Abstract

This paper has a two-fold aim: to analyze the development of digital transformation field, and to understand the impact of digital technologies on Business Model Innovations (BMI) through a structured review of the extant literature. Results of this research reveal that the field of digital transformation is nascent with a growth of interest from researchers starting in 2014. Results show for a need of research in developing countries and for positivist research. Main impacts of digital transformation have been servitization and asymmetric interdependences in the supply chain structure. These impacts have led to the employment of a variety of new business models, such as for frugal innovations and for circular economy.
Abstract

This paper has a two-fold aim: to analyze the development of digital transformation field, and to understand the impact of digital technologies on Business Model Innovations (BMI) through a structured review of the extant literature. Results of this research reveal that the field of digital transformation is nascent with a growth of interest from researchers starting in 2014. Results show for a need of research in developing countries and for positivist research. Main impacts of digital transformation have been servitization and asymmetric interdependences in the supply chain structure. These impacts have led to the employment of a variety of new business models, such as for frugal innovations and for circular economy.

Keywords: digital transformation, business model innovation, structured literature review

Introduction

In recent years, the phenomenon of digital transformation (DT) has become very popular (Fitzgerald et al. 2013; Kane et al., 2015). On the one hand, this is evidenced by an increased number of publications in academic and practitioner journals, conferences, seminars, professional programs and university courses dedicated to this area. On the other hand, as digital transformation has become a critical topic for many stakeholders, there is an increased attention from international organizations, business practitioners, consultants and policy makers as well. For instance, consulting companies such as McKinsey, Accenture, Capgemini, Gartner, PricewaterhouseCoopers and IBM have all created programs that aim at understanding and facilitating digital transformation of companies. Additionally, World Economic Forum in collaboration with Accenture launched in 2015 a Digital Transformation Initiative (DTI) to offer insights about the impact of digital technologies in business and society. According to the DTI’s latest report (World Economic Forum, 2017), digital transformation is assessed to deliver $100 trillion in value to business and wider society over the next decade. In realizing this potential of digital transformation, European Commission proposed the allocation of a €9.2 billion budget for Digital Europe programme (European Commission, 2018) in support to issues related to digital transformation for the benefit of European economy and society.

Digital transformation phenomenon arises from the effect of new digital technologies such as social, mobile, analytics, cloud and Internet of Things (SMACIT) (Sebastian et al., 2017). The adoption and diffusion of these digital technologies with the uptake of Internet has brought to
companies the shift from analog to digital. As such, digital transformation or digitalization stands for “the integration of digital technologies into business processes” (Liu et al. 2011, pg. 1728) in a digital economy. Notwithstanding, digital transformation is more than a simple process design; it plays an important role in structuring new business operations while transforming the organization for digitization (Liu et al. 2011). Thus, the exploitation of digital technologies offers opportunities to integrate products and services across functional, organizational and geographic boundaries (Sebastian, Ross, and Beath 2017). As a consequence, these digital technologies increase the pace of change and lead to significant transformation in a number of industries (Bharadwaj et al., 2013; Ghezzi et al., 2015), since they have the ‘power’ to disrupt the status quo and can be used to drive technological change in industries (Bharadwaj et al., 2013). Indeed, digital technologies have revolutionized the way industries operate, introducing the concept of ‘Industry 4.0’ or ‘smart factory’ (Lasi et al., 2014). Moreover, the case of digital platforms has created for companies a new way of operating in a ‘business ecosystem’, which has led to changing dynamics in the value networks (Gray et al., 2013). Obviously, digital technologies have substantially transformed the economy and society, bringing fundamental changes encompassed by the new emerging approaches of circular and sharing economy.

Following Westerman’s et al. (2014) categorization on digital transformation effects, the role of digital technologies is central to the creation of new dynamics for business operations, which in turn forces changes to existing business models. One reason for this is that digital transformation includes the integration of digital products and services within the core business model to improve or introduce new customer experiences or value pathways (Nambisan et al. 2017). The other reason is that digital infrastructure offers to companies the capabilities to develop new business models (Rayna & Striukova, 2016; Berman et al., 2012), as they can re-appropriate existing resources and experiment with new forms of value creation mechanisms, while also providing greater value for all stakeholders (Tilson et al., 2010). Thus, new business models based on digital technologies offer competitive advantage to firms (Berman et al., 2012).

Within corporate practice, business models are nowadays important element that bring success or failure to companies, as they need to organize for new technologies (Kapoor and Klueter, 2017). In these conditions, to ensure the alignment of their strategies with the ever-changing competitive environment, companies need to be able to revise their business models (BM) continuously, to reflect the existing market realities, customer expectations and competitive forces (Braganza et al., 2009). In fact, as novel digital technologies have reduced business models’ experimentation costs (Marston et al., 2011), entrepreneurs and senior executives have been leveraging in recent technological developments to redesign their business models. However, a recent study carried out by Capgemini Consulting (2018) shows that organizations are still struggling to implement digital transformation.

In the light of digital transformation of companies it becomes important to understand how companies innovate their business models. As Hess et al. (2016) state, one important consequence of digital transformation is the development of new business models. We apply Foss and Saebi (2017) definition of Business Model Innovation (BMI) “designed, novel, non-trivial changes to the key elements of the business model innovation and/or the architecture linking these elements.” Despite research efforts and the frequent challenges encountered in practice, there is still need for a better understanding in digital transformation of business model innovation. The latest call of Visnjic et al. (2016) shows that the understanding of digital transformation of business models remains poor. Moreover, understanding how digital transformation enables innovation of BMs is
essential requirement for their adaption, as they represent the new logic for companies how to create and capture value (Afuah, 2004).

In order to develop a better understanding in digital transformation of business model innovation, we contend the need to carry out a structured review of the relevant literature. While at the best of our knowledge there appears to be only a recent article published on digital transformation of BMI (Li, 2018), this article employs a qualitative methodology and focuses in the creative industry. In this paper we seek to extend the scope of literature review research in this topic in a broader number of industries. As digital transformation is taking place in almost every industry and has led to the creation of completely new business models that were not existent until lately, this study provides new insights that were not previously drawn. Therefore, our aim is to review and critique the state of research in digital transformation of BMI literature, provide a comprehensive, holistic overview of digital transformation of BMI and outline avenues for further research. From the theoretical perspective, this study contributes to these digitally enabled types of BMI, that make the emergence of business models a promising unit of analysis for undertaking innovation strategies. Concerning practice, the results of this study may help practitioners to understand how digital transformation of business model innovations can be achieved.

The paper is organized as follows: next section discusses the methodology; it explains the method of data collection and analysis for the purpose of undertaking the structured literature review. This is followed by the results of the study, answering the four research questions addressed in the methodology part. The next section focuses at discussing the existing gaps in the literature and avenues for further research. In the final section of the paper are discussed the conclusions, contribution and implications for theory and practice.

**Methodology**

This paper adopts a structured literature review. According to Massaro et al. (2016), a structured literature review is “a method for studying a corpus of scholarly literature, to develop insights, critical reflections, future research paths and research questions”. The reason for adopting a structured literature review is because “it is based on a positivist, quantitative, form-oriented content analysis for reviewing literature” (Massaro, Dumay, and Guthrie 2016). This method follows a ten-steps process that ensures the researcher to “potentially develop more informed and relevant research paths and questions” (Massaro et al., 2016) and accomplishing this way the theory advancement objective of the literature review (Webster and Watson, 2002).

We initially wrote a literature review protocol to guide us with the work flow we had to follow during the process of reviewing the literature. The protocol driven approach offers to the researchers a framework to select, analyze and assess papers that is reliable and repeatable, with the aim of ensuring robust and defensible results (Massaro et al, 2016). In the further step we defined the research questions that serve to bring new insights from carrying out the literature review. In the protocol document we identified the following research questions:

RQ1. How has the field of digital transformation developed over time?
RQ2. What is the focus of literature in digital transformation of BMI?
RQ3. How has digital transformation facilitated Business Model Innovation?
The next step was to determine the type of studies to consider for the review. In the protocol we decided about the keywords we had to use to search for articles and the criteria for article selection. Following the keywords used in previous studies in the digital transformation literature, we decided to search with “digital transformation”, “digital disruption”, “technolog* change”, “organiz* change”, “disrupt*” and “business model”. As the specific aim of this study is to offer a holistic understanding on digital transformation of business model innovation, we purposefully focus on scholarly empirical research that provides insight into how digital transformation is impacting the innovation of business models. Nodes for coding were determined based on previous SLR studies (Massaro et al., 2015; Vesti et al., 2017). According to these studies, nodes examine the information related to authors, their affiliation, time distribution of publications; country of research; the focus of the paper and methodology. Additionally, we added nodes about industry sectors, discipline of the studies, theories used and potential impact on the value creation, delivery and capturing process. Through these added nodes we aim to gain deeper insights about the development of the field and provide implications for further development. These nodes were integrated into a framework that served for the coding of the papers and the analysis of the results. The framework with a description of parameters is provided in Table 1.

Table 1. Literature review classifying framework

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Specifications/variables</th>
</tr>
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<tbody>
<tr>
<td><strong>Bibliographical/Source-info</strong></td>
<td></td>
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<tr>
<td>Author</td>
<td>Author's demographics</td>
</tr>
<tr>
<td>Time distribution of publications</td>
<td>Year published of the article</td>
</tr>
<tr>
<td>Journal titles</td>
<td>Where the article is published</td>
</tr>
<tr>
<td>Country/Region of research</td>
<td>Origin of the data setting</td>
</tr>
<tr>
<td>Industry sectors</td>
<td>Empirical setting of the article</td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computer modelling and simulation</td>
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<td></td>
<td>Conceptual paper</td>
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<td></td>
<td>Explanatory</td>
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<td></td>
<td>Exploratory</td>
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<td></td>
<td>Mixed method</td>
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<td></td>
<td>Special Issue</td>
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<td></td>
<td>Viewpoint</td>
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<td></td>
<td>Theoretical viewpoint</td>
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<td><strong>Discipline</strong></td>
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<td></td>
<td>Economics</td>
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<td></td>
<td>Entrepreneurship</td>
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<td></td>
<td>Finance and Accounting</td>
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<td></td>
<td>General Management and Strategy</td>
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<td>Information Systems</td>
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<td>Innovation and Technology</td>
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<td>Marketing</td>
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<td>OB and HR</td>
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<td></td>
<td>Operations</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>
Focus of the paper
- Disruptive technologies
- Shared platforms and ecosystems
- New enabling technologies

Theoretical perspectives
- Disruptive Innovation theory
- Actor-network theory
- Path dependence
- Dynamic capabilities
- Strategic learning
- Theory of affordances
- Organizations power
- Transaction cost theory

Impacts on value
- Digital transformation and value creation
- Digital transformation and value delivery
- Digital transformation and value capture

After having identified the keywords and the framework of the study, we started the collection and selection of papers followed a multi-staged process. Firstly, we searched in the SCOPUS database with the defined keywords in the protocol. This first search revealed 193 publications. In a second step, in order to control over the quality of articles we restricted the search to peer-reviewed journals in the category of Business and Management that are ranked 3, 4 and 4* in ABS evaluation. With this additional restriction we did not take into consideration book chapters, book reviews and conference articles. Therefore, in this second search we found articles published in peer-reviewed journals over the time span from 1996 to 2018, which reduced the number of publications to 94. After the collection of all the articles, each paper was checked for the inclusion of key words in the title, abstract and keywords, in order to ensure that articles fit the research objective of this study. Referring to our protocol we had defined the selection criteria to identify which studies have to be included or excluded. The criteria for article inclusion requires the existence of both string words about digital transformation and business models, which were connected by Boolean operator AND. During the screening stage of publications we found only few articles which were published previous to 2014 to be about digital transformation. In other cases there were articles that were talking about digital transformation or disruptive technologies, but their impact and connection with business model innovation was missing. For these reasons, these articles which were not focused on both disruptive technologies and business model innovation were excluded. At the end of the process, 54 articles were excluded and the final sample of considered publications included 40 research articles.

For the analysis of the final list of papers we utilized NVivo12 software package. The folder with the selected papers was imported into the software. Each paper was coded based on the same nodes as specified in the framework, in order to reach the aim of the SLR and avoid researcher’s bias. We created nodes that were related to the bibliographical information of articles, theme of research, discipline, industry sectors, gap of the paper, research question, theory based, methodology, and results. These nodes were used to answer the first two research questions of our study. For the third research question we created another node to code all the impacts of new enabling technologies on
Business Model Innovation. Another node was created to code all the information identified for further research in the field.

After having coded all the papers, following the steps of the protocol, the research group shared the coding project among the members, in order to verify that coding complies with research questions and the framework of the study and to ensure the inter-code reliability. Next, analysis of the dataset developed insights and critique in the field of digital transformation of BMI. A part of the work in this study was to advance knowledge in the field of digital transformation, by highlighting the gaps, identifying new venues for research and raising new research questions.

Results

**RQ1. How has the field of digital transformation of BMI developed over time?**

This section provides an overview of the development of the field in digital transformation of BMI. It reports the findings related to descriptive features of this new emerging field of research.

**Author demographics**

List of analyzed articles shows that no author is dominating the field in terms of number of publications. Bogers, Li, Ghezzi and Mangematin are the only authors with two publications each, while the other authors have published only once in the field of digital transformation of BMI. Most of articles are co-authored and only five articles are written by a single author (13 percent). Li is the only author that has published two articles, where in one of the articles he is single author. Moreover, the analysis of 108 authors of the 40 publications reveals that most of the articles (87 percent) are written by academic scholars. There are no articles written mainly by practitioners, while the collaboration between practitioners and scholars covers 13 percent of publications. More specifically, these collaborations are carried out in very new topics such as platform-based ecosystems and intelligent goods in closed-loop systems. This result implies that this field of research is closely related to practice. For this reason, more collaboration between practitioners and academics is needed in the future. Also, these demographics suggest that in this field of research four authors have remained focused on exploring further aspects of BMI driven by digital transformation. For instance, Ghezzi publishes about strategy making and business model design in dynamic contexts in 2015 in Technological Forecasting and Social Change and in 2017 he publishes in Journal of Business Research. This trend of republishing after two years in a different journal from the first one is evidenced in articles of Bogers (2016, 2018) as well.

**Time distribution of publication articles**

The analysis of the years in which the selected papers in our sample are published shows that the first article about digital transformation of business models was published in 2009. This article
corresponds to the case study of Kodak (Lucas and Goh, 2009), which missed the digital photography revolution when faced by a disruptive technology. As it can be seen from Graph 1 below, only five papers were published within the next four years (until 2013) after the first paper was published. These first papers deal mostly with a general understanding of opportunities and barriers created by disruptive technologies on BMI (Chesbrough, 2010), like for example in the case of latecomers that can capture value through a secondary BM (Wu, 2010). Publication in the topic remains poor and scattered until 2013 and research continues to highlight the importance of technological discontinuities on creation of disruptive BMs and challenge of dominant industry logics (Sabatier et al., 2012). Only Simmons et al. (2013) article studies the role of marketing activities in inscribing value on BMI during the commercialization of disruptive digital innovations in industrial projects.

Graph 1. Time distribution of publication articles

Over the past five years, there has been a growing number of articles being published at this field of inquiry with 34 articles out of 40 articles published between 2009 and 2018. The highest interest in publishing in the digital transformation of BMI is just recently, where since 2017 are being published 22 articles (55 percent of articles). The gradual increase of publications reflects the necessity to carry out more research in this field, as the impacts and issues related to digital technologies become apparent in many industries. This is shown in articles published during 2014 – 2015 that try to explore more in depth the effects of digitization on incumbents’ business models. Research investigates these effects in publishing industry (Øiestad and Bugge, 2014), and with a special interest at understanding organizational or sectoral lock-ins in creative industries (Mangematin et al., 2014) and newspaper industry (Rothman and Koth, 2014). To overcome the challenges of strategy formulation and implementation in dynamic industries, Ghezzi et al. (2015) suggest a framework for strategic making and BM design for disruptive change.

These insights from the analysis of the distribution of articles inform us about the nascent stage of this field of inquiry with a rapid growth in 2014. The analysis reveals again about the practitioner-led nature of research in this field. As it is demonstrated above, time distribution of articles highlights the relevance of studies in the field. Over time there is a continuous change on the researched topics, shifting from impacts of disruptive technology on incumbents’ BMs to impacts of digital technologies on BMI of digital start-ups. Furthermore, the high concentration of the distribution of publications in the latest years reveals both the importance of the topic and the increased interest of researchers in this novel field of inquiry.
**Journal title**

We reviewed the 40 articles to identify the journals in which these articles have been published and to identify their distribution in each journal. Our analysis shows that a total of 16 journals were captured in this review of literature. Technological Forecasting & Social Change journal accounted the majority of articles being published (14 articles, 35 percent). The three other journals that account for a higher number of publications compare to other journals are Long Range Planning, Journal of Business Research and Technovation. These journals have published 3 articles each, with a total of 9 articles (23 percent). The remaining of articles are spread over the rest of journals, belonging to a diverse range of disciplines. Results of this analysis highlight the idea that this topic is practitioner-led and with much importance recently for businesses, policy makers and society. This is evidenced in Technological Forecasting & Social Change journal firstly by Sung’s article (2018) suggesting policy implications toward Industry 4.0 for Korea. Similarly, study of Jia (2016) bases in commercialization efforts of a UK based 3D printing technology provider to evaluate the financial viability of innovative BMs.

![Journal title distribution](image)

**Country of research**

A part of our analysis was to identify and describe geographical regions where studies have been conducted. Graph 3 gives a classification of the countries studied in the field of digital transformation of BMI. The left side of the graph includes studies carried out in developed countries, while on the right side are shown developing countries. Results show that most of the research in this field of inquiry is conducted in developed countries. Within the developed countries, digital transformation of BMI has been studied mostly in USA and Germany. This concentration of research in mainly these two countries may be result of the governmental efforts, like in the case of German government support for Industry 4.0, or as in the case of the EU-funded DIGINOVA project digital for advancing innovation in digital making (Potstada et al., 2016). According to the analysis of our data, other countries in Europe that represent the same interest for
researchers are the Netherlands, Italy and the UK, with two publications in each country. In contrast, developing countries are much under-represented with only three articles. This implies that emerging countries in general are totally ignored or poorly analyzed. A need for more research in these countries is important, in order to define the boundaries of theorization on digital transformation of BMI, that will lead to a better understanding of this phenomenon. As Ghezzi and Cavallo (2018) argue, generalization and relevance of findings depends on the peculiarity of the context under examination. For this reason, there should be carried out a replication of research in other (mature) contexts (Ghezzi and Cavallo, 2018). This will overcome the problem of generalizability with a single geographic region as well (Simmons et al., 2013).

Graph 3. Country of research

![Graph 3. Country of research](image)

**Industry sectors**

Anecdotally, examples used to illustrate digital transformation of BMI come generally from media, publishing, electronic, accommodation and automobile. The most common companies that exemplify digital transformation of BMI are Facebook, Uber, Netflix and Airbnb. In order to enhance our understanding of industry influences on digital transformation of BMI, we classified the articles according to the industry sectors their empirical setting was based on. As depicted in graph 4, articles are based in a wide range of industry sectors, comprising 13 different industries. Results also indicate for an almost equal spread of articles among industries, and there is no concentration in only a handful of industry sectors. Nevertheless, we can identify two groups of industries that represent a higher number of articles; manufacturing (6 articles) and creative industries (5 articles). Closer examination of these industries shows that manufacturing industry mainly dealt with consumer goods manufacturing, while creative industry sectors were represented by accommodation industry and digital game industry. The remaining majority of articles were spread across the broad range of industry sectors. There were three articles that were based in multiple-case studies with settings operating in diverse industry sectors. We classified these articles in a multiple industry sectors group. However, the concentration to only few industries can be a limitation for the generalization of findings. There is a need to study other industries such as design, architecture, advertising and fashion industry (Mangematin et al., 2014).
Methodology

All studies conducted so far on the digital transformation of BMI are characterized by an explorative approach.

These studies aim at achieving a first understanding of the phenomenon of digital transformation of BMI, which is indicated by the extensive use of qualitative research. This finding relates to the fact that digital transformation is a new phenomenon. Consistent with this, Li (2018) argues as well that we are facing a methodological challenge in the investigation of new emerging trends, since these trends “are still at very early stages of development with limited empirical presence”. For this reason, the author suggests utilization of new research methods such as research prototyping and fictional design.

In addition, only few longitudinal studies are carried out. This arises the need for future longitudinal studies, which will help in better understanding of sharing economy and peer-to-peer platforms (Akbar and Tracogna, 2018). However, the contributions of these studies to this literature mainly consist on the frameworks and propositions derived from explorative research. There have
been no further empirical studies to support or refuse the suggested propositions. Few papers investigate the relationship between digital transformation and business model innovations following an explanatory methodology. A considerable number of papers (11 papers) are conceptual or theoretical viewpoints. These insights suggest that field of research in digital transformation of BMI has the potential to be restricted to a single paradigm. The absence of the positivist research will prevent the wider acceptance and development of the field.

Disciplines

Most of the research is undertaken in the disciplines of Technology and Innovation Management, General Management and Strategy, and Entrepreneurship. Few studies come from disciplines of Economics, Information Systems, Marketing and Operations.

Graph 6. Disciplines

This might primary be because the purpose of our study is too focused and bridges together two different topics: digital transformation and business model innovation. The other reason might be that these three disciplines are more concerned with the impact and implications of the phenomenon of DT in the business environment. Furthermore, the dominance of only a few number of disciplines relates also to the journals that are interested to publish in this topic. Since most of the articles have been published in Technological Forecasting & Social Change, Long Range Planning, Journal of Business Research and Technovation this affects the disciplines that will be much more covered by research. However, the low presentation of articles focusing on Operations and Entrepreneurship discipline areas is unexpected. This suggests that the field of digital transformation of BMI is fragmented along three major discipline areas, where the predominance of only a single-discipline research is noticed. The fragmentation of the field has implications in the conceptualization and research methodology for the progression of digital transformation of BMI field.
RQ2. What is the focus of literature in digital transformation of BMI?

In this section we will discuss the focus of the literature in digital transformation of BMI.

Focus

The literature on digital transformation is dispersed between disruptive technologies, shared platforms and ecosystems, and new enabling technologies such as Big Data, Internet of Things (IoT), Industry 4.0, Cloud computing and Digital Fabrication (DF). Disruptive technologies in the literature refer to technologies that have the potential to introduce new products’ attributes, which could become a source of competitive advantage (Christensen, 1997); while a platform is defined as “any combination of hardware and software that provides standards, interfaces, and rules that enable and allow providers of complements to add value and interact with each other and/or other users” (Teece 2018). Taken together, the platform innovator(s) and complementors constitute an ecosystem (Teece, 2018).

The majority of research in this field (36 articles, 90 percent) has focused its attention in the understanding of impacts that new disruptive technologies have on industries, identifying the areas of transformation on activities, processes and business models. Only four articles (10 percent) focus at understanding how the process of transformation takes place by drawing on different disciplines and theories.

Graph 7. Focus of the paper

Analysis of articles about disruptive technologies reveals that the earlier years of the literature (2009-2010) have been focused to challenges and opportunities created from these technologies for incumbents’ BMs. Some of the articles focus at challenges faced by incumbents in managing radical technological change. As Chesbrough (2010) states, there exists many “opportunities and barriers in business model innovations” coming from technological advances. For instance, case study of Kodak identifies organization structure and culture to play a crucial role in overcoming core rigidities to create new value from (Lucas & Goh, 2009). Rothman (2014) follows a very divergent perspective, showing that digital transformation of BMI fails when companies follow the same old strategic patterns and remain path-dependent. Whereas, in the later years, starting from 2013 focus has shifted to ways how to overcome these challenges. For example, Karimi and Walter (2016) argue that adoption of a disruptive BM requires firms to give to groups autonomy, risk-taking and proactiveness. The investigation of Kapoor & Klueter (2013) suggests overcoming
firms’ inertia associated with incumbents’ prevailing business models by investing in research and development through alliances and acquisitions.

Nevertheless, disruptive technologies bring opportunities to firms who understand how environmental changes necessitate business model modifications. Wirtz et al. (2010) argue that Web 2.0 phenomenon, based on social networking, interaction orientation, user-added value and customization/personalization serve as value offering to traditional Internet business models (content, commerce, context and connection). Another opportunity considered in literature relates to the introduction of disruptive technologies from advanced economies into emerging economies through a second business model innovation by latecomer firms (Wu et al., 2010). Additionally, firms can follow different tactics (compensating, enhancing and coupling) to reconfigure their value propositions (Bohnsack and Pinkse 2017). Table 2 represents these challenges and opportunities of disruptive technologies.

<table>
<thead>
<tr>
<th>Author</th>
<th>Opportunity</th>
<th>Challenge</th>
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<tbody>
<tr>
<td>Lucas and Goh (2009)</td>
<td></td>
<td>Organization structure and culture</td>
</tr>
<tr>
<td>Kapoor and Klueter (2013)</td>
<td></td>
<td>Overcoming firms’ inertia associated with incumbents’ prevailing business models</td>
</tr>
<tr>
<td>Wirtz et al. (2010)</td>
<td>Web 2.0 serves as value offering to traditional Internet business models</td>
<td></td>
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<tr>
<td>Wu et al. (2010)</td>
<td>Second business model innovation by latecomer firms</td>
<td></td>
</tr>
<tr>
<td>Bohnsack and Pinkse (2017)</td>
<td>Compensating, enhancing and coupling tactics to reconfigure value propositions</td>
<td></td>
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</tbody>
</table>

The second most important analysed topic depicted in Graph 7 focuses on shared platforms and ecosystems, as new business models of digital enterprises. Table 3 below summarizes the focus of these studies and their findings. From the table we observe that shared platforms and ecosystems are a very recent focus, studied between years 2017 and 2018. However, we notice that literature has addressed a number of broad issues which relate to initial understanding of platforms, starting with their classification into five typologies (Muñoz et al., 2017), and investigation of platforms’ role in dealing with disruption (v. Alberti-Alhtaybat, Al-Htaybat, and Hutaibat, 2018) and BMI (Gupta and Bose, 2018). Moreover, results show that an important focus is given to financial aspects of platforms and ecosystems. For instance, studies of Teece (2018) and Helfat and Raubitschek (2018) focus at aspects of profiting from innovation, while Khuntia et al. (2017) consider the relationship between evolution of service offering and financial viability of platforms. Furthermore, analysis of the data indicate for a focus also on managerial issues and success factors of these digital platforms. Since digital enterprises operate in a highly dynamic environment, focus it has been given to Lean Startup Approaches (LSA) within the strategic agility context. LSAs can
be employed as agile methods to enable digital entrepreneurs innovate BMs (Ghezzi and Cavallo, 2018). In addition, Piscicelli et al. (2018) found out that success of sharing platforms depends on a number of factors: the identification of a significant market friction, building of a critical mass of users before implementing a correct pricing level and structure, addressing the hurdles of competition and regulation and fostering between users a positive interaction.

Table 3. Focus of literature in shared platforms and ecosystems

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Aim of the study</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muñoz and Cohen (2017)</td>
<td>Typologies of sharing business models</td>
<td>Crowd-based tech business models, collaborative consumption business model, business-to-crowd business model, space-based business model (low-tech), and Utopian sharing outlier business model</td>
</tr>
<tr>
<td>v. Alberti-Alhtaybat et al. (2017)</td>
<td>Dealing with disruption</td>
<td>Building a unique business model based on technological innovations and agility</td>
</tr>
<tr>
<td>Gupta and Bose (2018)</td>
<td>Business model transformation in pioneering digital firms</td>
<td>Technological affordances help companies to strategically learn to adapt to operating environment</td>
</tr>
<tr>
<td>Piscielli et al. (2018)</td>
<td>Success factors for P2P goods-sharing platforms</td>
<td>Business model design and execution; Capability to experiment and innovate business model</td>
</tr>
<tr>
<td>Ghezzi and Cavallo (2018)</td>
<td>Lean Startup approaches (LSA) and BMI in digital startups</td>
<td>LSAs are agile methods for BMI for digital startups under conditions of environmental dynamism.</td>
</tr>
<tr>
<td>Khuntia et al. (2017)</td>
<td>Influence of service offerings evolution in operational maturity and financial viability of HIE</td>
<td>Shifting over time from transaction fees, to subscription or hybrid revenue based models</td>
</tr>
<tr>
<td>Helfat and Raubitschek (2018)</td>
<td>Profiting from innovation in digital platform-based ecosystems</td>
<td>Innovation, scanning/sensing, and integrative capabilities</td>
</tr>
<tr>
<td>Teece (2018)</td>
<td>Profiting from innovation in the digital economy</td>
<td>Understanding of relevant complements, good BM design, supportive governmental policy</td>
</tr>
</tbody>
</table>

Based on the results of Graph 7, we observe that research is also led by a recent arising interest in big data (Urbinati et al., 2018), cloud computing (Nieuwenhuis et al., 2018) and closed-loop systems in the circular economy (Rajala et al., 2018). These new enabling technologies are allowing firms to apply new business models that support issues related to sustainability. The growing intelligence of goods is generating novel BMs that rely on the intelligence of ecosystems within the activities for resources, by shaping closed-loop systems (Rajala et al., 2018). In addition, firms are
engaging more in frugal innovations, allowing them to carry out resource-constrained innovations for emerging markets (Winterhalter et al., 2017).

To conclude, this section develops insights with regards to the focus of the literature. The literature shows that shared platforms and ecosystems, as well as new enabling technologies are a very recent focus. In contrast to articles about disruptive technologies that focus on challenges and opportunities, articles about shared platforms comprise a broad number of issues from typologies to managerial and financial aspects. Nevertheless, the results show that few articles focus in one topic and the focus shifts quickly, leaving topics under-investigated. This finding highlight the need for more research in topics that are under-investigated and represented by only few studies. The scattered nature of the field, might affect the accumulation of knowledge in the field, as studies do not focus on previous findings.

Theoretical perspectives

Theory development is essential for the proper advancement of knowledge in any field of research (Kuhn, 1970). To develop a better understanding about theoretical perspectives in the field of digital transformation of BMI, we analyzed the articles and determined for each one if a theoretical perspective was apparent. For those articles that reflected theoretical perspectives we further analyzed them and identified if the theory was an existing one or was a new theory. The results of this analysis about the theoretical stance revealed that majority of articles (28 articles, 70 percent) had no discernable theory present.

Looking at articles with an apparent theoretical perspective, we observe that the majority of articles (seven articles) have adopted theoretical perspectives during 2017-2018. Recent contributions (e.g. Akbar and Tracogna (2018); Teece (2018); Helfat et al. (2018); Vendrell-Herrero (2017)) show to have started questioning and seeking for more theoretical frameworks in order to explain and understand the phenomenon of digital transformation of BMI. Interestingly, disruptive innovation theory (Christensen, 1997) was the most popular, while other theories have been adopted only by single studies. Theory of disruptive innovation was initiated by Christensen (1997) to explain the replacing process of a mainstream innovation by innovations that are cheaper than the market and with inferior performance. In this dominant view within the field which originates from technological and innovation management perspective, digital transformation is studied from an organizational and individual level of analysis. These researchers incorporate disruptive innovation theory in their studies to show how value generated from technology can be accelerated. For instance, case study of Kodak (Lucas and Goh, 2009) recognizes culture and organizational structure to be crucial elements in creating new value when disruptive technologies are introduced in an industry. In addition, Osiyevskyy and Dewal (2015) concentrate on strategic decisions of managers and argue that responding to ongoing disruption with experimentation depends on leaders’ explorative intentions.

More recent articles that relate digital transformation of BMI to disruption theory concern topics based on managerial practices of inspiring and managing disruptive innovations in digital entrepreneurship, such as collaborative open foresight (Wiener, 2018) and knowledge management (v. Alberti-Alhtaybat et al., 2018). As v. Alberti-Alhtaybat et al. (2018) state about the logistic
company Aramex “current study seeks to illustrate their approach to logistics and their mindset regarding disruptive technologies, which is reflected in their particular business model”. Also, for instance, Wiener et al. (2018) argue for collaborative open foresight to be a new managerial solution for inspiring disruptive innovations.

In addition, we highlight other theoretical perspectives that provide a variety of perspectives on digital transformation of BMs. Simmons’ article (2013) takes an actor-network perspective, to demonstrate that digital transformation of BMI is a social process facilitated by the negotiation between the network of partners involved. Other researchers use different theoretical perspectives to understand Digital transformation of BMI. Akbar and Tragona (2018) develop their research on transaction cost economics theory to explain the impact of transaction features to the emergence of sharing platforms. Teece, Helfat and Raubitschek ground their profiting from innovation framework on dynamic capabilities theory. Teece builds on the recent importance of digital platforms, standards, appropriately regime, complementary assets and technologies to show that mobilization of relevant resources and platform capabilities are important dynamic capabilities in managing complements in the ecosystem to capture value from it. Similarly, Helfat and Raubitschek (2018), suggest integrative capabilities to be important for designing and orchestrating the alignment of activities and their products with other partners in ecosystem BMs. Finally, based on affordances theory, Gupta and Bose (2018) identify the factors impacting digital transformation of BMs and attempt to develop a theory of strategic learning for digital ventures as digital technologies offer to firms the potential to develop strategic learning while they adapt continuously to their operating environment.

These findings suggest that in the literature, digital transformation of BMI was firstly related to disruptive innovation theory, and recently the trend is appearing again. The only difference stands in the fact that previous research addresses digital transformation as an extension of disruptive theory that brings challenges and opportunities to the business model of incumbents, considering digital transformation a consequence of disruptive innovation.

To conclude, these theoretical insights suggest that digital transformation has brought a new conceptualization of business models beside value creation and capture function. Sharing platforms are predominating as business models and digital transformation is emphasizing the commercializing value of disruptive innovation management. These new values of disruptive innovation management include building coordination (Teece, 2018), implementing strategic learning processes and structures (Gupta and Bose, 2018), involvement in collaborative open foresight projects (Wiener, 2018), leveraging on strategic partnerships through knowledge management (v. Alberti-Alhtaybat, Al-Htaybat, and Hutaibat 2018) and using agile methods to enhance strategic agility (Ghezzi and Cavallo, 2018). So, digital transformation emphasizes not only competition, but also collaboration, closing this way the gap between stakeholders. Moreover, referring also to what we discussed previously in the focus of literature section, digital transformation is enabling companies to work for issues of sustainability by engaging them in circular and sharing economy approaches. Thus, Business Models have become an open tool to everyday changes related to technological improvements and knowledge management with regard to stakeholders and sustainability issues. Digital transformation of BMI includes now the technological developments, relationships with stakeholders and sustainability issues in its framework. Therefore, our analysis suggests that digital transformation of BMI is a bridge that links the value of strategic innovation management required to solve problems with stakeholders,
technology development and sustainability issues with their opportunities to create and capture value.

**RQ3. How has digital transformation facilitated Business Model Innovation?**

This section combines the results of the conducted literature review to better understand the impacts of digital technologies on value creation, capture and delivery of BMs. In the literature, digital technologies “are regarded to play a critical role in facilitating business model innovations in different sectors” (Li, 2018). New enabling technologies create for companies new ways of doing business and lead to the implementation of new ways of creating, delivering and capturing value.

**Digital transformation and value creation**

The value-creation sub-component of the BM describes the products and services offered to the customer. The review of the literature shows that digital transformation is enabling companies with a diversity of ways to create new value. We identify below four ways of value creation and explain each of them.

First, digital transformation allows firms to create new value through revision and extension of their existing portfolio of products and services. For example, newspaper and book publishing industries adopted servitization strategy to offer digital products to customers (Øiestad and Bugge, 2014). This extension of products and services relates specifically to the dematerialization of physical products and the switch from product to service logic. In fact, dematerialization and service logic show to have impacted pharmaceutical industry with new approaches such as personalized medicine, nanobiotechnology and systems biology, providing this way new therapeutic principles in this industry (Sabatier, 2012). Other cases in literature include firms in retailing industry, which have created new value by adding a new business model through online retailing (Kim and Min, 2015).

Second, digital transformation enables firms to better understand customer needs and offer new value propositions in accordance to what they want. One type of these value propositions create high personalization with customers. For instance, novel value propositions can offer a high involvement to the customers in value co-creation through Addictive manufacturing and 3D printing technologies, as in the case of manufacturing industry (Bogers, 2018). Additionally, high value creations are based on new BMs that rely fully on recent technological developments such as smart apps, drones, 3D printing and crowdsourcing delivery to create new value for customers, through new services. The adoption of these digital technologies has transformed companies in the logistic industry to technology enterprises, which sell “transportation and logistic solutions without being encumbered by heavy investments in assets” (v. Alberti-Alhtaybat, Al-Htaybat, and Hutaibat 2018). In contrast, other value proposition aim to satisfy only necessary needs. In this case, firms offer new value propositions and even create new markets by addressing the needs of low income customers in emerging economies (e.g. resource-constraints innovations in the healthcare industry) (Winterhalter et al., 2017).

Third, we notice a tendency of some industries like financial services, hospitality and automotive in employing disruptive technologies on their BMs, in order to find solutions towards sustainability
issues and sharing economy approach. For instance, automotive industry is adopting sustainable mobility (Bohnsack and Pinkse, 2018) to create new sources of value by offering a superior product or service (e.g. car-sharing services, mobile applications), or by coupling their products with other services (Bohnsack and Pinkse, 2018). Similarly, the embedment of the sharing economy approach in the financial services industry is bringing new innovations on processes and services (Gomber, 2018), that are leading to digital banking services, products and functionality, which enhance customer experience (Gomber, 2018).

Forth, we witness the creation of new value through digital platforms and ecosystems. DT provides the necessary digital infrastructure to everyone to connect different actors in networks. For example, in the USA, DT has created new organizations of Health Information Exchanges (HIE), through multi-sided digital platforms to offer information exchange service between different actors in the industry (Khuntia et al., 2018). In the telecommunication industry, diffusion of data content through mobile devices and the innovation of network infrastructure technology has resulted in a mobile telecommunication ecosystem. In the hotel industry, the emergence of booking platforms (booking.com) and sharing platforms (Airbnb), have brought new value propositions to customers which are cheaper and more authentic.

**Digital transformation and value delivery**

Value delivery describes the way activities and processes in a company are employed to deliver to the customer the promised value. The review of the literature reveals to have been a significant change in the way value is delivered in digitally enabled business models. Digital transformation has core competences, activities, capabilities and roles of firms (Nucciarelli, 2017; Teece, 2018; Ghezzi et al., 2015).

First, firms are required to examine their core competences to align them with the shift to digital formats and servitization (Øiestad and Bugge, 2014). Their new competences should include knowledge on digital technologies to manage relations with customers efficiently and to use interactivity of digital channels (Li, 2018). In addition, firms should be open to incorporate new disruptive technologies in order to innovate their operations continuously (v. Alberti-Alhtaybat, Al-Htaybat, and Hutaibat 2018).

Second, rapid changes in the new ecosystem business environment open the need for new capabilities and more emphasize on specific existing capabilities. New capabilities are necessary to deal with changes in the value chain and ecosystem business environment. For instance, in pharmaceutical industry, firms need to deploy specific assets and capabilities that relate to orchestration and management of information flows in the network. Moreover, integrative capabilities help companies capture value in ecosystems and leverage their assets (Li, 2018). In other industries (e.g. telecommunication) marketing capabilities have to deal with decreased costs and technical capabilities to deal with changes in the ecosystem. Firms need to be “agile” and leverage on platforms and on strategic partnerships.

Third, DT implies a change in activities and processes of the firm. When firms get involved in projects about sustainability, manufacturers in the automotive industry implement environmentally-friendly processes of manufacturing. This undertaking has led companies and suppliers collaborate on open innovations projects, such as in the case of “Mobility Scenarios for the year 2030 – Materials and Joining Technologies in Automotive Engineering” (Wiener et al., 2018). The other
example are processes of frugal innovations in the healthcare industry, which are designed to reduce cost in all value chain activities (Winterhalter et al., 2017).

Forth, DT has impacted the role of firms in the industry. The shift in the role of actors in the industry results from the entrance of new players. For example, in the telecommunication industry the entrance of new players (web companies) in the industry affects value delivery (Ghezzi et al., 2015).

**Digital transformation and value capture**

Value capture of the business model concerns the revenue model and its financial viability, by focusing on revenue streams and cost structures. From the review of the literature we find that DT creates to firms new various ways on how to decrease costs and increase the revenues.

First, firms capture value through new enabling technologies. Big data provide companies with the means to reduce uncertainty in decision-making (Urbinati et al., 2018), to optimize processes and increase the efficiency and quality of products and services (Loebbecke and Picot, 2015). These attributes help firms identify new sources of value in other markets and to reduce costs of adoption of BMs over time.

Second, firms can capture value from the superior value propositions. This is evidenced in industries such as logistic, where customers pay for superior service and solutions, or resource-constrain innovations, for superior quality of service network. In the pharmaceutical industry firms capture value through new value propositions, for which companies deliver service to patients. In creative industries premium prices are based on the exclusivity and personalization level of the service offered (Li, 2018).

Third, DT allows firms to capture value on platforms by leveraging on new technologies and improved customer intimacy (Gomber, 2018). However, with regard to financial viability, research shows that value capture is influenced by the advancement of services provided. Transaction-based revenue models are not appropriate revenue models for achieving viability over time.

**Conclusions**

This paper uses a structured literature review to provide insights about the development of the field of digital transformation of BMI, to understand the impact of digital transformation on BMI and to provide avenues for further research. The review of the literature shows that digital transformation of BMI is a new field of research with a growth of interest from researchers starting in 2014. As there is an increased interest of researchers we expect a further growing number of publications in the field. Moreover, we observe that topics have shifted over time from incumbents to digital start-ups and from disruptive technologies to new enabling technologies. This reveals the practitioner-led nature of research in this field.

The field does not have any dominating author, implying that few authors remain focused on exploring further aspects of BMI driven by digital transformation. This hinders the knowledge-building process in the field, as only few authors make use of prior findings to build cumulative knowledge. Furthermore, results show for a need of research in developing countries, as they are
much under-represented with only three articles. Further research in developing countries is important, in order to define the boundaries of theorization on digital transformation of BMI, that will lead to a better understanding of this phenomenon. With regard to industry sectors, manufacturing and creative industries dominate research. This calls for a need to study other industries such as design, architecture, advertising and fashion industry (Mangematin et al., 2014).

The extensive use of qualitative methodology suggests for a potential of the field to be restricted to only interpretive theory building. This calls for more deductive test theory, which might be helped if the field will show more interdisciplinary research in the future.

Focus of research has been mainly in the understanding of impacts that new disruptive technologies have on industries, identifying the areas of transformation on activities, processes and business models. Only few studies focus at understanding how the process of transformation takes place by drawing on different disciplines and theories. Furthermore, the results of our data show that digital transformation has challenged supply chains through digital products and through customization of production. Therefore, there has been an impact in value creation and capture, as well as in the building blocks of BMs, namely – value proposition, value architecture and distribution (Li, 2018). These new opportunities offered by digital transformation, have recently facilitated the emergence of new BMs for frugal innovations and circular economy.

With regard to theoretical perspectives, we suggest that digital transformation has brought a new conceptualization of business models beside the value creation and capture function. Thus, we propose that digital transformation of BMI is a bridge that links strategic management of companies’ disruptive innovation required to solve problems with stakeholders, technology development and sustainability issues with their opportunities to create and capture value.

Simons’ article brings a new perspective in our understanding of digital transformation in companies, taking into consideration the moderating role of social aspects in creating value from digital transformation at a firm level. Further research should investigate which social aspects in the network of actors have more contribution in value creation. Moreover, we also lack an understanding on how social relationships of the actors in a network contribute in value delivery and capture. This perspective of actor-network theory can be very helpful in studying sharing platforms and ecosystems, outside the boundaries of the firm.

Thus, these studies focus on disruptive technologies and advance the disruptive innovation theory by proposing culture, organizational structure and leaderships’ cognitive intentions to be important factors affecting companies’ respond to disruptive innovation. However, there is still a missing link in understanding the moderating role of disruptive technologies, based on their digital infrastructure and requires more research on the conditions and the extend of BMs transformations (Gupta).

Our study has limitations as well. Firstly, this paper considers only research published in leading journals, listed in the ABS classification with 3, 4 and 4*. This can be a limitation for missing results published in other journals that might be relevant for the aim of our study. Secondly, there are some implications with conclusions derived in this study. One reason has to do with validity of results only for the specific time period we consider in this study, until July 2018. As we previously saw, since research in the field is having a high interest, future contributions could modify our conclusions. In addition, conclusions derived in this research base in exploratory research, where sometimes single case study approach is followed (Wiener et al., 2018), or sharing platforms are evolving over time (Pisciell, 2018) and where IT industry is characterized by short innovation cycles (Nieuwenhuis et al., 2018). Nevertheless, this research on digital transformation on BMI can provide practitioners with new insights about the phenomenon of digital transformation, and will
help them to continually innovate their BMs and remain competitive, as new technologies become more ubiquitous.
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