Business Process Management: Potentials and Challenges of Driving Innovation

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Abstract

Business process management (BPM) is fundamental for organizational competitiveness. In the last decades, BPM has evolved from a technology-focused into a holistic and principle-oriented discipline concerned with efficient and effective business processes. However, the emerging digital age requires rethinking the role of BPM in organizations. On the one hand, we identify opportunities of BPM as a driver of innovation that institutionalizes digital technologies in business processes. On the other hand, we also recognize opportunities to, in turn, innovate BPM. Overall, we identify both opportunities and challenges of BPM when it comes to innovation in the digital age. Based on these insights, we provide an outlook on the chapters of this book which may guide both the research and practice of BPM in driving innovation in a digital world.

1   Introduction

Information technology (IT) plays a vital role in driving innovation in today's digital world, and Business Process Management (BPM) is key in leveraging these potentials. Many new technologies, such as mobile and real-time technologies, the Internet of Things, big data analytics, and social media, have come to the fore in recent years, which seems to accelerate the speed of business innovation and transformation. While such new technologies represent important triggers of innovation, only the incorporation of IT into business processes allows

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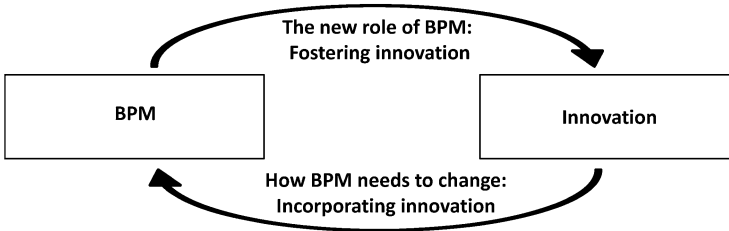e-mail: theresa.schmiedel@uni.li; jan.vom.brocke@uni.li

Fig. 1 BPM and innovation

organizations to be innovative and remain competitive. Thus, business process management (BPM) can be considered a key driver for innovation.

Against this background, the purpose of the present chapter is to analyze the role of BPM in driving innovation in a digital world in greater detail. In doing so, we follow a comprehensive (Rosemann & vom Brocke, 2015) and principle-oriented (vom Brocke, Schmiedel, et al., 2014) understanding of BPM. Our socio-technical cognition of BPM builds on a growing consensus among both researchers and practitioners that BPM is comprised of more than just methods and systems supportive of operational excellence. BPM is also instrumental for innovating and transforming businesses through strategy-, governance-, people- and culture-oriented factors (Rosemann & vom Brocke, 2015).

The remainder of this chapter is organized as follows: As a next stage, we provide some background information on business innovation in general and about innovation in the digital age in particular. We then examine the role of BPM in business innovation, looking into two complementary facets: the potentials of BPM in driving innovation and the challenges for BPM in taking on and demonstrating this new role. Particularly, we look into the potentials of BPM's new role in fostering innovation and into the challenges of changing BPM where necessary to incorporate required innovation (Fig. 1). Finally, we provide a brief outlook on the chapters of this book.

2   The Need for Innovation

Innovation is a concept that seems to enter more and more business- and management-related discussions. While one could at times gain the impression that innovation has become a buzzword or hyped concept in both research and practice, there is strong consensus that innovation is and always has been a key driving force of competitiveness and welfare.

In fact, the wealth of a society strongly depends on the innovative capacity of its people and organizations. Particularly in regions that witness production- and service-oriented jobs moving to other parts in the world, innovation is considered to be a continuous requirement for sustaining welfare in a changing industrial

environment. Such regions comprise North America, Europe, and Australia, but other regions such as Asia and South America will face a similar situation very soon. In essence, innovation is essential for all areas of the world to sustain and further develop living conditions, both from an economic and a societal perspective.

Considering the rapidly changing business environment and technological developments in recent years, the innovative capacity of BPM gains increasing importance. In this context, it can appear challenging for organizations, however, to recognize such external changes, not as a threat to established business habits, but, rather, as an opportunity that ultimately allows fostering the success of organizations.

Over the last couple of decades, research and practice have developed BPM into a discipline that has proven to drive the competitiveness of organizations (Hammer, 2010). BPM is concerned with the design, implementation, and monitoring of efficient and effective business processes (Smith & Fingar, 2004; vom Brocke & Rosemann, 2015). Since processes, i.e., operations in and across organizational functions, are at the core of every organization, the relevance of BPM for companies of all kinds of industries, private, and public organizations has been recognized worldwide.

We can distinguish between two abstract modes of managing business processes: On the one hand, BPM concentrates on running business, i.e., it ensures both process compliance through performance monitoring and also continuous workflow improvement with the overall objective to maintain operational excellence (Schmiedel, vom Brocke & Uhl, 2015). On the other hand, BPM engages in changing and disruptively innovating business, realizing superior ways to provide products and services utilizing new technologies.

Having recognized the relevance of innovation in general and with regard to BPM in particular, we next look more deeply into the meaning of innovation, since it seems to be a rather broad term that can refer to various aspects.

3   The Power of Process Innovation

Innovations have been distinguished in many ways. To illustrate this we exemplarily look at three dimensions of innovation with two particular types of innovation each and pay special attention to the power of process innovation as one example that, naturally, stands out in the context of BPM.

One dimension refers to the **origin** of innovations. In this regard, there are two typical sources (Chesborough, Vanhaverbeke, & West, 2006).

- **Closed innovation:** Innovations that stem from the research and development activities of companies and institutions, i.e. from a specific group of people who are employed in order to innovate.
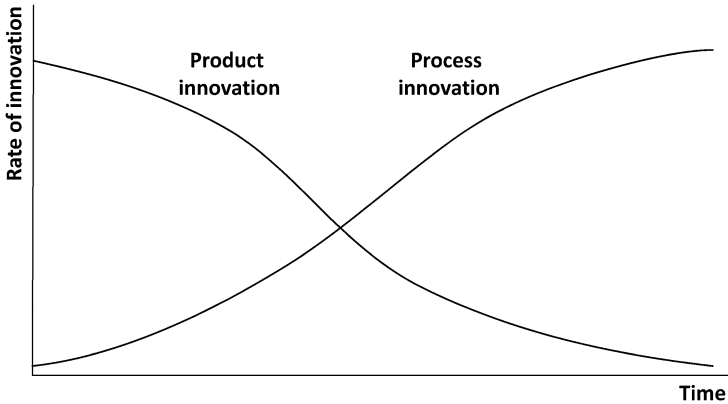
Fig. 2 Product vs. process innovation

- **Open innovation:** Innovations that are developed through open innovation processes, e.g., through involving the crowd, namely people from outside the organization (e.g., MyStarbucksIdea.com or Dell's IdeaStorm.com).

Further, we can distinguish innovations based on their **impact**. Innovations with a very broad impact are based on disruptive technologies which completely change the way people interact and do business; also referred to as "game changing" innovations. Whereas innovations which "only" influence a particular industry are more focused in their impact on society.

- **Specific innovations:** Innovations that have an impact only within a limited scope, e.g. within a very specific market (e.g. iPods in the music market).
- **Disruptive innovations:** Innovations that have a substantive influence on many or even all parts of the economy (e.g. the Internet).

Distinguishing innovations based on their **form**, two key types of innovation are typically differentiated as depicted in Fig. 2 (Fichman, Dos Santos, & Zheng, 2014; Utterback & Abernathy, 1975).

- **Product innovation:** Innovations that focus on the development and diffusion of new products (which often contain some form of new technology), i.e. innovations as seen from the producer perspective.
- **Process innovation:** Innovations that focus on the adoption of such products (which often requires some form of new behavioral pattern) through individuals or organizations, i.e. innovations as seen from the user perspective.

While the importance of product innovations is undisputed, the innovation of processes seems to be a key differentiator of our times, mostly through the use of new technology. Take for example, Nespresso, PayPal, or iTunes. These are largely

successful businesses built around products that seem to have been out there forever, namely, coffee, money and music. It is a very old need which is addressed but it is fulfilled in a highly innovative way, namely by process.

Process Innovations are particularly appealing, since they

- directly affect people's experience,
- often do not need heavy engineering,
- can take place with a given technology,
- can be deployed globally.

In comparing the development of product and process innovation over time, smartphones serve as a good example to illustrate the shift in the rate of innovation across time. Smartphones represent a product innovation combining various functionalities such as the ones of mobile phones, web browsers, or navigation systems. When the first smartphones entered the market, the rate of this product innovation was very high. Meanwhile, however, this product innovation has led to countless process innovations in both private and business life, ranging from individual assistance (e.g. on health care) to corporate app stores innovating sales processes for instance. Even though smartphones as such are not highly innovative any more, they still enable manifold process innovations in all kinds of application areas. New technologies of our times represent the foundation for further process innovation in the digital age (see the chapter by Sandy Kemsley (2015)).

4   Potentials of Our Digital Age

Most of today's innovations are driven by IT. New technologies including mobile and real-time technologies, the Internet of Things, big data analytics, and social media clearly illustrate the enormous impact of IT on society in terms of enabling competitiveness and welfare (vom Brocke, Debortoli, Müller, & Reuter, 2014). Further, examining such technologies gives an indication how strongly IT generally shapes our times. The digital age is increasingly characterized by usage of the Internet through anyone and anything at anytime and anywhere:

- **Anyone and Anything:** Addressing the question on who represents the digital age, we can observe that large parts of modern societies are experts in using IT in their daily business. Looking at new generations growing up with the Internet, i.e. so-called digital natives, their expertise with IT is even more advanced, working with the Internet comes ever more naturally to them and is increasingly taken for granted. Not only people are online today, however, as nearly anything can be connected to the Internet, including cars, houses, clothes, tools, and

machines. It has been reported that since 2013 more "things" are on the Internet than people (Mclaughlin, 2013). The possible connection of anyone and anything to the Internet is a key characteristic of the digital age.

- **Anywhere:** Another key characteristic of the digital age refers to the ubiquity of the Internet. Technically it is possible to realize a comprehensive network coverage that enables Internet access around the globe. Internet providers for such services are omnipresent and Internet-to-go use is growing as it becomes more and more affordable. Being able to go online anywhere can fundamentally change social and economic processes. Potentially, ubiquitous Internet access might increase efficiency as waiting and travelling times can be used effectively. For example, HomePlus has innovated the retail market in South Korea by placing QR-code-based shopping experiences in local underground transport, which can now be seen in many places around the world.

- **Anytime:** Another characteristic of the digital age relates to the fact that data is not only available anywhere (irrespective of location) but also anytime (irrespective of time). Particularly, it also relates to the idea of real-time availability of data. The possibility to receive up-to-date information at any point in time is key for essential innovations in many business processes. Integrating multiple kinds of real-time data, analytics today already enables the prediction of events like the spread of the flu or the occurrence of traffic jams much better than conventional methods could have managed. It is intriguing to think how such data integration will innovate our professional and private lives in the near future, and first studies are available to report on specific use cases in business (vom Brocke, Debortoli, et al., 2014).

The implications of these characteristics may become clearer when looking into some scenarios: The car of the future will not only optimize routing based on real-time traffic information, but it will be able to avoid accidents through information from other cars in its proximity. The house of the future will be able to do smart energy management based on weather information and based on the location of the people inside the building. Clothes of the future will manage the personal state of health, eventually suggesting to the wearer to drink a glass of water or to rest for a few minutes based on body data taken from the skin (vom Brocke, Riedl, & Léger, 2013).

In industry, such innovations of the digital age will significantly change business. Apart from new possibilities in designing and managing internal organizational processes, new customer services will be available that could not have been offered before. At the same time, it is obvious that the mere technological action opportunities will not result in value creating innovations right away. It is rather about new business processes that can be afforded through the technology, and BPM plays a key role in leveraging the manifold opportunities. In the next section, we further examine the role of BPM in driving such innovations.

5   The New Role of BPM

Considering BPM as a source of innovation, we can generally distinguish between the modes of running and changing business. Based on this differentiation, BPM can drive innovation in two ways: (1) through managing processes which yield product innovations (running processes) and (2) through managing the redesign of processes which yields process innovations (changing processes).

(1) **Focusing on the management of creative processes to foster product innovations**. Some organizational processes aim at generating innovations, such as processes in the research & development department of a company. The primary focus of these processes lies in identifying innovations of products and services that generate additional business value. In such processes, for instance, creativity plays an important role (Seidel, 2011), and the management of these processes includes designing, implementing, and monitoring creative and administrative work to enable overall smooth procedures and to maintain operational excellence.

   Traditionally, organizations consider processes that generate innovations as the heart of their business. Working on product innovations has typically been driven, for example, by engineers in a secured environment inside the company. In recent years, however, open innovation has proven beneficial in more and more cases (Chesborough et al., 2006). Involving people from outside the organization in innovating products and services often makes use of open innovation platforms such as the one from the coffee brand Starbucks, where customers suggest new recipes for drinks and food, among other ideas.

   The growing trend to involve customers in innovation processes seems to be fostered by the possibilities that the various IT-supported collaboration systems of the digital age offer. Online platforms, social media, and mobile apps, for example, are increasingly used to technologically support collective efforts to develop new products and services, also referred to as crowd sourcing (Leimeister, Huber, Bretschneider, & Krcmar, 2009). Thus, managing processes which yield innovations today truly refers to both internally and externally grounded processes.

(2) **Incorporating new technologies into organizational processes to foster process innovations**. Apart from managing innovation processes, BPM also allows for managing process innovations, i.e. redesigning business processes to increase competitiveness. Establishing innovations in organizational processes can refer to various aspects, including the redesign of process steps through integrating IT products such as smart phones and tablets or IT services such as mobile apps.

Generally, we can distinguish between two triggers of process innovation. On the one hand, both internal and external requirements from involved stakeholders can lead to the redesign of business processes. On the other hand, the possibilities of new technologies can trigger process innovation. While stakeholder requirements have always been triggers for change and innovation, new technologies of the digital age represent a key source of numerous affordances for process innovations today.

In fact, fundamental business transformations are often driven by incorporating IT into business processes. Examples are wide-ranging, including globally integrated ERP systems that allow for harmonized processes, mobile phone apps that allow for new sales processes, and big data analytics that allow for real-time process decisions based on data available from products in use.

Overall, we can observe distinct ways in which BPM can serve as a source of innovation. In the next section, we look into how BPM needs to change in order to account for its new role and examine how BPM as a management approach may need to be innovated in order to further drive innovation.

6   How BPM Needs to Change

As a discipline, BPM builds on an established pool of methods and models that have proven successful in improving the competiveness of organizations in various forms. However, we might observe a shift in one of the core institutional logics that BPM professionals draw from: turning from a logic of automation to a logic of innovation (Tumbas, Schmiedel, & vom Brocke, 2015). With regard to established BPM methods, we need to recognize that such methods have been designed for the application areas of their times. Originally, BPM essentially focused on well- (or semi-) structured processes, while driving innovation today calls for management practices suitable for processes of diverse natures.

Therefore, it is highly relevant to develop methods and models that account for different types of application areas. In developing such methods and models, it will be important to particularly leverage the potential of new technologies to prove that they successfully drive innovation in a digital age. Considering how far BPM requires innovation, we can again distinguish between the two modes (1) running and (2) changing business.

(1) **Considering the nature of processes in context-aware BPM**. Regarding the continuous management of organizational processes, extant BPM models and methods seem to focus on structured and standardizable processes. However, knowledge-intensive and dynamic business processes tend to be neglected. It seems to be important, though, to examine how far existing models and methods are applicable to all kinds of processes.

For example, one might reflect whether all processes should be modeled and, if so, whether all processes should be modeled in the same way. New

technologies of the digital age, for example, meanwhile allow for real-time mining of business processes based on the digital traces that single process steps leave or based on text mining possibilities (Günther, Rinderle-Ma, Reichert, Van der Aalst, & Recker, 2008). Such analytical possibilities enable new ways of modeling as-is processes.

Generally, we can observe a lack of distinction between existing types of organizational processes for applying suitable methods and models. Research has shown, for instance, that we need to address creative processes differently than we have addressed routinized processes in the past (Seidel, 2011). Such considerations are necessary in order to consider the nature of processes when managing them. Identifying dimensions that distinguish business processes and that require a distinct approach for their management will be particularly important in order to realize context-aware BPM in both research and practice.

(2) **Leveraging the potentials of digital technologies in a holistic approach towards process innovation**. The digital age offers manifold opportunities to innovate business processes. In order to do so, it will be important to first identify value-creating potentials (vom Brocke, Debortoli, et al., 2014). In particular, reflecting on the possibilities that anything may be connected anywhere and anytime may be supportive in finding relevant innovation ideas. For example, monitoring and analyzing process performances based on digital processes enables real-time deviance mining, i.e. the identification of best and worst process performances (see the chapters by Recker (2015) and by Dumas and Maggi (2015)).

Once required process changes are identified, research has found that BPM needs to follow a comprehensive approach in order to successfully manage such changes (vom Brocke, Petry, & Gonser, 2012). Beyond modeling and IT-related factors, BPM should consider various other factors in developing dynamic capabilities of process transformation. Prior research has shown that such factors include capabilities, such as strategic alignment, governance, people, and culture (Rosemann & de Bruin, 2005), that need specific consideration in management (Müller, Schmiedel, Gorbacheva, & vom Brocke, 2014; Schmiedel, vom Brocke, & Recker, 2013).

Looking beyond the two modes of running and changing business, recent research has suggested essential principles for BPM that also apply for leveraging and shaping BPM as a driver for innovation (vom Brocke, Schmiedel, et al., 2014). In the following, we will further outline how (3) drawing from essential BPM principles helps to build up innovation capabilities in an organization.

(3) **Building up innovation capabilities following essential BPM principles.** Managing innovation through BPM and building up long-term innovation capabilities in an organization can be guided by essential principles of BPM (vom Brocke, Schmiedel, et al., 2014). Such principles include, for example, the "principle of purpose", which emphasizes the need that BPM contributes to strategic value creation. This is an important aspect to consider when managing for innovation, because innovation may well be enabled by technology, but it

ultimately needs to deliver business value, and from a number of projects there is evidence that value-orientation is often neglected throughout IT projects.

Another example relates to the "principle of continuity" which suggest that BPM is a permanent practice—and which also implies that innovations should constantly be considered in organizations and not only when reasons for change have piled up. In the digital world in particular, the "principle of technology appropriation" is another highly relevant principle. It suggests that BPM makes opportune use of technology, which is fundamental in an innovation context. An overview of the principles is also given at www.bpm-principles.org. While the identified principles of good BPM are generally relevant for managing extant processes, they are particularly important to consider when changing business processes and incorporating innovations in the organization.

In the next section, we present an overview of the chapters in this book, outlining how they further inform researchers and practitioners on driving innovation in the field of BPM.

7 Contributions of This Book

The chapters of this book provide a broad overview of the various facets of BPM when it comes to driving innovation in today's digital world. The authors of these contributions show how BPM plays a key role in establishing and maintaining organizational competitiveness and ultimately societal welfare.

The book is structured into five parts. **Part I** gives a general **introduction** on innovation in the context of BPM. The overview on potentials and challenges of innovation in this chapter is followed by two further chapters. Charles Møller reports on "*Business Process Innovation as an Enabler of Proactive Value Chains*". He outlines the importance of agile and resilient value chains and discusses how process innovation supports the transformation of value chains, using the example of a Danish research and innovation program in manufacturing. Richard Welke presents "*Thinking Tri-laterally About Business Processes, Services and Business Models: An Innovation Perspective*". He outlines the close connection of business models (as purpose of a service), services, and processes (as sequence of tasks in a service) and illustrates a fresh perspective on process innovation based on bottom up, top down, or middle out viewpoints.

Following up on this introduction, **Part II** gives insights on **driving innovation through emerging technologies**. Four chapters outline the important role of new technologies including mobile, social, and cloud technologies, in realizing innovative ideas in the context of BPM. Sandy Kemsley provides an overview on "*Emerging Technologies in BPM*". She explores the role of new technologies in the context of BPM, outlining how mobile, cloud, social, and analytical technologies initiate change in the nature of work and what the implications of intelligent processes are. Peter Trkman and Monika Klun report on "*Leveraging Social Media for Process Innovation. A Conceptual Framework*". They illustrate

how social media can be used in various phases of business process life cycles to support, for example, the modeling, execution, monitoring and improvement of organizational processes. Bernd Schenk outlines "*The Role of Enterprise Systems in Process Innovation*". He highlights how enterprise systems can function as enabler, trigger, and enforcer in organizational innovations and illustrates this by the opportunities of cloud computing for the integration of enterprise systems in process innovations. Jens Ohlsson, Peter Händel, Shengnan Han, and Richard Welch report on "*Process Innovation with Disruptive Technology in Auto Insurance: Lessons Learned from a Smartphone-Based Insurance Telematics Initiative*". They present the potentials of behavioral-based insurance and emphasize the need for process changes in organizations to leverage the potentials of insurance telematics.

Based on these insights into emerging technologies, **Part III** focuses on **driving innovation through advanced process analytics**. Four chapters present latest findings on the role of analyzing extant data for realizing innovations in a process context. Wil van der Aalst reports on "*Extracting Event Data from Databases to Unleash Process Mining*". He introduces an approach to create event logs from underlying databases as a fundamental prerequisite for the application of process-mining techniques when information systems do not explicitly record events. Jan Recker gives insights on "*Evidence-Based Business Process Management: Using Digital Opportunities to Drive Organizational Innovation*". He illustrates how digital capabilities enable organizations to innovate based on facts rather than fiction and outlines how research can play a key role as an innovation support service. Marlon Dumas and Fabrizio Maria Maggi give insights on "*Enabling Process Innovation via Deviance Mining and Predictive Monitoring*". They show how analyzing process execution logs offline can detect deviant behavior that leads to performance changes and how process analytics at runtime can predict the influence of certain activities on probable process outcomes. Peter Loos, Peter Fettke, Jürgen Walter, Tom Thaler, and Peyman Ardalani outline the "*Identification of Business Process Models in a Digital World*". They introduce a comprehensive seven-phase method for the inductive development of reference models and present an application scenario of specific techniques that allow to automatically derive reference models.

Following the elaborations on process analytics, **Part IV** sheds light on **driving innovation through new generation process modeling**. Three chapters give an overview of latest developments in documenting business processes in organizations. Jörg Becker presents "*Designing Process Modeling Tools to Facilitate Semantic Standardization: Increasing the Speed of Innovation in a Digital World*". He outlines five design principles for process modeling tools which support the development of harmonized process models and illustrates a prototypical implementation. Mikael Lind and Sandra Haraldson provide details on "*(Air)port Innovations as Ecosystem Innovations*". They show how business process modeling can be used to facilitate digital innovations in ecosystems with multi-actor collaborations and illustrate key innovations in the case of Future Airports. Monika Malinova and Jan Mendling report on "*Leveraging Innovation Based on Effective Process Map Design: Insights from the Case of a European Insurance Company*".

They use a specific case to illustrate how companies benefit from systematic process map design and how this relates to process innovation.

Complementing the previous technical and methodological aspects, **Part V** gives insights into **driving innovation through organizational capabilities**. Four chapters elaborate on the importance of factors including strategy, governance, and culture in innovating in a BPM context. César A.L. Oliveira, Ricardo M.F. Lima, and Hajo A. Reijers present "*Implementing a Digital Strategy Through Business Process Management*". They outline how informing employees about strategic corporate goals during workflow execution increases strategic alignment and offers innovative possibilities for the implementation of strategic change. Stefan Sackmann and Kai Kittel elaborate on "*Flexible Workflows and Compliance: A Solvable Contradiction?!*". They introduce an innovative approach and its prototypical implementation to solve the trade-off between flexible and compliant workflows by allowing a workflow to be changed according to requirements during run-time. Amy Van Looy reports "*On the Importance of Non-technical Process Capabilities to Support Digital Innovations*". She suggests a process capability framework that recognizes the importance of non-technical capabilities relating to process-oriented management, structure, and culture. Janina Kettenbohrer, Mirko Kloppenburg, and Daniel Beimborn provide insights into "*Driving Process Innovation: The Application of a Role-Based Governance Model at Lufthansa Technik*". They elaborate on effective governance models that support decision-making in process improvement and innovation, and apply a role-based governance model to an exemplary process at Lufthansa Technik.

Overall, the book illustrates several distinct facets of BPM that are important for driving innovation in a digital world. The various viewpoints show, on the one hand, that BPM bears huge potential to foster such innovations, and, on the other hand, that BPM also faces challenges, which call for advancing both BPM research and practice towards examining how to further develop BPM as a discipline. We hope you find the chapters of this book inspiring food for thought and action.

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