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International Aspects and Challenges of Digital Transformation¹

Abstract: This paper aims to examine the international context of the digital transformation sweeping through advanced economies worldwide. The authors focus on both the business-to-business (B2B) and consumer-to-business (C2B) aspects of this process. The B2B perspective is linked with the idea of a fourth industrial revolution, a notion that is also referred to as Industry 4.0, while the C2B perspective involves the growing role and popularity of social media. The paper sets out to identify the interdependencies between these two dimensions of the digital transformation. The authors apply a narrative approach to lay out the main issues related to the process in the international context. The study is a balanced analysis of key issues related to the B2B and B2C streams of the digital transformation. It also outlines the major advantages and threats as well as expected implications of Industry 4.0 and social media. The research encountered a number of challenges that chiefly stemmed from the relative novelty of the discussed problems. These included a lack of first-hand data, a dearth of adequate literature references, and data confidentiality, compounded by firms' unwillingness to share information. Nevertheless, the authors managed to identify some internationally embedded peculiarities of Industry 4.0 (B2B perspective) and demonstrated the usefulness of social media in new production and communication processes (C2B perspective).

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Introduction

The ongoing process of digital transformation, which leads to profound changes in business models and ushers in a fourth industrial revolution, reflects the progressive fusion of the virtual and real worlds [Hermann, *et al.*, 2015; Rüßmann *et al.*, 2015]. In this paper, the authors assume that the Industry 4.0 and social media aspects of the digital transformation (B2B and C2B perspectives respectively) reflect the broader problem of “how global networks’ participants, who adopt ICTs in search of increasing profits, reducing costs or both, may at the same time create business ecosystems for innovation.” Through the very use of information and communication technology (ICT), Industry 4.0 and social media promote product and process innovations. The digital transformation is bringing about obvious advancements in manufacturing, its output and procedures. However, in order to fully capture value – i.e. to realise the benefits accruing to higher productivity – improved innovativeness, new more efficient business models and new higher quality products and services are needed, in addition to significant investments in physical and human capital. In this paper, the authors assume that Industry 4.0 and social media very much embody the idea of using ICT for increasing productivity and innovativeness. All the identified threats and risks as well as the expected gains, benefits and improvements pertaining to the B2B and C2B aspects of the digital transformation reflect the general challenges faced in innovation ecosystems in the data-driven era.

The goal of our paper is to identify and evaluate these two aspects of the digital transformation in the international context by diagnosing the main challenges, strengths and limitations that this concept entails. Hüther [2016] highlights four combinations of relations among both individuals and organisations within the digital transformation, namely: B2B – *business-to-business*, B2C – *business-to-consumer*, C2B – *consumer-to business*, and C2C – *consumer-to-consumer* linkages. Our study focuses on two perspectives: B2B and B2C, i.e. Industry 4.0 and social media respectively.

The paper starts by introducing and explaining the fundamentals of the digital transformation. It frames the discussion within the B2B and C2B perspectives of the process linked to the concepts of Industry 4.0 and big data as well as social media. The authors subsequently endeavour to identify the influence of Industry 4.0 on B2B markets, in terms of both strengths and weaknesses, and to draw links between the transformed B2B relations and the C2B perspective while bearing in mind the international dimension of business.

Finally, the paper provides some concluding remarks and highlights limitations, which at the same time suggest possible avenues for future research.

Digital transformation – conceptual and methodological challenges

The process of digital transformation currently sweeping through the world's advanced economies heralds the fourth industrial revolution. Industry 4.0 is hence often considered as a strategy of re-industrialisation [Smit *et al.*, 2016; Schuh *et al.*, 2014; Roblek *et al.*, 2016]. It announces a business transformation that reshapes conventional manufacturing by enabling the fusion of digital technologies with conventional manufacturing [Herman *et al.*, 2015; Manyika *et al.*, 2016, Owerczuk *et al.*, 2016]. The process encompasses a series of rapid transformations implying a quantum leap in production methods thanks to Cyber-Physical Systems (CPS), the Internet of Things, the Internet of Services, and the Smart Factory approach [Hermann *et al.*, 2015]. Rüßmann [*et al.*, 2015] points to nine technology advances that are the backbone of Industry 4.0. These are Big Data and Analytics, Autonomous Robots, Simulation, Horizontal and Vertical System Integration, the Industrial Internet of Things, Cybersecurity, Cloud, Additive Manufacturing 3D, and Augmented Reality. The underpinning technologies of the digital transformation are thus multiple and diversified. They include: advanced application of CPS, networks and other forms of communications that link machines, humans, and systems; simulations enabling modelling and virtualisation as well as big data, cloud computing, and augmented reality [Heng, 2014; Hermann *et al.*, 2015]. The Industrial Internet, or integrated industry, implies agility, changeability, virtualisation and reconfigurability of manufacturing. Considering all these features, Zheng, Wu [2017] highlights the four main characteristics of Industry 4.0, which consists of “vertical networking of smart production systems, horizontal integration via a new generation of global value chain networks, through-engineering across the entire value chain, and acceleration through exponential technologies”. The digital transformation will reshape the industry landscape of Europe and current business models [Brettel *et al.*, 2014]. For the time being, there is a lack of unanimity as to whether this process is evolutionary in nature or whether it is a genuine revolution. Hence, in our opinion, the term “revolutionary evolution” best illustrates the idea behind this transformation and describes its character.

The question arises which conceptual framework should be harnessed for the analysis of this trend. Existing studies point to some useful approaches such as the resource-based view (RBV), competitiveness and competitive advantages, Porter's five forces, global value chains (GVC), new theories of international trade, concepts of global production networks, Akerlof's economics of information [1970], and knowledge management (KM) [Nonaka, Takeuchi, 1995]. Currently, any analysis of the digital transformation and its aspects is hampered by a lack of adequate data. It is necessary to tap into

existing statistics to obtain some substitute for data that should normally be elicited from businesses first hand were it not for their confidentiality policies. To bypass this problem and obtain some valuable empirical facts, the researcher can either rely on surveys with appropriately designed questions or draw on available statistics on the digital economy that can act as proxies.

Internationally, the digital transformation poses many questions as to who in fact is doing the trading: multinational enterprises – their headquarters and globally dispersed affiliates: subsidiaries and branches – or rather national economies and their populations of autonomous SMEs? If indeed there are the “happy few” – a limited number of the most successful companies which contribute heavily to exports, innovativeness and economic growth in a country, then the perspective of individual companies seems to be the most suitable one. The digital transformation is reshaping the scope and character of cooperation and linkages immensely, in fact redrawing the company’s boundaries as the unit of analysis and making it increasingly difficult to define the clear borders among collaborating entities. Social media additionally blur the difference between producers and consumers by allowing customers to actively co-design and co-produce the final goods.

The Industry 4.0 and B2B perspectives of digital transformation – promises and uncertainty

Industry 4.0 is shaking up the current global market structures and reshaping international relations. The instruments of the fourth industrial revolution have triggered modifications and adjustments among global market players, with changes taking place not only among organisations (companies or institutions) but also among individual consumers and producers [Pauleen, Wang, 2017]. Industry 4.0 assumes the functioning of platforms with a centre and a periphery. It can thus imply that the core would benefit over-proportionally. As the winner takes all, it can happen that countries and firms from the centre of the platform would take advantage of their being more competitive and being a supplier of core solutions to the actors in the periphery, thus in a way forcing others to adopt already set standards and to comply with existing norms. Whether this scenario materialises would depend on the strategy adopted by the “core” – if it opts for “*sharing*” knowledge and solutions in the common interest with other partners, assuming that such cooperation reflects a positive sum game and that the benefits can accrue to both sides thanks to network economies/externalities, among other factors. Alternatively, there is a risk of “*appropriation strategy*” implying monopolistic behaviours according to zero-sum principles. In the international economy, Industry 4.0 also means certain complications for business relations due to possible trade restrictions resulting from the fact that these products contain elements of cryptography or are dual-use goods [Aquilante *et al.*, 2016]. This aspect may unintentionally hinder the otherwise free flow of goods and services.

Given the complexity and high uncertainty as well as the promising returns of the fourth industrial revolution, it remains open which would be more beneficial for countries and firms: being the leader or rather, paradoxically, being the follower? Whether it would be more beneficial to enjoy the first-mover position or latecomer status with its specific advantage of backwardness?

Industry 4.0 is identified mainly with large enterprises that have access to the means to carry out advanced projects. Such enterprises have also worked out procedures to obtain and use information assets from the market. They are able to analyse big data and develop new solutions for their customers more effectively than small and medium-sized enterprises (SMEs) [Pauleen, Wang, 2017]. Thus, a large number of SMEs could potentially be a barrier to an effective transformation of business towards Industry 4.0. Many SMEs do not use intelligent tools to identify tangible assets available both outside and inside of the company while mastering the fundamentals of knowledge management (KM) [Erickson, Rothberg, 2014]. Continuous interaction and exchange of information (via RFID, wireless sensor networks, and cloud computing) not only between humans (C2C), but also between humans and machines (C2M) as well as between machines themselves (M2M) influence the establishment of knowledge management 4.0, i.e. KM 4.0 [Roblek *et al.*, 2016]. The first phase of KM emphasises the integration of knowledge. The second phase assumes that it is necessary to produce knowledge in the social environment. In the third phase, knowledge becomes available outside the organisation thanks to Web 2.0, while the IoT influences the development of KM 4.0 in terms of connecting devices (Table 1).

Table 1. Differences between classical and IoT knowledge processes

Classical knowledge processes	Internet 2.0-based knowledge processes	IoT knowledge processes
Knowledge based on data from the intranet, CRM; Data saved in local servers; Local time and personal limited access; Information sharing and discussion via email or intranet	Information accessed and stored via clouds and platforms Content available on any device, any place, any time Online relations between the customer and supplier	Big data directly from “the things” and customers saved in clouds Real time Content available online No limitations for sharing information between people or “things” Collaboration via wireless communications also between “things”

Source: Roblek, Meško & Krapež [2016: 5].

KM 4.0 means new functionalities for customer support systems (CRM), enterprise resource planning (ERP), manufacturing execution systems (MESs), and energy management systems (EMS).

Industry 4.0 would have an impact on the architecture and governance of global value chains (GVC). Certain reconfigurations of GVC could be expected [Alcácer, 2016]. However, it remains unclear whether they would lead to an

increased role for TNCs or would rather promote small suppliers. Nor is it certain if the outcome would be shortened chains and greater dispersion or rather the opposite. Industry 4.0 raises the question of the origins of competitive advantage. For multinational enterprises (MNEs), it may assign more importance to control rather than ownership, whereas in the case of SMEs what would matter might be simply the networks' *insidership*.

From the microeconomic perspective, another aspect worthy of mention is that Industry 4.0 facilitates the transformation of traditional business models, thus translating into a redefinition of each component of the business model separately: the value created for customers, the profit formula, key resources, key processes [Wielki, 2011: 204], and alteration of the business model as a whole. Next to traditional business models, e-business models are emerging. E-business models are the implication of the omnipresence of the Internet in business. There are firms that transfer their operations to the Internet, and there are businesses for which the Internet is a threshold resource without which their existence and value creation for customers are not possible [Szpringer, 2012: 43].

At the macro level, the fourth industrial revolution could lead to multifaceted polarisation. The risk of emergence of an "hourglass society" with the middle class disappearing and in jeopardy is being increasingly stressed. Simultaneously, economic relations between countries and the place they occupy in global production chains would be affected. Most likely those in the middle – neither the cheapest ones nor the leaders – might find themselves in the worst situation. As it seems, the process of "hollowing out" threatens not only the middle class in each nation, but also individual economies depending on their place in global value chains (GVC) and global production networks (GPN).

Industry 4.0 would promote and encourage the development and functioning of agglomerations and big cities. They would be rewarded as they offer urbanisation economies and provide an appropriate infrastructure necessary for the development of intelligent enterprises.

Although the fourth industrial revolution holds out many promises, scholars and practitioners should remain aware of the risks involved and avoid a situation where Industry 4.0 turns out to be just hype – an ill-defined concept triggering exaggerated hopes or even inflated expectations [Briefing European Parliament 2015, R. Davies, Industry 4.0: Digitalisation for Productivity and Growth, EPRS, 2015]. Current scenarios focus on the consequences for labour markets. They stress the problem of a mismatch and unrelated skills, the necessity of upgrading the mix of qualifications, and the problem of precarious digital work. They also highlight the possibility of spying on workers or mass redundancies and put forward the controversial idea of universal (guaranteed) basic income as a solution for future automated labour markets or even the necessity of a new social contract [Briefing European Parliament 2015, R. Davies, Industry 4.0: Digitalisation for Productivity and Growth, EPRS, 2015].

Given the complexity of this “revolutionary evolution”, multiple questions can be posed. The surrounding uncertainty raises doubts, and many aspects remain in the realm of speculations and predictions. Consequently, we can only try to advance some research proposals. Much attention is obviously being paid to the potential benefits and costs of Industry 4.0. How will they play out? What about their distribution? How certain are they? How can we channel them? For the time being, one can rely on estimates, speculation and scenarios that very much depend on model assumptions. Policy makers, practitioners and scholars should tackle all these questions immediately.

Big data, social media and the C2B perspective of digital transformation – implications for societies and firms

The digitisation process characteristic of the fourth industrial revolution reshaped, first, the way of gathering information from the market, and second, the system of communication between market participants, i.e. businesses and consumers [Leefflang *et al.*, 2014; Raine, Wellman, 2012]. The growing numbers of internet users and web tools make it possible to gather more and more valuable information about consumer behaviours, decisions and interests – for instance, what they look for on the web, what they buy, when they make their purchases, what shops they visit, and how they pay. Erevelles, Fukawa and Swayne [2016] underlined that consumers, who are also usually internet users, have become a kind of generator of structured (transactional) and unstructured (behavioural) data for companies. That information is the foundation for big data, which reflects the C2B perspective of the digital transformation. According to a definition proposed by De Mauro, Greco and Grimaldi [2016], big data is “the information asset characterized by such a high volume, velocity and variety to require specific technology and analytical methods for its transformation into value”. That is why big data is often described in terms of the “three V’s”: Volume, Velocity and Variety [Hofacker *et al.*, 2016]. Those information assets are selected, analysed and used by analysts and then by enterprises (and other institutions, e.g. banks) to create their individualised and personalised offerings. Based on information obtained from big data, enterprises more adequately cover the special needs and preferences of individual consumers with tailor-made offerings [Frederick, 2016].

One challenge for firms is to filter out valuable data from a huge set of information that is usually dominated by redundant data. Big data is not secret data but data that is widely available. This calls for new processing tools and analytical skills among managers and employees. According to McKinsey & Company, firms that use modern information management systems are more effective and achieve higher levels of return on equity indicators [Ratnicyn, 2016: 91]. Smart use of big data improves firm performance. Being smart while managing big data calls for a new culture of decision making

in companies – decisions have to be data-driven and not, to a great extent, experience- or intuition-driven [McAfee, Brynjolfsson, 2012: 65].

In a data-driven world, smart firms should be able to recognise and acknowledge that their clients are not just anonymous buyers but individuals with their own personal preferences. Thus, big data makes it possible to personalise whole sets of offerings to customers. Kramer [2014] goes even further and presents a new concept called Human-to-Human (H2H) whereby the human being is in the foreground. Some smart and conscious companies are trying to make changes to this effect. For example, Toshiba has started introducing a *Human Smart Community* instead of its *Toshiba Smart Community* as the underlying concept and basis of its management system. At the centre of the *Human Smart Community* is a technologically advanced community, with the emphasis on the well-being and quality of life. The broad perception of big data aspects characteristic of researchers including Kramer [2014] goes in line with an expansion of areas where big data may be exploited. The social implications of this new trend are reflected in its vital role for the not-for-profit and charitable sector. Government and social institutions can use such data to better target their services. The availability of huge sets of open data creates opportunities for not-for-profit organisations. Thanks to the crowdsourcing of this data, social institutions are better equipped for decision making. However, next to the positive aspects of big data usage, one has to mention the problem of privacy, which can stem from unlimited and public access to data. The social aspect of privacy protection is even more obvious in the context of social media, which are completely changing communication systems in both the business sector and within societies as a whole.

Considering the digitisation process and the development of new technologies, including mobile devices, it should be noted that “the new way” of communication between enterprises and consumers is still evolving. Because of the new functions of internet tools, one-way communication from enterprises to consumers has changed into dialogue. Consumers are able to express their preferences and opinions using new media instruments [Levinson, 2014], including social platforms, blogs, and forums. Those instruments, especially social media services, have changed the way in which the internet is used and how consumers behave [Kaplan, Haenlein, 2010]. Social media encompass a group of applications technically and ideologically based on Web 2.0 that allow users to create and exchange content [Kaplan, Haenlein, 2010]. From the perspective of firms, social media are marketing communication tools that help keep contact with customers, transmit information about current and new products, and contribute to image building [Valos *et al.*, 2016; Floreddu, Cabiddu, 2016]. They are used by entrepreneurs and marketers to post information about products and brands, for example in the form of advertisements [Durkin *et al.*, 2013; Mihaela, 2015].

New media and other internet tools can be used to build the relationship and trust between companies and individuals. This can help improve both internal and external communication in companies [Taiminen, Karjaluoto,

2015; Pauleen, Wang, 2017] and further increase their effectiveness and competitiveness [Shideler, Badasyan, 2012; Barnes *et al.*, 2012].

The new tools brought in by the digital revolution affect companies and producers as well as their customers and clients, i.e. the broader society. This two-way channel has a tremendous impact on both the recipients and senders of information.

B2B and C2B perspectives of digital transformation and the interdependencies between them – discussion

Benefits accruing to the fourth industrial revolution usually encompass a set of modifications, changes and upgrades that vary in kind and scale. Industry 4.0 should enable the development of new smart products, new services, new business models and new efficient processes. The expected improvement in efficiency would be attributed to better allocation of resources due to fast collection and processing of large quantities of data in real time (benefits of big data). It would help balance customisation with mass production. Many companies from different industries (e.g. Coca Cola Company, Adidas, Nike, Nissan, Renault, and Burberry) individualise products and services. On the one hand, this policy gives them a huge advantage from the perspective of individual consumers. On the other hand, it allows companies to be more competitive among individual and original customers who want to obtain (buy) specially adapted, unique products. Big data assets give companies access to information about the needs, preferences and behaviours of their existing or potential customers [Hofacker *et al.*, 2016].

Flexibility allowing customised mass production is a defining feature of the digital transformation. It stimulates innovations by enabling quicker manufacture of new products without costly retooling. As a result, the time from the design of a product to its final delivery is reduced. Customised production helps alleviate resource scarcity and improve energy efficiency, for instance through the operation of so-called “lights-out”, or “dark”, factories [Briefing European Parliament 2015, R. Davies, Industry 4.0: Digitalisation for Productivity and Growth, EPRS, 2015]. New technologies may facilitate urban production and, most importantly, help cushion the consequences of demographic change – shrinking populations and aging societies. On the other hand, Industry 4.0 tools have caused changes in communication among market participants, not always positive or desired. The use of new internet instruments, such as social platforms, internet communicators and applications, consumer forums and company websites, should be considered when one examines relations between business and consumers. The possibilities of those media have changed the direction of communication [Yuksel *et al.*, 2016]. The traditional way of transferring information is one-way: from the company to the audience. But internet tools have enabled the audience to “speak” as well. For example, social media are used as platforms for placing information about the

needs and behaviours of their users. Sometimes consumers are unaware that by posting information, adding comments under the posts of other users, and watching interesting videos or ads, they reveal their interests, values and desires [Yuksel *et al.*, 2016]. A “smart” company can interpret this information very fast and adapt its offering to the individual’s preferences. Such a company uses social media as a communication channel for both gathering and exchanging messages from and to potential customers. Social platforms help develop a dialogue between businesses and consumers. On the one hand, they offer a huge advantage and constitute a strength of internet tool usage, but they also have many weaknesses connected with the way in which negative information is shared about products and companies. It can happen that consumers “evaluate the gap between their expectations and their experience during and after consumption” [Hofacker *et al.*, 2016: 92]. If the result is negative and they are not satisfied with the purchase, they usually share this kind of information using social platforms or other internet tools – such as comments on Facebook or Twitter, videos on YouTube or photos on Instagram – with other potential customers. Such messages can quickly destroy a company’s reputation [Balaji *et al.*, 2016; Grégoire *et al.*, 2014]. Exchanging information among customers via internet tools is called electronic Word of Mouth (eWOM) in the literature, which Hennig-Thurau *et al.* [2004: 39] describe as “any positive or negative statement made by potential, actual, or former customers about a product or company, which is made available to a multitude of people and institutions via the Internet”.

One of the most important challenges is the technical aspect, mainly the quality and availability of an advanced infrastructure capable of handling large quantities of data, in addition to storage facilities, broadband connections, network quality and parameters, the type of connection, speed, symmetry, time lags, and stability. Actors would face the imminent problem of adequate legal standards and law safeguarding the rights and obligations in the digital and interconnected world, specifically personal data protection and intellectual property rights, rules on data storage and copyrights. When it comes to the C2B perspective, the use of big data raises many doubts and threats and sometimes even fears among consumers. They are usually afraid of excessive interference in their lives and activities. Therefore, in order to protect data (as well as consumers as their owners), countries and governments have to set up adequate institutions to protect the rights of consumers and internet users.

The controversial issue of employee supervision and the problem of product liability need to be addressed as well. The disruptive transformation on the labour market requires well-designed solutions in the field of education, along with training and the right mix of skills. The expected complexity of work would mean more flexibility for employers, but also greater instability. In certain segments, job loss and dislocations are inevitable. It remains an open question just to what extent smart immigration strategies or other measures could alleviate the problem of the increasingly uneven distribution of skills. Experts point to the lack of adequate analytical talent and the emer-

gence of not only national, but also within-company, data silos due to missing interactions and collaborations. The digital transformation, by galvanising the dominance of MNEs, could significantly impact the independence of SMEs along global value chains. Besides, the need for more integrating policies addressing various aspects of digitisation worldwide – technological and otherwise – should be highlighted. Greater awareness of the digital transformation among all stakeholders is required and might be achieved by properly designed policies and education. Increased stakeholder awareness could also be facilitated by the establishment of an international “observatory” for the transformation [Briefing European Parliament 2015, R. Davies Industry 4.0: Digitalisation for Productivity and Growth, EPRS, 2015].

Summing up, available research reports point to the existence of significant interlinkages between the two perspectives of the digital transformation covered in our paper. Given the early stage of Industry 4.0 and the crystallisation of social media development and big data analytics, these interdependencies can only be painted as a broad-brushed picture, in part because the tools applied in B2B, i.e. Industry 4.0, such as big data, are simultaneously regarded as the B2C facet of the digital transformation.

Conclusions – implications of findings and limitations

Industry 4.0 and social media herald certain new trends and seem to re-define the critical factors for international business cooperation. As it seems, offshoring is steadily receding, being replaced by reshoring [Halse *et al.*, 2016]. Factors critical for cross-border economic cooperation would be not the cost, but qualified personnel, advanced technology and compatibility of production systems. Hence, one may argue that the similarities would be decisive for companies that want to cooperate in the digital data-driven era. In such an environment, the market leaders would be those whose business model is based on high margins, who have capital, who determine the standards, norms and regulations, and who rely on and effectively harness the wealth of information flowing from consumers.

The digital transformation and its B2B and C2B interfaces will undoubtedly have repercussions for economic relations between countries. For now, one can only speculate about these implications, outlining some scenarios or advancing future research hypotheses – for instance stipulating that competitive advantage will be increasingly determined by the compatibility of the partners and that teaming up with suppliers and customers and even partnering with competitors would provide a *modus vivendi* in the age of analytics.

The observed digital transformation poses the question of the role of the state in an economy. In fact, as many argue, the process of re-industrialisation and the recent renaissance of industrial policies confirm that these developments can be described as a “state-sponsored vision of modern industry”. In Germany, this is conceived as a dual strategy of increasing the competitiveness

of domestic manufacturing and providing modern industrial solutions with a view to becoming a “factory outfitter”, i.e. a provider of critical industrial infrastructure and equipment [Heng, 2014]. Obviously, Germany is not the only country that is launching this kind of industrial policy. In France and Italy, a similar initiative is called *Factory of the Future*, in the UK the term used is “catapult centres” [Briefing European Parliament 2015, R. Davies *Industry 4.0: Digitalisation for Productivity and Growth*, EPRS, 2015]. As the emergence of national data silos could undermine international cooperation, it is crucial to make efforts to ensure a certain measure of standardisation and, perhaps, unification of selected solutions through international agreements. This could help avoid far-reaching incompatibility.

Modern manufacturing systems in a data-driven world must meet enormous requirements and expectations. These systems are expected to be self-optimising, self-controlling self-repairing, efficient, and predictable. This requires advanced algorithms, models, and methods, while also posing huge challenges for various groups of stakeholders. The crucial question is how to compete in the age of analytics and how to capture value in this complex dynamic setting.

The use of new media in communication has created a great deal of knowledge about people’s needs and expectations, which have become more valuable than ever before. In this age of innovation, companies should pay more attention to people’s virtues, because people are the main distinguishing element of companies [Davenport, Kirby, 2016]. People are recognised as communication participants of both B2B and C2B markets. In B2B communication, a customer is a person with whom one should build a relationship to achieve an effect. Meanwhile, on the C2B market, the consumer is no longer an anonymous entity (one of many consumer segments) but has become a partner, an “equal” participant in communication processes. Nowadays, companies not only gather information from consumers (as in the case of big data) and send messages to them (one-way), but they are challenged to lead the conversation with their potential customers. Hence, a major challenge for companies in the era of digitisation is to see people not only as clients or consumers, but also as humans with their emotions and desires.

Digitisation is disrupting the routine patterns of interactions between economic sectors, creating a sense of momentary disorientation on various issues. Building a digital economic order that combines economic efficiency with social security is a matter of fundamental importance. Besides, as some argue, this disruptive technology will spill over into other areas of our life. It will transform the political arena, implying new communication tools and narratives for policy makers. The wealth of fresh data streaming in real time will offer democratically accountable politicians an ingredient necessary for making policy decisions [Porcaro, 2016]. Hence the “production” of policies might be utterly redesigned, with policies becoming sellable commodities purchased by governments in a market of outcomes.

Our study can be seen as a balanced diagnosis of key issues related to the digital transformation and its B2B and B2C dimensions. We also provide a synopsis of the opportunities, threats and expected implications of both Industry 4.0 and social media. Our research was hindered by a range of obstacles, such as a lack of first-hand data, a dearth of adequate literature references, and data confidentiality, compounded by firms' unwillingness to share information. All these obstacles largely resulted from the relative novelty of the discussed problems.

We believe that our paper may have some practical implications as the results allowed us to explore the main opportunities and threats related to the two analysed facets of the digital transformation. Such an analysis is always a prerequisite for proper policy design and for adopting the right strategy. We also see certain social implications of our study. Our insights into labour market challenges and the requirements for workers and enterprises using Internet assets in production and marketing communication processes should not be underestimated in the light of the scale and speed of the digital transformation.

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MIĘDZYNARODOWE ASPEKTY I WYZWANIA CYFROWEJ TRANSFORMACJI

Streszczenie

Rewolucja cyfrowa, która wiąże się z koncepcją Przemysłu 4.0 i ze wzrostem popularności mediów społecznościowych, wywołuje diametralne zmiany w modelach biznesu oraz prowadzi do przenikania się rzeczywistości wirtualnej i realnej. Celem artykułu jest charakterystyka cyfrowej transformacji w kontekście międzynarodowym zarówno z perspektywy B2B, gdzie wyłania się ideologia Przemysłu 4.0, jak i z perspektywy C2B, gdzie ciągle rośnie rola i popularność mediów społecznościowych. W artykule podjęto próbę zidentyfikowania współzależności między czwartą rewolucją przemysłową a upowszechnianiem się mediów społecznościowych. Autorzy odwołali się do narracyjnego podejścia w badaniach w ramach nauk społecznych. Artykuł oparto na danych wtórnych i literaturze przedmiotu, nadając mu charakter eseju. Pokazano kluczowe przewagi, zagrożenia i przewidywane konsekwencje rozwoju Przemysłu 4.0 oraz mediów społecznościowych. Prezentowane rozważania osadzono w kontekście międzynarodowym, eksponując specyfikę czwartej rewolucji przemysłowej oraz użyteczność mediów społecznościowych w nowych procesach produkcji i komunikacji. Ograniczeniami przeprowadzonych badań jest ciągle brak danych pierwotnych i jeszcze ciągle niewielkie rozpoznanie tematu w literaturze przedmiotu.

Słowa kluczowe: cyfrowa transformacja, Przemysł 4.0, Big Data, media społecznościowe

Kody klasyfikacji JEL: F23, O33
