to our digitization program and to the users of our digital collections."

Dimensional Division of Digital Capabilities

Research on digital capability originated from related research on information technology capability. The information technology capability of an enterprise is considered to be the capability of enterprises to acquire, transmit, and process

information to make effective decisions. From this perspective, a study outlines that the digital technology and management capabilities of enterprises in the process of developing new digital products can be defined as their digital capabilities. Information technology capabilities can effectively improve the efficiency of information processing and the efficiency of data use, but they can change the connectivity capability of enterprises to help enterprises more widely and easily reach all kinds of resources, markets, and users. Therefore, an increasing number of scholars are beginning to define the connotation of digital competence from the perspective of dynamic competence. A study emphasizes the special dynamic capabilities of an organization, where digital capabilities boost the digital transformation of enterprises through digital perception, digital acquisition, and digital transformation. In addition, from the perspective of resources, some scholars think that digital capability includes the capability not only to apply digital technology but also to integrate the digital resources of enterprises [16]. From a comprehensive review of the existing research, we think that digital capability refers to data as the basic factors of production; on the basis of digital hardware investment and collaborative software support, it further touches on basic business and supporting obligations, systematically redefines enterprise activities, and helps to solve the problem of upstream and downstream business synergy and internal and external stakeholders to achieve a better and more agile response and meet customer demand to achieve disruptive innovation.

Methods

The research study was explorative by nature and used an embedded multiple-case study design (Yin, 2009), whereby each of the two industries chosen constituted one case. The research was conducted at the firm level; the interviewees, representatives of their respective organizations, formed one unit of analysis (Yin, 2009). The choice of this research design was determined by the current knowledge of digitalization BMI, which implies research questions such as those presented above. In the present explorative study, the companies chosen did not constitute a representative sample but served rather to illustrate the connection between digitalization and BMI in two different industries. First, companies in the automotive industry and, second, companies in the media industry were chosen. To increase (internal) consistency and explore potential differences between different contexts, the selection was made for the following reasons: first, the companies in the automotive industry operate in B2B-markets, but the companies in the media industry are mostly active in B2C-market. Second, making a comparison between a (mainly) manufacturing and a service-oriented industry allowed the varying importance of digital technologies in the context of BMs to be contrasted. Third, this is also associated with the historical development of the embeddedness of digitalization in the two industries which form selection criteria. After the first step in the selection process had been taken, the available

information on the relevant companies was collected. In a second step, appropriate respondents were selected, all of whom were either working in the top management level and had a strategic perspective on the topic or were responsible for digitalization and/or BM development in the business. In this context, we used purposive sampling to select our key informants (Flick, 2005; Teddlie and Yu, 2007) according to the interviewee's knowledge and availability (Flick, 2005). Key informants were chosen, not because they were representative for the members of a company in any statistical sense, but because they were knowledgeable about the topic of interest and "able and willing to communicate about it" (Kumar et al., 1993, p. 1634). Once the selection had been completed, the potential interviewees were contacted. Once they had agreed to participate in the study, they received initial information about the study, including a short list of questions which they answered before the interview took place. The final sample consisted of n= 10 companies and n= 12 interviews, of which six were from the automotive industry and six from the media industry. One interview was conducted per company except in the cases of company E and J. In total, 10 out of 12 interviews were conducted personally; the rest were conducted via telephone (compare Table I). An interview guideline for the semi-structured interviews was used to ensure that similar topics were addressed and discussed in all interviews. In ten cases, the interviews were recorded and transcribed afterwards. In two cases, a careful written record was taken. The study was conducted on a broad basis in Austria and Hungary in 2017.

Results

Digitalization has been interpreted by businesses as a means to fulfill customers' needs more effectively (A4), adapt to changes in the sector (A4) and increase their competitive advantage (A6). The need to adapt to changes and developments in a company's environment and achieve increasingly shorter technology cycles represented triggers for digitalization activities in companies (A1, A4). One interview respondent emphasized the strategic challenge of selecting the right technology at the right time (A1). The effects of digitalization were anticipated for a company's value chain (A6, A4) and for the value network (A6). Interview respondent A6 stated that digitalization leads to changed or new products and services. A6 added that digitalization leads to new business relations. Furthermore, respondents also indicated that digitalization influenced the company's internal structures by reinforcing interdisciplinary collaborations (A5).

BM in general

All automotive industry interview respondents perceived the influence of digitalization on the BM. Interestingly, one person (A4) perceived only minor to no influence on their core BM, whereas another interview respondent (A6) saw its influence on all areas from value creation to value proposition and value capture. Interview respondent A4

stated that digital approaches played a major role in all areas of the company. This also included their production facilities (A4). Similarly, interview respondent A2 had seen the influence of digital technologies since the early to mid-1990s.

Conclusion

The process of digitalization requires an entirely different mindset, the high availability of resources for investment and digital transformation purposes, and the different competencies and knowledge that the existing workforce possesses. Such reasons give rise to various training initiatives for the workforce and consumers intending to develop digital competencies that are not only crucial in the context of work and employment but also in the context of the use of services and the organization of professional and private life. So how do we research and study a phenomenon that is so complex and the consequences of which are not yet fully known to society? In order to truly understand what the digitalization process and its related concepts bring about and what changes it causes, we must first understand the conceptual differences in the various meanings of the said process and related concepts (e.g., digital transformation, digital convergence). We need to understand that digitization refers to the process of converting analog data to digital format, digitalization defines the use of digitization as a lever to achieve change in processes, while digital transformation refers to the process of shifting organizations to new ways of working and thinking. The result of these activities is the convergence of different sectors or digital convergence. We further believe that this kind of research and study of digitalization can be carried out based on already established research models. Due to a completely different relationship between digitalization on the one hand, and the spatial and temporal dimension on the other, we cannot expect that the academic community will be able to, with sufficient speed, produce scientific findings, conclusions and pragmatic forecasts that would otherwise be necessary at this time. This is also confirmed by the review of Slovenian literature on the subject, which is rather scarce. Although some articles and publications on this topic can be found, none of them offers an in-depth study of the impacts and consequences of digitalization at the level of society, organizations, and individuals. Scientific knowledge, however, is essential for organizations to help them prepare for the opportunities and challenges of digitalization and to identify trends in digitalization that affect the organizational environment more easily.

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