The Impact of Digitization on Business Models – A Systematic Literature Review

Completed Research

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Abstract
The emergence of digital technologies is disrupting entire industries and businesses face severe shifts in their competitive environment. New competitors with digitally driven business models enter the market and challenge incumbent firms. The concept of business model can help to understand the influence of digitization, but current research efforts do not fully provide a broad understanding. The aim of the paper is to structure the existing literature and provide a conceptual framework for future research. Therefore, a systematic literature review is conducted to gain comprehensive insights. Findings reveal that the impact of digitization on business models can be described through the concept of business model change, namely: creation, termination, revision and extension. This paper provides a conceptual framework based on for future research on the impact of digitization on business models.

Keywords
Digitization, Business Model, Business Model Change, Systematic Literature Review.

Introduction
With the upcoming of vast developments in information technology and the ongoing globalization, the environment for businesses changes rapidly. They unlock new markets and industries and have sustainable impacts on the competitive environment. Digitization is ubiquitous and new achievements in information technology can be observed leading to the establishment of plenty new businesses. Furthermore, digitization is the most powerful driver of innovation over the past few years and is acting as the trigger for the wave of innovation making the business model concept highly relevant for research activities. On the one hand, new possibilities evoke, but on the other hand there could be threats for existing companies (Lucas and Goh 2009). This will change the economic and societal environment drastically and requires adoption to this megatrend. A need for change in business logic and activities becomes evidential. Therefore, a digital shift can be detected where companies should rethink their current business model (Bharadwaj et al. 2013). In the field of information systems, the business model concept plays a superior role in many research activities but the lack of a common definition of the business model prevents to conceptualize a framework within the context of digitization (Chesbrough 2010; Veit et al. 2014). Digitization causes a structural change for industries and its impacts are manifold and due to this background, the question comes up what impact digitization has on business models. However, the impact of digitization on business models is a rapidly evolving field but it is still rather dispersed and lacks further description (Bouwman et al. 2018). The aim of this paper is to structure the landscape of the existing literature regarding the impact of digitization on business models and provide a conceptual research framework. Therefore, this paper investigates the following research question: What is the state of the art of literature concerning digitization and business models in the domain of information systems research and management science?

In order to gain valuable insights and provide a solid theoretical foundation for this research question this paper is structured as follows. First, the main concepts of digitization and business models are examined and distinguished from related terms. This is necessary, because the terms are defined differently in
Digitization can sustainably change nearly every area of both society and economy. Seemingly, the mega trend of digitization has no boundaries and the pace of transformation is increasing at an exponential level (Kagermann 2015). However, companies who are failing to align their digital business strategy to the competitive environment, will face severe issues and lose track to the digital transformation (Keen and Williams 2013). The emergence of digital technologies produced numerous terms, which are closely related but need to be differentiated properly. Digital Transformation describes the paradigm for a company's purposeful managed adaption and integration of digital technologies to ensure a sustainable business model considering the process of digitization (Gimpel and Röglinger 2015). A firm leader has a superior role in orchestrating those challenges, because an individually fitting digital strategy must be designed and the structure of the organization needs to be adapted (Kohli and Johnson 2011). Therefore, a rousing leader, who develops a digital vision, based on the prediction how value is generated in the futures, is a condition to successfully perform the digital transformation process (Earley 2014). Digitization is commonly described as the increasing penetration and adaption of digital technologies in society and economy as well as the associated changes in behavior (Gimpel and Röglinger 2015; Tilson et al. 2010). The meaning of digitization is transforming analogue knowledge and information to become a stored digital form. The advantage is that this provides instant access to information and enables ubiquitous exchange between people and plugged-in applications. Companies that expedite their digitization process use digital tools like cloud, analytic and social tools as well as mobile devices (Kane et al. 2015). In other words, digitization is not only about transferring analogue signal to a digital equal, it is also a socio-technological transformation process. Katz and Koutoumpis (2013) accentuate the process component of digitization as an ongoing process in a physical as well as in a societal way. Hence, digitization is enabling networks and platforms where the exchange of information is taking place. Therefore, digitization is not an occurring event but rather a transformational process where every single part of society and economy is affected. In a business-orientated level, Gray and Rumpe (2015) define digitization as the realization of matching customer needs with companies offering the usage of digital technology. Schmidt et al. (2016) add, that digitization enables platforms and networks which connect people and things to unfold beneficial effects such as improved maintenance of machines or reduction of complexity for the customer. In this paper we follow this definition of digitization.

Through the integration of digitally driven services into products new possibilities evoke and is increasing the value when services and products are combined (Shelton 2013). The combination of a service with an offered product is called servitization (Coreynen et al. 2017). Studies show that servitization enhances the value creation process and increase the willingness to pay when combined with digital technology (Vendrell-Herrero et al. 2017). Especially in manufacturing firms, servitization can be a competitive advantage, because it invites the customer to participate with the production process (Kamp and Alcalde 2014; Kastalli and van Looy 2013). Servitization is not linked formally with digitization, but with the emerge of digital technology, servitization can be seen as a promising strategy allowing the company to sell products as well as complementary services (Barrett et al. 2015).

Business Models

One of the first definitions by Timmers (1998) illustrates the business model by describing different stakeholders and how revenues are generated. He understands business models as a construction plan of the product and how the relationship between all the involved actors is set up. In addition, a similar approach was made by Stewart et al. (2000) and Porter (2001) focusing on the revenue streams as the key variable. Another approach is presented by Linder and Cantrell (2000) who reduce the business model concept to the main company objective of generating value. Amit and Zott (2001) understand the business
model concept as the architectural arrangement of the components of value creation to exploit business opportunities. One of the first definition only relating to the concept of value is stated by Richardson (2008). He perceives business model as a framework of value proposition, creation and capture. This concept is used in other definitions presented by Teece (2010), Sorescu et al. (2011) and Lakhani and Iansiti (2014). Yet, there is still no commonly accepted business model definition and as illustrated above, there are a lot of different approaches in the business model definition.

Osterwalder, Pingneur and Tucci (2005) point out that a well-defined business model concept could contribute to managerial challenges such as planning, changing and implementing. In contrast, Al-Debei et al. (2008) developed guidelines to ensure that the proposed definition is coherent, flexible for future additions and applicable for general usage. They accentuate the conceptional attribute of a business model and enable an abstract perspective. In addition, Cavalcante et al. (2011) argue that a model is always a reduction and simplification of a complex construct to grasp conceptional insights. Consequently, a business model can be illustrated as an abstract version of a business at a more conceptual than at an operational level. Regarding the research question, we follow this abstract view of a business model in this paper.

**Systematic Literature Review**

**Research Methodology**

The following section describes the applied methodology on the conducted systematic literature review to give detailed information on how the relevant literature is identified. The purpose of this approach is to map and assess the body of knowledge on the impact of digitization on business models and to point out prevailing research gaps. This approach is mainly based on the recommendations of Webster and Waston (2002), Kitchenham (2007), Henriette et al. (2015), Boell and Cecez-Kecmanovic (2015) and Thuan, Antunes and Johnstone (2016) as the guidelines for gaining a comprehensive insight into the existing literature. The methodology assumes a systematic approach that refers to a well-defined and structured protocol of the review, which ensures the accuracy and confirmability of the method (Bandara et al. 2015; Levy and Ellis 2006; Okoli and Schabram 2010). First of all, the terms are derived from the research question and further relevant data bases are selected. In the next step, exclusion criteria are defined due to elimination of irrelevant results. Furthermore, titles and abstracts are screened to decide whether the article tackles the research question or not. Finally, the extant papers are analyzed in-depth with the aim to extract valuable data. In the following, the methodology is described in detail in form of a research protocol to highlight every single step.

**Search Patterns**

Referring to the research question on the impact of digitization on business models at least two variables can be derived for database search namely digitization and business models. The Boolean operators OR and AND are used for connecting those terms. The search string is applied on title, abstract and key words resulting in the following used strings for database search: title (digitization AND business model*) OR abstract (digitization AND business model*) OR keywords (digitization AND business model*). The search was conducted regardless of time limitation of publications and only those articles were included which are written in English. In the next step, the relevant databases need to be determined. Hence, an approach was created which includes numerous electronic databases so that a broad selection of relevant information system journals and latest conference proceedings could be integrated within this review. The search was conducted between February and March 2017 on AIS eLibrary, Business Source Premier, Emerald, IEEE Xplore Digital Library, JSTOR, science direct, Springer and Wiley Online Library. Consequently, 1524 articles were identified. The emerged pool of articles contains duplicates which needed to be removed before the next step in the systematic literature review could be initiated. First, the database was filtered for duplicates by DOI number and secondly, by title name. Accordingly, eight articles were eliminated within this step and a total of 1516 articles remained in the initial pool. The following study selection criteria intended to identify those primary studies that provide direct evidence about the research question. Therefore, some exclusion criteria were applied which are explained as follows: first, only academic journals were included, leading to an exclusion of books, master theses, doctoral dissertations, prefaces or interviews. This follows the suggestions of Ngai and Wat (2002). Divergent to this approach is that in this
research, conference proceeding papers were included because they play an important role in the IS literature. Secondly, all articles are excluded that were published within a high ranked journal. As a result, 655 articles matched those exclusion criteria. In the next step, some inclusion criteria were applied. This stage aimed to include highly relevant articles by applying a two-step procedure. First, those articles were selected which are either within the domain management or information systems respectively in between those domains. Then titles and abstracts were screened and reviewed in-depth due to their reliability on the topic of digitization and business models. Applying the literature process shown in figure 1, finally 32 articles were selected for further examination.

Figure 1 Systematic Literature Review Process

Results and Data Analysis

The publications per year exploded in the middle of the last decade and more than two-thirds (n=953) of all 1516 identified articles were published since 2010. This reflects the rising popularity of the main constructs digitization and business model. Regarding the final pool of articles, several statements can be derived. By applying the classification of Fettke (2006) the results can be described in a structured way. First, most of the articles were published in 2016 (n=10) and the majority was published since 2015. Second, none of the articles were published in one of the basket of eight, the Top Management Journals in the field of Information Systems Research. 63% (n=20) were published at one of the included conference proceedings. 37% (n=12) were published in an academic journal. According to the research question, exploring the impact of digitization on business model, the pool of articles differs in their focus in aiming either direct or indirect to the question. An article can have a direct focus, when the research question of the article is congruent or similar to the research question of this paper. An article can have an indirect focus, when the research question of this paper is only a part of the study design of an article. 75% (n=24) of the articles show a direct focus whereas 25% (n=8) offer an indirect focus.

Referring to the abstract definition of business models the impact of digitization on business models can be categorized in creation, termination, extension and revision as the framework for further examination (Cavalcante et al. 2011). Creation describes a process where a new idea evolves and is transferred into a business model design passing several iteration loops. Another type of business model change is business model termination, which refers to the elimination of the whole business model. This can have external factors like disruptive innovations or a significant change in consumer behavior that make the business model redundant. A business model can extend when a company is searching for new opportunities to enrich the current business model, adding promising components to their portfolio. In contrast to the business model termination and creation, revision conceptualizes a prior business model to reshape to regain competitive advantages through replacing single parts of the business model (Cavalcante et al. 2011). Although Cavalcante (2014) did not refer to the impact through digitization explicitly, the concept of business model change can help structuring the analysis. In the final pool business model creation was
tackled by 65% (n=21) articles, followed by business model revision which was examined in 47% (n=15). Those two concepts combine 75% (n=24) of all articles, whereas business model extension was mentioned in 38% (n=12) and business model termination only in 6% (n=2).

One impact of digitization on business models is business model creation, which enables new business models due to the usage of evolving digital technology like Cryptocurrency (Morisse 2015), Smart Home, or Car Sharing (Hildebrandt et al. 2015; Turber et al. 2014). Especially in the context of the Internet of Things (IoT), new business models are created and enable cross-selling activities, customized products, services, and the gathering and monetization of connected data (Tesch 2016). New business models take advantage of this technology and change the landscape of businesses by offering new products and services (Sethi et al. 2002). Furthermore, new data driven business models evoke, exclusively build on the usage of data which is called datafication (Lycett 2013; Mai 2016). This is caused by the reduction of marginal costs that tend towards zero due to the high number of users. Customer experience shifts towards digital integration leading to customized products augmented with a digital service (Holotiuk and Beimborn 2017). Engelbrecht et al. (2016) identify eight categories for data-driven business models using three dimensions of data-origin, target group and technological effort. Data origin deals with either non-user or user data. The second dimension focuses on the target group, which can either be customers or organizations. The third dimension refers to the technological effort that needs to be made while fulfilling a data-driven business model. As soon as an organization has identified in which category of data-driven business models they are a suitable, a business model can be designed. The company can benefit from looking at other potential competitors whose business models fall into the same category. These examples highlight the multilayered opportunities in business model creation as a result of the impact of digitization.

The second category of business model impact through digitization is the termination of existing business models. This change in business models can have several reasons, like the ongoing process of replacing of prior physical operations with its digital equivalent. In the automotive industry, for example, the production time and costs were decreasing after switching to digital technology. They virtualized nearly the whole production, from planning to sales leading to a change in customer behavior. Hence, customers are searching on the internet and neglect to go to a showroom where the car is presented in its physical form. Customers can use digital technology like virtual reality to experience the sales process in a digital rather than in its real nature (Hanelt et al. 2015).

Moreover, existing business models can be extended due to digitization when new opportunities evoke. For example, Lakhani and Iansiti (2014) conducted a case study on General Electric. They describe the impact of digitization on the business model of General Electric through the changes in the production process, the distribution of products, the employee management and the organizational structure. Furthermore, the perspective of marketing and sales activities changed completely, because there is no need for salesmen who travel the country and visit potential customers. Instead, General Electric include potential customers in the value creation process which allows General Electric to gather and analyze data from this interaction. Another example of business model extension is presented by Chen et al. (2016), who conducted a case study on the airline Lufthansa revealing that new possibilities in analytics on existing data can also provide insights to improve cost savings and innovative services. The core business model stayed the same because the transportation of passengers all over the world is still the same. Therefore, the existing business model needs to be extended to stay capable of competing.

The fourth category of the impact of digitization on business models is business model revision. According to Zimmermann (2000) and Maull et al. (2014), traditional intermediaries or intermediary processes are removed or redesigned because digital technology enables direct access to customers or companies along the value chain. Those processes are transformed from analog to digital and raise a new type of intermediary processes namely digital intermediates. This phenomenon is, for example, taking place in the financial industry, where the existing business model is forced to align to digitization. A shift to online services and selling activities can be detected as well as new communication and distribution channels for marketing activities. The customers can select and inform their self about the products and services from different providers, causing the traditional branch-based model, where direct customer contact is necessary, to be changed. The products and services can be offered in a personalized manner, because the customer can insert personal information and requirements in the process. This increases the motivation and purchase intention of the customer leading to a higher turnover.
The Impact of Digitization on Business Models

Conceptual Framework for Future Research

The SLR approach was chosen to systematically appraise the literature concerning the impact of digitization on business models. This approach was designed regarding the recommendations from prior reviews on this topic by Henriette et al. (2015) and Cziesla (2014). Those reviews show that there are different understandings of the construct of impact. According to the lack of a conceptual research framework in this field the following suggestions, shown in table 1, are proposed.

<table>
<thead>
<tr>
<th>Business Model Perspective</th>
<th>Business Model Change</th>
<th>Creation</th>
<th>Revision</th>
<th>Extension</th>
<th>Termination</th>
<th>neutral/unclear</th>
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<tbody>
<tr>
<td>Value</td>
<td>(Turber et al. 2014), (Hildebrandt et al. 2015), (Hanelt et al. 2015), (Engelbrecht et al. 2016), (Tesch 2016), (Remane et al. 2016), (Lakhani and Iansiti 2014), (Mauli et al. 2014), (Vendrell-Herrero et al. 2017), (Veit et al. 2014)</td>
<td>(Turber et al. 2014), (Hildebrandt et al. 2015), (Hanelt et al. 2015), (Tesch 2016), (Oiestad and Bugge 2014), (Loebbecke and Picot 2015), (Veit et al. 2014)</td>
<td>(Hildebrandt et al. 2015), (Hanelt et al. 2015), (Loebbecke and Picot 2015), (Vendrell-Herrero et al. 2017), (Veit et al. 2014)</td>
<td>(Hildebrandt et al. 2015)</td>
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<td>Revenue</td>
<td>(Zimmermann 2000), (Sethi et al. 2002), (Hildebrandt et al. 2015), (Remane et al. 2016), (Lakhani and Iansiti 2014)</td>
<td>(Zimmermann 2000), (Sethi et al. 2002), (Amberg and Schroeder 2005), (Hildebrandt et al. 2015)</td>
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<td>Network</td>
<td>(Hanelt et al. 2015)</td>
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<td>(Elaluf-Calderwood et al.)</td>
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</table>

Table 1. Conceptual Framework for Future Research

The research framework consists of two distinctive dimensions, namely the business model perspective and the concept of business model change. The business model perspective considers that there is a multitude of different approaches of business model definition. Regarding the key focus of each definition, the perspective of a business model can be differentiated between their key variables value (e.g. Richardson 2008), revenue (e.g. Johnston and Clark 2005), network (e.g. Zott and Amit 2008) and organization (e.g. Al-Debei et al. 2008). This proposed list is extendible with other suitable key variables which explain the specific business model concept. The second dimension is referring to the concept of business model change by Cavalcante et al. (2011), consisting of creation, termination, extension and revision. The dimensions are chosen because on the one hand, they illustrate the impact of digitization within the business model change and on the other hand, the business model perspective dimension is flexible enough to change the specific key variables. This framework can serve as a first draft to evaluate the impact of digitization on business.
models. Notably, the current research focuses on business model creation while there is little attention on business model termination.

Conclusion and Further Research

This paper provides a first step in structuring the landscape of the existing literature regarding the impact of digitization on business models. In summary, the conducted SLR revealed some interesting insights concerning the research question about the impact of digitization on business models. Generally, business models can change in four different ways namely, creation, termination, revision and extension. As shown, each possible change is triggered by digitization and can be explained within this concept and explored these with the use of illustrative examples. Digital technology and new analytical methods like big data, create new possibilities to design a business model. While there is a growing number of articles concerning creation, revision, and extension only little attention has been paid to the field of termination although this is a threat. Business model termination can be crucial for incumbent firms. Moreover, digitization is the key enabler for decreasing costs in production and offering services in nearly every industry. However, digitization can threat existing companies if they do not accept the challenges and underestimate the impact on their business model. The suggested research framework for this field presents a first draft which is derived directly from the results of the SLR. The research framework consists of two distinctive dimensions, namely the business model perspective and the concept of business model change. This research approach aims to illustrate a first step towards structuring existing literature.

This study is subject to several limitations due to the nature of our research. Several aspects namely, the extension of the search string, the forward and backward search and the quality assessment are kept for further examination. For further research on this field, a more differentiated Boolean Search String should be developed. The search string should consist more contextual variables and should subdivide each variable to include relevant topics concerning the research field. For example, the keyword digitization needs to be distinguished and other keywords like datafication, blockchain or big data should be added. Hence, the search string will be expanded by crucial key words which will enrich the results. Another possibility is to focus on single industries, but as the nature of digitization is not limited to industry boundaries. Furthermore, the forward and backward search could reveal new insights and support the results which are presented in this paper (Thuan et al. 2016). Therefore, this could be a topic for future work towards this manifold research field. Hence, the presented SLR focusses on two research domains, although it is acknowledged that there are other seemingly interesting domains to tackle, e.g. management or marketing. Regarding the quality assessment a higher level of (internal and external) validity could be achieved to ensure a higher level of generalizability (Kitchenham 2007). Nguyen-Duc et al. (2015) proposed to conduct a paper quality assessment by raising up several questions to evaluate the quality of the final pool of articles. Those quality assessment questions describe from an internal perspective whether the final pool is rigorous and provide enough credibility and relevance to answer the research question (Dybå and Dingsøyr 2008).

Understanding the impact of digitization on business models today and tomorrow is a crucial competence for all kind of businesses and organizations. Therefore, future research should gain profound insights for theory and practice.

References


