

DIGITIZATION AS A CATALYST FOR BUSINESS MODEL INNOVATION A THREE-STEP APPROACH TO FACILITATING ECONOMIC SUCCESS

Juergen Bleicher

*Professor, Cooperative State University Baden-Wuerttemberg, Villingen-Schwenningen,
Germany.*

e-mail: bleicher@dhbw-vs.de

Henriette Stanley

Cooperative State University Baden-Wuerttemberg, Villingen-Schwenningen, Germany.

e-mail: stanley@dhbw-vs.de

Abstract

Purpose – Incorporating digitization and innovative digital approaches can make or break an organization. Companies need suitable instruments to identify and exploit digital value drivers. Decision makers need management tools that enable them to translate digital value drivers into sustainable economic success. This paper introduces an integrated framework for analysing the strategic potential of digitization in business model development.

Design/methodology/approach – The framework integrates Osterwalder and Pigneur’s Business Model Canvas, Parmar et al.’s five patterns for IT-facilitated value creation, and Kim and Mauborgne’s Blue Ocean Strategy. By applying the framework to three cases, digital innovation drivers and their strategic relevance are highlighted.

Findings – The findings suggest that the three-step approach has the potential to guide decision-making. The research revealed the categories “enabling”, “complementary”, and “functional”, indicating the scope for strategic action.

Research limitations/implications – The limitations lie in the empirical relevance, as the framework is limited to three cases. The revealed categories might encourage future research activities that develop corresponding generic strategies.

Practical implications – The paper offers strong practical recommendations for organizations confronted with digitization challenges. The framework offers a strategic perspective for practitioners by offering an instrument to systematically encourage innovation.

Social implications – Digitization is an important economic factor for job creation, GDP growth, and productivity and has a strong impact on society.

Originality/value – Business model research is of undiminished interest for academics and practitioners. This paper aims to provide a model that can be applied in industry and contribute to model building. The integration of three existing models is a new approach.

Keywords: Business Model, Strategic Management, Digitization, Sustainability, Organizational Learning.

1. INTRODUCTION

An accelerating pace of change and associated market dynamics are affecting organizations worldwide. The challenge is for decision makers to identify relevant changes in good time to transform their organizations accordingly. New business models with the potential to change the competitive landscape of entire industries are constantly emerging. Not surprisingly, the interest in business models is undiminished: seven out of 10 companies are engaging in business model innovation, and up to 98% are modifying their business models to some extent (IBM, 2008). The academic literature reflects this development: the number of articles published on business models has been constantly rising since the 1990s.

The transformation of industries in the digital age forces organizations to rethink their business models (Iansiti & Lakhani, 2014). Digitization is a megatrend in its early days, jeopardizing existing businesses and promising extensive opportunities at the same time. Digitization processes have become

part of every aspect of business with a major impact on business growth and sustainability. A significant challenge of digitization is that it is not restricted to a certain industry or business division but rather affects cross-divisional or cross-departmental functions that impact the business as a whole. In order to avoid shrinking profitability and to make effective decisions, companies need to understand the significance and scale of changes caused by digitization. Business models need to be adapted in order to integrate these rapidly developing digital processes and to translate them into value and economic success.

This paper provides an overview of the major effects digitization has on the future of industries. The integrated framework addresses the strategic potential of digitization as an innovation driver for business models. The approach is based on Osterwalder and Pigneur's (2010) Business Model Canvas describing current models and Parmar et al.'s (2014) five patterns for IT-facilitated value creation, which identifies existing and potential digital value drivers. In a final step, Kim and Mauborgne's (2005) Blue Ocean Strategy for creating uncontested market space is applied in order to strategically exploit digitization according to the "Eliminate – Reduce – Raise – Create" grid.

2. ECONOMIC GROWTH THROUGH DIGITIZATION

2.1 DIGITIZATION

At a basic level, digitization describes the process of converting data from an analogue to a digital format. "Digitization encapsulates the social transformation triggered by the mass adoption of digital technologies that generate, process and transfer information" (Katz & Koutroumpis, 2013, p. 314). Digital content drives the techno-economic and socio-institutional environment. Digitization builds upon broadband network access, appropriate technology in the form of devices (e.g. laptops, tablet computers), software and operating systems and their respective uses. (ibid) In the last decade, information & communication technologies (ICTs) have experienced revolutionary technological progress, infrastructure development, and considerable growth in accessibility and connectivity. In 2015, 3.2 billion people worldwide were connected to the Internet (compared to 400 million users in 2000), 2 billion from developing countries. Globally, 46% of households have Internet access. This corresponds to 34% of households in developing countries and more than 80% in developed countries. In 2015, more than 7 billion mobile cellular subscriptions were active. Mobile broadband penetration has increased 12 times since 2007. 3G mobile-broadband coverage is expanding rapidly, with 69% of population coverage worldwide (International Telecommunication Union, 2015).

A large body of theoretical and empirical literature has investigated the role and impact of ICTs on economies, societies, productivity, and welfare. In their Digital Economy Outlook 2015, the Organisation for Economic Cooperation and Development (OECD) observes that ICTs are transforming social interactions and personal relationships and that the full potential of the digital economy has yet to be realised. The growth potential has not been reached and the key innovative role played by the ICT sector has just started to increase. Governments are aware of the strategic need to strengthen the digital economy in order to reduce unemployment, poverty, and inequalities. State-of-the-art and accessible digital infrastructure is necessary for the creation of new business models. Issues such as security, privacy, consumer rights, and social risk management need to be an integral part of decision makers' strategies. The disruptive effects of digitization need to be critically analysed. The transition of workers into new digital jobs has to be facilitated (OECD, 2015, p. 11 et seq.).

Growth resulting from digitization has been the focus of research as early as the 1990s. In their paper *The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?*, Oliner and Sichel (2000) conclude that ICT is the key factor behind improved labour productivity growth in the US economy throughout the 1990s, "after nearly a quarter century of sluggish gains" (ibid, p.4). Based on their index for measuring the economic impact of digitization, Katz and Koutroumpis argue that digitization has a significant positive effect on economic output and makes a larger contribution to GDP than stand-alone technologies (2013). They also illustrate the positive impact of digitization on employment creation, and find a correlation with life satisfaction and well-being. According to Katz et al., European countries are at an advanced level of digitization, second only to North America. Evangelista et al. (2014) essentially agree. They conclude that the usage dimension of digitization is relevant for labour productivity and the employment rate of the elderly. Digital empowerment is conducive to GDP growth, employment growth, the employment rate of women, and the reduction of long-term unemployment. Their empirical analysis also suggests that digitization has a major impact

on labour productivity, employment, and the overall economy. Fraunhofer ISI estimates that the economic benefit of digitization and networking in fields such as energy, healthcare, transport, education, and government is currently at a yearly level of 56 billion euros (BITKOM, Fraunhofer ISI, 2012). The literature confirms that digitization is having a positive impact on the economy (e.g. Bloom et al., 2012; van Reenen et al., 2010; Guerrieri et al., 2011).

As today's digital economy encompasses all sectors and industries, the success and sustainability of organizations depend on their capability to compete in a new economic environment. ICT use may differ greatly on an industry or organizational level and also depends on the organization's size and other characteristics.

2.2 IMPACT OF DIGITIZATION ON INDUSTRY GROWTH

The function of digitization as a driver of economic growth and connected factors has already been established. At the organizational level, a large majority uses ICT, although the use of more sophisticated ICT applications, e.g. to manage information flow, is less widespread. According to the OECD (2015), 95% of enterprises in OECD countries had a broadband connection and more than 76% had a website in 2014. Numbers fluctuate significantly from country to country – web presence ranges from over 90% in Switzerland to just over 40% in Portugal. Web exposure is lower among small firms. 21% of firms with 10 to 249 employees are active in e-commerce; organizations with 250 or more employees have a 40% participation rate in e-commerce. Turnover rates from e-commerce sales are higher in larger firms.

Rifkin cites factors such as the use of renewable energy and internet technologies as indicators for a third industrial revolution, fuelled by ICT (2011). Kagermann (2015) defines this third industrial revolution as an IT-based period that has its origins in the mid-1970s and is characterized by increasingly automated manufacturing processes and cyber-physical control systems gradually replacing traditional computer-controlled manufacturing.

Industry 4.0, a term describing the current upheavals within the production and manufacturing industries, focuses on intelligent production processes in complex environments enabling communication between humans, machines, and products through self-controlled or cyber-physical controlled interfaces. This digitization of the physical world can also be described as the Internet of Things (Vyatkin et al., 2007; Einsiedler, 2013), which refers to the interconnection of physical objects that can also be equipped with ubiquitous intelligence. Through this ubiquity of the Internet, networks of devices become highly distributed and allow inter-communication in all directions (Feng, et al, 2012). The Internet of Things has an enduring effect on business models due to the fundamental properties of digitally transmitted signals without errors, indefinite replicas without degradation, and zero marginal costs after a one-time investment in network infrastructure. The properties improve the scalability of an organization as well as connectivity (Iansiti & Lakhani, 2014). The Internet of Things offers opportunities for new business models and has the potential to change business processes significantly. Physical objects can now be monitored or managed electronically and data can be used to improve decision-making. Digitally enhanced machines and devices impact the efficiency of the industry's value chain significantly.

According to Barua et al. (2004), ICT and the Internet have enabled organizations to improve customer and supplier interactions and processes. Net-enabled business transformation (NBT), as defined by Straub and Watson (2001), allows organizations to optimize communication and information flow, reduce inventory, enhance satisfaction for all involved parties, understand preferences, and increase turnover, resulting in potential financial benefits.

Whilst triggering innovation and transforming industries of all sectors, digitization has the potential to impact industry growth substantially. Traditional business models will be subject to increased pressure and competition. Strategic innovation has become an imperative for most organizations. Muradli and Volkova (2015) highlight leadership activities, the HRM team, and professional associations as critical success factors for implementing strategic innovation. Adopting changes and fostering strategic innovation might be easier at start-up companies, where crucial disruptive forces can emerge incidentally rather than by design while established enterprises struggle to change their familiar ways of doing business. The powers of digitization can pose serious threats to existing organizations. Understanding the strategic potential of digitization and fostering strategic innovation are decisive factors in establishing sustainable business models.

3. FRAMEWORK: THE STRATEGIC POTENTIAL OF DIGITIZATION IN BUSINESS MODEL DEVELOPMENT

Disruptive forces do not stem exclusively from technology. The management challenge is to recognize how technology changes the business logic of entire industries and to learn how to translate associated challenges into innovative business models. The accelerating pace of change makes it increasingly important for an organization to be able to develop innovative business models (Bereznoi, 2014). According to research by Bertolini, Duncon and Waldeck (2015) more than 80% of executives are aware of the pressure to transform their organizations, though a third have little confidence in the capabilities of their respective organizations to cope with severe challenges (Bertolini, Duncon, & Waldeck, 2015).

Integrated business model management is a strategic imperative for those who take the responsibility for sustainable success. To understand the strategic relevance of digitization as an innovation driver in business model development and as a key success factor facilitating sustainable economic success, a three-step approach is deployed. The first step addresses the need to understand the current business. The Business Model Canvas by Osterwalder and Pigneur analyses the business logic and illustrates crucial interrelationships within an organization. The next step serves to identify digital innovation drivers based on Parmar et al.'s five patterns for IT-facilitated value creation. To comply with sustainability requirements, elements of Kim and Mauborgne's Blue Ocean Strategy are employed to utilize the strategic potential of digitization.

Understanding the existing business model

To describe and understand the current business model, Osterwalder & Pigneur (2010) use nine basic building blocks that illustrate an organization's value chain. The model covers "four main areas of a business: customers, offer, infrastructure, and financial viability". As business model innovation is a crucial factor, the tool helps to develop, visualize, validate, and concretize new ideas. The Canvas can be applied in all industries by integrating all aspects and functions of a business model. In order to analyse a model's existing and potential digital value drivers, Parmar et al.'s five patterns of innovation are applied.

Identify existing and potential digital value drivers

The digital revolution has gained significant attention, although it is still in its early days. The disruptive force experienced so far is very likely modest compared to the transformation we will be exposed to in the future. In order to systematically exploit value drivers caused by digitization and benefit from disruptive forces, Parmar et al. suggest five patterns of innovation. The first pattern describes the *augmentation of products*, i.e. the use of data generated by physical objects to improve the business model. *Digitizing assets* describes assets that are wholly or essentially digital or can be turned into digital assets. The third pattern is aimed at *combining data within and across industries*. This pattern is the first one to enter the area of "big data" and highlights how to use and integrate data held by other parties. *Trading data* stands for the sale or exchange of data in order to yield higher-value information. The fifth pattern – *codifying a capability* – enables an organization that possesses a distinctive capability to sell a "best-in-class", often standardized, process to other parties (Parmar, et al., 2014). The five patterns deepen an understanding and structuring of digital value drivers and help to identify new business opportunities.

Utilizing the strategic relevance of digitization

As digital innovations can change entire industries with few resources, new business is expected to emerge on a large scale (Hoffmeister & von Borcke, 2015), providing great opportunities for entrepreneurs to create new market space. Kim and Mauborgne's Blue Ocean Strategy is an instrument complementing the three-step approach in the quest for sustainability. The notion of a strategy enabling leaders to sustain organizational success by creating uncontested market space has gained considerable attention. The authors recommend not wasting scarce resources in overcrowded industries. They suggest making existing competition irrelevant by following a structured path in creating entirely new industries. The cornerstone of the strategic logic is value innovation aimed at improving the cost structure and the value proposition at the same time. The "four action framework" provides guidance in challenging the existing strategic logic and in creating a new value curve. Applying the "Eliminate-Reduce-Raise-Create Grid" (ERRC-Grid) saves companies from over-engineering and reduces costs as differentiation and cost leadership are pursued at the same time. The straightforward concept has a strong practical implication (Kim & Mauborgne, 2005a).

Combining the Business Model Canvas with Parmar et al.'s five patterns for IT-facilitated value creation and the Blue Ocean Strategy promises to translate a challenging strategy into a realistic implementation concept. The three-step approach points out weak strategy execution. Kaplan and Norton (2005) identified an implementation failure rate of up to 90 percent. The suggested framework enables managers to align an organization in accordance with strategic goals. Decision makers can grasp potential business and crucial interrelationships. A common business understanding is the basis for meaningful implementation and commitment among key players.

The application of the suggested framework to real-life business cases is exemplified in the following.

4. CASES: DIGITIZATION AS AN INNOVATION DRIVER FOR BUSINESS MODELS

Case 1: MyMuesli

MyMuesli was established in 2007 in Germany. In their online store, the organization sells organic muesli mixes that can be customized and individually mixed from 80 different ingredients, making for up to 566 trillion possible variations. Winning the "Startup of the Year" award in 2013, the organization now employs over 300 people across Europe. Additionally, MyMuesli sells their products in 40 brick-and-mortar stores in Germany, Austria and Switzerland, reporting profits exceeding several million euros per annum.

The application of the three-step model to MyMuesli is illustrated in Table 1. The business model shows little potential for augmenting the product (Parmar et al., pattern 1). Customer data can be collected in order to improve the organization's marketing (e.g. based on geographic preferences) or to expand the product range. The product itself as an asset cannot be digitized. The business model does not lend itself to combining data; straightforward customer data cannot be considered 'big data' and other companies do not hold data of relevance for MyMuesli. Trading data is therefore not part of the model. The straightforward business processes do not represent an outstanding capability or potential value. This case illustrates where business potential based on digitization is limited. The strategic relevance justifying further exploration does not exist.

Table 1

Overview of the integrated framework to exploit digitization strategically for MyMuesli

	Step 1: Understanding the existing business model	Step 2: Identifying existing and potential digital value drivers	Step 3: Exploiting digitization strategically ("ERRC Grid")
Customer Segments	<ul style="list-style-type: none"> • niche market a) health conscious b) special nutritional needs 		Limited potential to exploit digitization strategically → no basis for further strategic analysis
Customer Relationships	<ul style="list-style-type: none"> • customized automated self-service • personal assistance 	<ul style="list-style-type: none"> • customized automated self-service 	
Channels	<ul style="list-style-type: none"> • online shop • 40 brick-and-mortar-stores 	<ul style="list-style-type: none"> • online shop 	
Value Propositions	<ul style="list-style-type: none"> • muesli: individualized, customized, organic 		
Revenue Streams	<ul style="list-style-type: none"> • asset sale a) muesli sale b) merchandise c) gift cards 		
Key Activities	<ul style="list-style-type: none"> • mixing customized orders 	<ul style="list-style-type: none"> • mixing customized orders 	
Key Resources	<ul style="list-style-type: none"> • ingredients • brand name 		
Key Partners	<ul style="list-style-type: none"> • suppliers 		
Cost Structure	<ul style="list-style-type: none"> • value driven 		

Case 2: Rolls Royce

Rolls Royce is one of the largest manufacturers of aircraft engines. The organization has been forced to innovate its existing business model. Disruptive developments such as allowing third-party manufacturers to access the highly profitable aftermarket business and growing customer expectations regarding service, the reduction of financial risks, and the predictability of service costs have challenged the organization. Rolls Royce responded by establishing the TotalCare business model. Digitization was a crucial factor. Onboard sensors allow them to measure and monitor equipment while customers are using it. Rolls Royce still manufactures jet engines and offers services, but the way customers access the products and pay for them has changed. TotalCare allows airlines to pay for use of the equipment by the hour. Offers include the provision and monitoring of equipment, or repair and maintenance. TotalCare enables Rolls Royce to secure the highly profitable service business and at the same time gain valuable information to improve product design.

The framework (see Table 2) illustrates that Rolls Royce has strengthened the organization's competitiveness. Applying Parmar et al.'s five patterns indicates a high potential for "Augmenting the Product". Data from onboard sensors enable Rolls Royce to operate engines in use in the field through Engine Health Management (EHM). Additionally, information can be exploited to strengthen R&D capabilities and to improve the efficiency of manufacturing. Regarding "Digitizing Assets", there could be the potential to digitize service activities, e.g. in-flight engine management for optimized fuel consumption. Collected or purchased data promise value creation potential through improving flight efficiency or material testing ("Combining Data"). "Codifying a Distinctive Service Capability" cannot be considered a relevant pattern in this case.

Employing the "Eliminate-Reduce-Raise-Create Grid" (ERRC-Grid) suggests that significant cost savings are realistic. Onboard sensors constantly collect data in real time. Data is a catalyst that improves the efficiency and effectiveness of customer service and R&D activities significantly. The value chain of the asset-intensive organization offers considerable potential for optimization. New business opportunities in the fields of flight efficiency or material testing emerge.

Table 2

Overview of the integrated framework to exploit digitization strategically for Rolls Royce

	Step 1: Understanding the existing business model	Step 2: Identifying existing and potential digital value drivers	Step3: Exploiting digitization strategically ("ERRC Grid")
Customer Segments	<ul style="list-style-type: none"> airlines 		
Customer Relationships	<ul style="list-style-type: none"> long-term individual customer relationships 		
Channels	<ul style="list-style-type: none"> sales force 		
Value Propositions	<ul style="list-style-type: none"> aircraft engines TotalCare™ service 	<ul style="list-style-type: none"> aircraft engines TotalCare™ service flight efficiency material testing 	<ul style="list-style-type: none"> aircraft engines TotalCare™ service flight efficiency material testing
Revenue Streams	<ul style="list-style-type: none"> Power by the Hour usage fee 		
Key Activities	<ul style="list-style-type: none"> R&D manufacturing service 	<ul style="list-style-type: none"> R&D manufacturing service 	<ul style="list-style-type: none"> R&D manufacturing service
Key Resources	<ul style="list-style-type: none"> manufacturing & service facilities patents performance data 	<ul style="list-style-type: none"> manufacturing & service facilities performance data 	<ul style="list-style-type: none"> manufacturing & service facilities performance data
Key Partners			
Cost Structure	<ul style="list-style-type: none"> value driven (R&D, service) 		

Case 3: PatientsLikeMe

PatientsLikeMe is an internet-based, quantitative research platform for patients with serious or life-threatening diseases. The platform facilitates the exchange of experiences regarding treatment methods, diagnostics, and medication for affected patients or caretakers. Aggregating the data can help to influence courses of diseases positively and to answer the question “Given my status, what is the best outcome I can hope to achieve, and how do I get there?” (Wicks, et al., 2010).

The organization was founded in 2004 by three MIT engineers: brothers Benjamin and James Heywood and their friend Jeff Cole. They were inspired by a case of illness in their family to create a platform to establish a tool for improving the management of certain diseases by focusing research and adapting care to the patients’ actual needs. PatientsLikeMe is a for-profit enterprise but describes its vision as “putting patients first, promoting transparency [...], fostering openness”. The organization aggregates and analyses the data of over 380,000 registered users on more than 2,500 different diseases and sells the results. Their customers are pharmaceutical and medical device manufacturers, laboratories, hospitals, health plan providers, governments, etc. (Wicks, 2012).

Table 3 illustrates that the business model of PatientsLikeMe is based on complete digitization; the organization’s value drivers – namely co-creation via the online community, research, and data – could be further exploited. Internal research activities could be reduced or even eliminated in favour of contract research services and increasing data sales activities. As digitization is the core of PatientsLikeMe, the potential for value innovation can be seen as high whilst the potential to optimize the cost side is low.

Table 3

Overview of the integrated framework to exploit digitization strategically for PatientsLikeMe

	Step 1: Understanding the existing business model	Step 2: Identifying existing and potential digital value drivers	Step 3: Exploiting digitization strategically (“ERRC Grid”)
Customer Segments	<ul style="list-style-type: none"> • pharmaceutical industry • medical device manufacturer • government medical institutions 		
Customer Relationships	<ul style="list-style-type: none"> • individualized • co-creation 	<ul style="list-style-type: none"> • co-creation 	
Channels			
Value Propositions	<ul style="list-style-type: none"> • research services • data for research 	<ul style="list-style-type: none"> • research service • data for research 	<ul style="list-style-type: none"> • research service • data for research
Revenue Streams	<ul style="list-style-type: none"> • sale of research studies • sale of data 	<ul style="list-style-type: none"> • 	
Key Activities	<ul style="list-style-type: none"> • research • manage community 	<ul style="list-style-type: none"> • research • manage community 	<ul style="list-style-type: none"> • research
Key Resources	<ul style="list-style-type: none"> • data • proprietary knowledge • researchers 	<ul style="list-style-type: none"> • data 	
Key Partners	<ul style="list-style-type: none"> • patients • caregivers 		
Cost Structure	<ul style="list-style-type: none"> • value driven 		

5. SUMMARY AND OUTLOOK

The digital age offers many opportunities for companies that succeed at adapting their business models appropriately. Not keeping up with changing market dynamics and rapid digital processes will lead to shrinking profitability and pose an existential threat to an organization. Digitization is a major driver of growth and sustainability. In the last decade, ICT has experienced revolutionary technological progress. Infrastructure development built on broadband network access and technology in the form of highly efficient as well as broadly accessible new devices has created indefinite possibilities. The impact on the micro and macro levels of economies is significant. Digitization drives economic growth, productivity, and welfare, can reduce unemployment, poverty and inequalities, and can also transform social interactions and relationships. The increasing use of digital technologies and content are associated with significant challenges. The effects can be disruptive; security, privacy, consumer rights, and social risk management have to be taken into consideration when developing future digital strategies. Workers of all ages have to be transitioned into new digital jobs.

On an industry level, organizations depend heavily on their capability of adapting to these new developments and successfully integrating them into their business model. The ubiquity of the internet, networks, and smart devices offers great potential for the value chain and scalability. Communication, interactions, processes, and information flow can be optimized; inventory can be reduced – all this results in financial benefits. The full value potential seems to be inexhaustible and has yet to be realized. The focus shifts from the automation of operational processes to innovative business models. New value propositions for customers based on the availability of data and sharing of information drive disruptions across industries. Successful organizations need an understanding of how to integrate, analyse, and exploit data as their value is just beginning to unfold.

Business model approaches become more valuable when they strategically incorporate digital success factors, facilitate decision-making processes and enable management teams to translate digital trends into innovative and profitable business practices. The three-step approach is a modest attempt at discussing an integrated framework, analysing the strategic potential of digitization. The application indicates that the structured procedure helps one to understand the business, identify existing and potential digital value drivers, and strategically exploit digitization. The analysis provided further interesting insights. Categories of digitization such as “enabling”, “complementary”, and “functional” could be detected. “Enabling” describes organizations with limited potential to exploit digitization to improve the business model. In this category, digitization has no or very limited relevance for strategic decision-making. Within the second category – “complementary” – digitization is meaningful because it secures traditional business and drives new business opportunities. In the case of Rolls Royce, digitization turned out to be a crucial element with high potential for value innovation, optimizing business costs, and establishing a purely digital business model. In this category, digitization has the most distinctive impact on strategic decision-making and sustainable business success. In the third category – “functional” – digitization describes the organization’s core. The case of PatientsLikeMe illustrates that digitization offers high potential for value innovation. In contrast to the case of Rolls Royce, digitization provides limited possibilities to optimize the cost side. This leads to the conclusion that digitization in terms of entrepreneurial scope for strategic action is most relevant for organizations belonging to the category “complementary”.

In conclusion, the analysis identified categories that could help to guide strategic decision-making and encourage further studies in order to develop generic strategic alternatives. The three-step approach offers a realistic framework for business practitioners while pointing out interesting areas for further research.

REFERENCES

1. Barua, A., Konana, P., Whinston, A. & Yin, F. (2004), "An empirical investigation of Net-enabled business value", *MIS Quarterly*, Vol. 28 No. 4, pp. 585-620.
2. Bereznoi, A. (2014), "Business model innovation in corporate competitive strategy", *Problems of Economic Transition*, 57(8), pp. 14-33.
3. Bertolini, M., Duncon, D. & Waldeck, A. (2015), "Knowing when to reinvent", *Harvard Business Review*, December 2015, pp. 90-101.
4. BITKOM, Fraunhofer ISI (2012), "Gesamtwirtschaftliche Potenziale intelligenter Netze in Deutschland" / "Overall economic potential of intelligent networks in Germany", available at: <https://www.bitkom.org/Publikationen/2012/Studie/Gesamtwirtschaftliche-Potenziale-intelligenter-Netze-in-Deutschland/Studie-Intelligente-Netze2.pdf> (accessed April 7, 2016).
5. Bloom, N., Sadun, R. & VanReenen, J. (2012), "Americans do IT better: US multinationals and the productivity miracle", *American Economic Review*, 102(1), pp. 167-201.
6. Einsiedler, I. (2013), "Embedded Systeme für Industrie 4.0."/"Embedded systems for Industry 4.0", *Production Management*, Vol. 18, pp. 26-28.
7. Evangelista, R., Guerrieri, P. & Meliciani, V. (2014), "The economic impact of digital technologies in Europe", *Economics of Innovation and New Technology*, November 2014.
8. Feng, X., Yang, L., Wang, L. & Vinel, A. (2012), "Internet of Things", *International Journal of Communication Systems* (25), pp. 1101-1102.
9. Guerrieri, P., Luciani, M. & Meliciani, V. (2011), "The Determinants of Investment in Information and Communication Technologies", *Economics of Innovation and New Technology*, 20(4), pp. 387-403.
10. Hoffmeister, C. & von Borcke, Y. (2015), *Think new! 22 Erfolgsstrategien im digitalen Business*. Hanser, Munich.
11. Iansiti, M. & Lakhani, K. (2014), "Digital Ubiquity. How Connections, Sensors, and Data Are Revolutionizing Business", *Harvard Business Review* (11), pp. 90-99.
12. IBM (2008), "The Enterprise of the Future, Global CEO study", available at: https://www-3.ibm.com/industries/ca/en/healthcare/files/2008_ibm_global_ceo_study.pdf (accessed April 19, 2016).
13. International Telecommunication Union (2015). *ICT Facts & Figures: The World in 2015*, ITU, Geneva.
14. Kagermann, H. (2015), "Change Through Digitization—Value Creation in the Age of Industry 4.0", Albach, H., Meffert, H., Pinkwart, A. & Reichwald, R. (Eds.), *Management of Permanent Change*, Springer, Wiesbaden, pp. 24-33.
15. Kaplan, R. & Norton, D. (2005), "Harvard Business School", available at: <http://www.hbs.edu/faculty/Publication%20Files/05-071.pdf> (accessed April 19, 2016).
16. Katz, R. & Koutroumpis, P. (2013), "Measuring digitization: A growth and welfare multiplier", *Technovation*, 33, pp. 314-319.
17. Kim, W. & Mauborgne, R. (2005), "Blue Ocean Strategy: From Theory to Practice", *California Management Review*, Spring, Vol. 47, No. 3, pp. 105-121.
18. Kim, W. & Mauborgne, R. (2005a), "Blue Ocean Strategy: How to create uncontested market space and make the competition irrelevant", *Harvard Business School Review*, Boston, MA.
19. Muradli, R. & Volkova, T. (2015), "Strategic innovation application in creative industries in Latvia", *Journal of Business Management*, 10, pp. 15-26.
20. OECD (2015), *Digital Economy Outlook 2015*, OECD Publishing, Paris.
21. Oliner, S. & Sichel, D. (2000), "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?", *Journal of Economic Perspectives*, November, pp. 3-22.
22. Osterwalder, A. & Pigneur, Y. (2010). *Business Model Generation*, John Wiley & Sons, Hoboken, New Jersey.
23. Parmar, R., Mackenzie, I., Cohn, D. & Gann, D. (2014), "The New Patterns of Innovation", *Harvard Business Review*, January-February, pp. 86-95.
24. Rifkin, J. (2011), *The third industrial revolution: How lateral power is transforming energy, the economy, and the world*, Palgrave Macmillan, New York.

25. Straub, D. & Watson, R. (2001), "Research Commentary: Transformational Issues in Researching IS and Net-Enabled Organizations", *Information Systems Research*, December, pp. 337-345.
26. Van Reenen, J., Bloom, N., Kretschmer, T., Sadun, R., Overman, H. & Schankerman, M. (2010, January), "The Economic Impact of ICT", 2016, available at: http://www.eurosfaire.prd.fr/7pc/doc/1291302690_econ_impact_of_ict_2010.pdf (accessed April 7, 2016).
27. Vyatkin, V., Salcic, Z., Roop, P. & Fitzgerald, J. (2007), "Now That's Smart", *Industrial Electronics Magazine IEEE*, Vol. 1 No. 4, pp. 17-29.
28. Wicks, P. (2012), "Slideshare, July 26, 2012" available at: <http://de.slideshare.net/georinamoulton/patientslikeme> (accessed May 15, 2016).
29. Wicks, P., Massagli, M., Frost, J., Brownstein, C., Okun, S., Vaughan, T. & Heywood, J. (2010), "US National Library of Medicine- Sharing health data for better outcomes on PatientsLikeMe", available at: <http://www.ncbi.nlm.nih.gov/pubmed/20542858> (accessed May 15, 2016).