

THE HUMAN SIDE OF BUSINESS PROCESS STANDARDIZATION:

**A THEORETICAL AND EMPIRICAL INVESTIGATION OF
EMPLOYEE PROCESS CHANGE ACCEPTANCE**

Janina Kettenbohrer

Dedicated to
my love, Stefan, my mother, Barbara, and my brother, Robin

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EMPLOYEE PROCESS CHANGE ACCEPTANCE**



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Zusammenfassung (German Summary)

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Prozessstandardisierung wird nach wie vor forciert, um die Effizienz in Unternehmen zu steigern. Eines der prominentesten Beispiele aus der jüngsten Zeit ist die prozessorientierte Neuausrichtung der Lufthansa Gruppe, welche mithilfe von Prozessstandardisierung Synergien zwischen den Tochterairlines und den zugehörigen Prozessen schaffen möchte. Obwohl Prozessstandardisierung und die zugrundeliegende Managementdisziplin Business Process Management keine neuen Phänomene sind, erzeugen sie in Unternehmen dennoch einige Schwierigkeiten. Bisherige Forschungsarbeiten zeigen, dass vor allem fehlende Methoden zur Identifizierung von geeigneten Prozessen (Schäfermeyer et al. 2012), kulturelle Barrieren (vom Brocke and Sinnl 2011), sowie fehlende Prozessorientierung, aber auch fehlende Identifikation und Motivation auf Seiten der Mitarbeiter (Grau and Moormann 2014) Hauptgründe für das Scheitern von Prozessprojekten sind. Bei der Standardisierung von Prozessen kommt ein weiterer Faktor hinzu: die Akzeptanz der Mitarbeiter, die dem neuen Prozessstandard folgen sollen. In den meisten Fällen haben die Unternehmen, in denen standardisiert werden soll, bereits dokumentierte Prozesse oder die Mitarbeiter haben eigene Routinen, um ihre Aufgaben abzuwickeln. Der neue Standard nutzt diese bereits existierenden Prozesse als Aufsatzpunkt oder ersetzt diese komplett. Aufgrund der radikalen Einflussnahme auf die tägliche Arbeit der Mitarbeiter, müssen diese im Rahmen der Prozessstandardisierung besonders berücksichtigt und ihre Akzeptanz gegenüber der veränderten Prozesse sichergestellt werden. Um die komplette Bandbreite der Mitarbeiterakzeptanz hinsichtlich Prozessstandardisierung abzudecken, wird im Folgenden der Terminus Prozessveränderungsakzeptanz verwendet.

Der erste Schritt in Richtung Prozessveränderungsakzeptanz wird durch eine prozessorientierte Arbeitsweise der Mitarbeiter gemacht. Diese neue Arbeitsweise beinhaltet sowohl die Möglichkeiten und Fähigkeiten, aber auch die Bereitschaft der Mitarbeiter in prozessorientierter und standardisierter Art und Weise zu denken und zu handeln. Um dies zu erreichen, müssen Organisationen zunächst die Faktoren verstehen, welche die Bereitschaft und die Motivation von Mitarbeitern prozessorientiert zu denken und zu handeln beeinflussen. Die aktuelle BPM-Literatur wendet sich zwar zunehmend den Mitarbeitern zu, indem BPM-Kultur (Hammer 2007; vom Brocke and Sinnl 2011; Willaert et al. 2007) sowie Mitarbeiterschulung und -befähigung (Kohlbacher and Gruenwald 2011a; Leyer et al. 2014; Škrinjar and Trkman 2013) immer häufiger diskutiert werden. Dennoch fokussiert sich die BPM-Literatur immer noch zu wenig auf die psychologischen Aspekte von Prozessmitarbeitern. Um Akzeptanz der Mitarbeiter gegenüber veränderten und standardisierten Prozessen zu erreichen, muss gänzlich verstanden werden, welche Faktoren diese beeinflussen.

Diese Dissertation beleuchtet detailliert die individuelle Perspektive der Prozessmitarbeiter und analysiert die Faktoren, welche die Prozessveränderungsakzeptanz von Mitarbeitern erhöht. Die übergeordnete Forschungsfrage der vorliegenden Dissertation lautet: *Welche individuellen und motivatorischen Faktoren beeinflussen die Mitarbeiterakzeptanz gegenüber Prozessveränderungen?* Diese Forschungsfrage (sowie deren abgeleiteten Forschungsfragen) wird mithilfe von neun Forschungsbeiträgen sowie eines multimethodischen Ansatzes beantwortet.

Das Fundament für diesen Ansatz stellen zwei Literaturanalysen dar, welche sowohl die verschiedenen Dimensionen von Prozessorientierung sowie Erfolgsfaktoren der Prozessstandardisierung beleuchten. Darauf aufbauend wurde der Einfluss von ausgewählten Faktoren auf die Prozessorientierung sowie die Prozessveränderungsakzeptanz von Mitarbeitern mithilfe von Fragebögen in unterschiedlichen Unternehmen und Industrien vermessen. Auf Grundlage dieser Daten wurden anschließend die unterschiedlichen Forschungsfragen unter Zuhilfenahme verschiedener theoretischer Konzepte, wie beispielsweise der Job Characteristics Theory, sowie unter Verwendung von verschiedenen Methoden analysiert.

Besonders von Bedeutung für eine detaillierte Analyse der Prozessveränderungsakzeptanz ist ein fundiertes Verständnis über Arbeit an sich sowie über Arbeitsbedingungen, welche die Motivation der Mitarbeiter positiv beeinflussen. Eine etablierte Theorie in diesem Kontext stellt die Job Characteristics Theory dar, welche den positiven Einfluss von sogenannten Arbeitscharakteristika (mediert durch sogenannte psychologischen Stadien) auf die Arbeitsleistung der Mitarbeiter (wie beispielsweise Motivation, gute Arbeitsergebnisse, aber auch geringere Fehltagel) postuliert. Die vorliegende Arbeit transferiert die Job Characteristics Theory auf das Thema Prozessveränderungsakzeptanz und untersucht den Einfluss der einzelnen Faktoren auf selbige. Neben den einzelnen Arbeitscharakteristika spielt auch die Bedeutung, die ein Mitarbeiter seiner Arbeit zuspricht (Meaningfulness of Work), eine entscheidende Rolle, ob Prozessveränderungen akzeptiert werden. Da Veränderungen (und vor allem Prozessstandardisierung) an sich häufig mit gefühlten Einschränkungen und Beschneidung des eigenen Verantwortungsbereichs einhergehen, werden diese von den Betroffenen als bedrohlich wahrgenommen. Gerade die Einschränkung des eigenen Wirkungsbereiches (durch beispielsweise geänderte und strikte Prozessvorgaben), hindert die betroffenen Mitarbeiter nach ihren eigenen höheren Zielen zu streben, wodurch eine sogenannte disharmonische Arbeitssituation erzeugt wird. Konkret bedeutet dies, dass Mitarbeiter Dinge tun müssen, die sie entweder nicht können oder nicht mögen. Aufgrund dieses gestörten Gleichgewichts sinkt die gefühlte Bedeutung der Arbeit, was jedoch vom Individuum vermieden wird. Im Umkehrschluss bedeutet dies, dass sobald das aktuelle Gefühl der Bedeutung der eigenen Arbeit angegriffen wird, die Bereitschaft Neues zu akzeptieren sinkt.

Neben der gefühlten Bedeutung, die ein Mitarbeiter seiner Arbeit zuspricht, spielt auch das Gefühl, als Person selbst sowie mit seinen Tätigkeiten eingebettet in einen großen, ganzen Prozess zu sein, eine bedeutende Rolle. Im Rahmen dieser Arbeit wird dieser Aspekt theoretisch aufgearbeitet und das Konstrukt Job Construals entwickelt sowie operationalisiert. Die beiden Aspekte, Job Construals und Meaningfulness of Work, weisen einige Ähnlichkeiten auf, sind aber in ihrer Ausrichtung sehr verschieden, was auch zu einer gewissen Rivalität zwischen den beiden Konzepten führt. Während sich Job Construals auf die Verbindung zwischen den Aktivitäten eines Mitarbeiters und den anderen Aktivitäten innerhalb eines Prozesses sowie deren Verbundenheit bezieht, fokussiert Meaningfulness of Work die Möglichkeit mithilfe der Prozessaktivitäten höhere implizite Ziele zu erfüllen.

Für eine ganzheitliche Betrachtung, wird in dieser Arbeit auch der Einfluss einer Process Governance-Struktur sowie der eines BPM-Systems auf die Prozessveränderungsakzeptanz von Mitarbeitern betrachtet. Die Process Governance-Struktur wurde mithilfe eines Action Design Research-Ansatzes entwickelt, evaluiert und mittlerweile flächendeckend implementiert. Der Einfluss des BPM-Systems wurde mit einem quantitativen Ansatz analysiert.

Die im Rahmen dieser Arbeit gewonnen Erkenntnisse tragen dabei auf vielfältige Weise zum Stand der Forschung bei. So werden theoretische und empirische Erklärungen für den Einfluss der einzelnen Arbeitscharakteristika auf die Prozessveränderungsakzeptanz sowie die Bedeutung von Meaningfulness of Work und Job Construals dargestellt. Ferner wird das Konstrukt Job Construals in die Literatur eingeführt und ein zugehöriges Messmodell vorgestellt. Damit erweitert diese Arbeit die Erkenntnisse und auch den Fokus der bisherigen Forschung zu Prozessmanagement sowie Change Management. Zudem werden weitere Einflussfaktoren (wie beispielsweise eine Governance-Struktur oder ein BPM-System) detailliert analysiert.

Des Weiteren leistet diese Arbeit wichtige Implikationen für die Praxis. Die Ergebnisse verdeutlichen die Bedeutung von Meaningfulness of Work und Job Construals für die erfolgreiche Veränderung von Prozessen. Unternehmen, die solche Veränderungen anstreben, dürfen neben nicht minder wichtigen Faktoren, wie beispielsweise einer Process Governance-Struktur, ihre Mitarbeiter nicht aus dem Fokus verlieren. Ganz konkret bedeutet dies, die Mitarbeiter aktiv in die Veränderungen einzubeziehen, ihnen die

Möglichkeiten zu geben, sich und ihre Erfahrungen in die neuen Prozesse einzubringen sowie ihnen durch gezieltes Training und eine zielgruppenorientierte Darstellung der Prozesse ein gutes Gefühl der Eingebundenheit zu geben.

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Introductory paper

1. Introduction

Over the past decades, many organizations shifted from a functional- to a process-oriented organizational structure (Škrinjar et al. 2008), while simultaneously standardizing their processes across business units or even company boundaries (Wüllenweber et al. 2008) to increase operational performance, realize cost synergies, and ensure quality (Manrodt and Vitasek 2004; Münstermann et al. 2010a). As organizations strive to standardize processes to realize global efficiency, efficiency at the local level sometimes diminishes in favor of higher efficiency at the global, firm-wide level (Weitzel et al. 2006; Westarp et al. 2000). Last year, for example, Lufthansa Group, one of the biggest DAX companies in Germany, started restructuring its organization to standardize processes across business units. One step in this process is to standardize its ground operations processes, including all aspects of aircraft handling at airports and aircraft movement around the airport, across its hubs in Frankfurt, Munich, Vienna, and Zurich. The new process-oriented structure should help realize synergies across subsidiaries and increase customer orientation (Dombrowski 2016; Kiani-Kreß 2016; Lufthansa Group 2015).

Although business process standardization (BPS)¹, its corresponding management principle called business process management (BPM)², and the concept of process orientation³ are not new concepts and the literature provides good examples and best-practices to successfully implement standardized processes (e.g., Münstermann et al. 2010b), a lot of organizations struggle with the changes and risks imposed by this endeavor (Hill and McCoy 2011). Especially the high effort invested in process-related projects indicate that universal best practices remain elusive (Al-Mashari and Zairi 2000; Guha et al. 1997; Trkman 2010).

Process standardization involves changing existent and accepted working procedures. Beyond defining new target processes, winning the acceptance of employees affected by this process is key to success. Some organizations have defined processes and procedures, while in others, employees have developed their own routines to fulfill tasks. Thus, new standardized processes either build on and combine existing processes and procedures to develop new standardized processes or replace existing processes without adopting any elements from them. To benefit from the new standardized process, it is crucial that the employees executing and following them also accept them. Accepting process standardization goes beyond following new standard processes and to include supporting process change. In this dissertation thesis, I use the term *process change acceptance* to capture the holistic level of employee acceptance of different business-process related changes to their work (Kettenbohrer et al. 2015a).

Employee acceptance of standardized processes can be positively influenced by fostering process-oriented thinking and behavior among employees, equipping employees with the abilities, capabilities and willingness to adopt a process orientation and embrace a standardized working style (Kumar et al. 2010; Leyer et al. 2015; Tang et al. 2013). In a first step, organizations must shift the focus from the task to the processes in which tasks are performed and understand what drives employee motivation and willingness to work in a process-oriented and standardized manner. Extant process management literature

¹ BPS is defined as “mak[ing] process activities transparent and achiev[ing] uniformity of process activities across the value chain and across firm boundaries” (Wüllenweber et al. 2008, p. 213).

² BPM is understood as “the art and science of overseeing how work is performed in an organization to ensure consistent outcomes and to take advantage of improvement opportunities” (Dumas et al. 2013, p.1).

³ Process orientation refers to “focusing on business processes ranging from customer to customer instead of placing emphasis on functional and hierarchical structures” (Kohlbacher 2010, p. 135).

lacks this multilevel perspective, which is essential to understanding employee process change acceptance. A number of researchers have focused on several drivers of process orientation such as BPM culture (Hammer 2007; vom Brocke and Sinnl 2011; Willaert et al. 2007) or employee training and empowerment (Kohlbacher and Gruenwald 2011a; Škrinjar and Trkman 2013). The primary focus of this body of literature is thus increasing employees' knowledge about the nature of processes and the logic of BPM or process improvement methodologies (Kohlbacher and Gruenwald 2011a; Leyer et al. 2014). Especially the impact of different learning style preferences (e.g., role plays or learning-by-doing) on the process-

oriented thinking of employees (e.g., Börner and Leyer 2010; Leyer and Wollersheim 2011; Wollersheim et al. 2016) has been examined extensively in the past few years. This is a first starting point not only in considering the organizational level of process orientation, but also in taking the individual level into account. In order to fully understand what drives employee acceptance of changes to their work routines and, more fundamentally, of process orientation, a deeper understanding of what motivates employees to work and of work design itself is required. Organizational psychology and management research have long shown the impact of individual and work-related motivational factors on business outcomes (e.g., Hackman and Lawler 1971; Hackman and Oldham 1975). These motivational factors have been shown to increase positive behavioral outcomes (e.g. work performance) and attitudinal outcomes (e.g. work satisfaction) and to reduce negative behavioral outcomes (e.g. turnover). The impact of these motivational factors on personal and work outcomes are mediated by critical psychological states (such as experienced meaningfulness of work) (Hackman and Oldham 1975).

Hence, in order to make process change initiatives, in general, and BPS projects in particular more successful, the human resource has to be considered more explicitly, such as by analyzing job task design, employee needs, and the work environment. This strong focus on the human side of process orientation and BPS will give us deeper insights into how to change processes more successfully and thus achieve the greatest benefits at the organizational level.

To this end, this dissertation adopts an explicit focus on the individual level to understand what drives employee motivation, individual process orientation and, consequently, employee process change acceptance. Adopting this perspective reveals a range of insights which have been overlooked in process standardization research so far. In particular, the aim of this dissertation is to identify and analyze the factors influencing employee process orientation and thus process change acceptance, including process standardization acceptance. The cumulative dissertation thesis draws on a multi-faceted theoretical foundation and takes a multi-method approach to answer the following overall research question:

What individual and motivational factors influence employee process change acceptance?

Figure 1 below illustrates how the overall research question relates to the central constructs of this dissertation thesis.

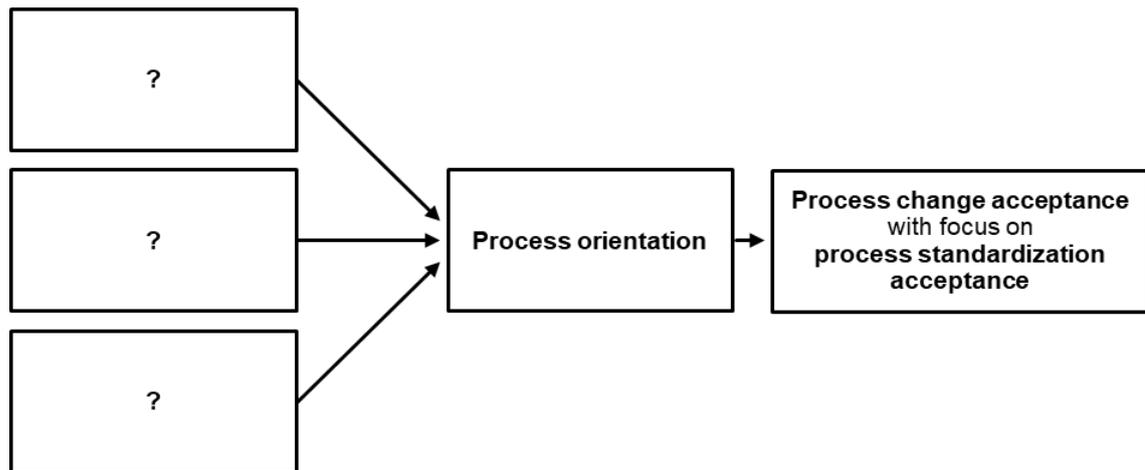


Figure 1. Illustration of how the overall research question relates to the central constructs of this dissertation thesis

This overall research question is addressed in nine research papers comprising this dissertation thesis structured around the following research questions guiding my research.

I begin with a review of extant literature to identify levels of process orientation and pinpoint the construct:

RQ1a: What levels of process orientation are discussed in the literature? (Introductory paper)

A second literature review was conducted to identify and structure factors supporting the successful implementation of BPS from an organizational perspective. The aim of this literature analysis is to gain a comprehensive overview of success factors and identify research gaps in BPS research:

RQ1b: What factors influence BPS success? (Introductory paper)

RQ1c: What are the gaps and emerging trends in BPS success factor research? (Introductory paper)

As this dissertation thesis focuses on the human side, Paper I analyzes task execution within processes and employee roles in BPM initiatives to identify levers to increase employee process orientation and process change acceptance:

RQ2: How are people considered in the BPM literature and which roles do they perform? (Paper I)

The next research questions and corresponding papers examine the factors that directly or indirectly influence individual process orientation and consequently individual process change acceptance. To provide a comprehensive overview of circumstances, the following papers take a wide-angle view, considering participants and management and a wide range of process characteristics, tools and contexts:

Participants and management:

RQ3: How needs a governance model to be designed in order to ensure effective and sustainable business process standardization? (Paper II)

Process characteristics:

RQ4: How do job characteristics affect employees' process orientation? (Paper III)

RQ5: How do job characteristics affect BPS acceptance of employees? (Paper IV)

RQ6: What influences an employee's willingness to accept process change? And what has the greater impact: meaningfulness of work or job construals? (Paper V)

Tools and context:

RQ7: What BPM system design ensures effective and sustainable BPM success?⁴ (Paper VI)

RQ8: How does BPM system use influence the process orientation of employees? (Paper VII)

RQ9: Does and – if yes – how does a BPM system contribute to employees' process innovation behavior? (Paper VIII)

RQ10: Which behavioral antecedents influence the degree to which business analytics (BA) tools are used in organizations? (Paper IX)

Figure 2 provides an overview of all the research questions in this cumulative dissertation thesis and how they fit into the overall research context.

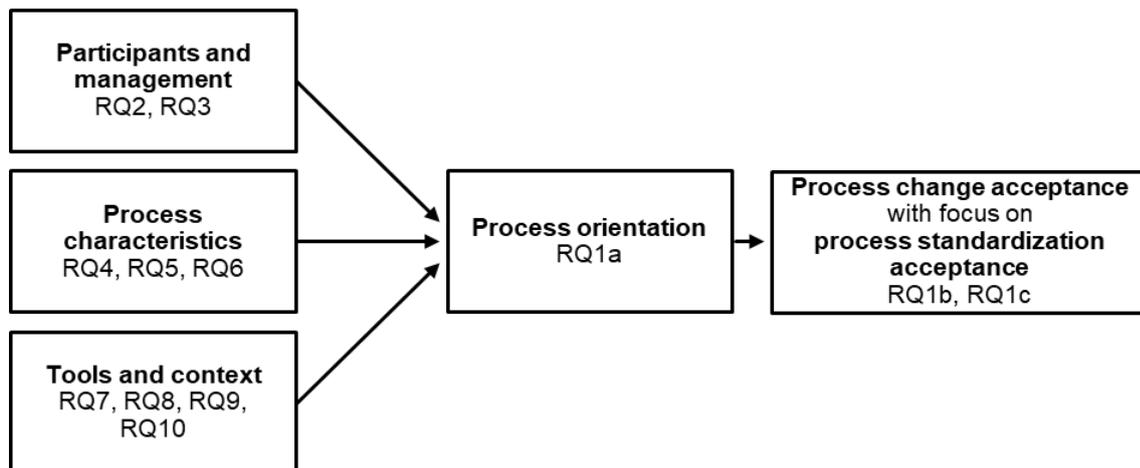


Figure 2. Overview of the research questions of this dissertation thesis grouped by construct

To answer the research questions, this cumulative dissertation consists of this introductory paper as well as nine research papers. The introductory paper provides a summary of the theoretical foundations of this dissertation, the research methodologies conducted, the main findings of the nine papers, and highlights contributions to theory and practice. The introductory paper also includes a literature review to identify the different levels of process orientation as well as a literature review on success factors for BPS. The different influencing factors as well as their impact on employees' process orientation and process change acceptance are then analyzed in detail in the nine papers that follow.

The individual papers use different theoretical foundations and leverage different research methods, i.e., literature review, qualitative methods such as action design research (ADR) and interviews, and quantitative methods, such as survey-based data collection and statistical analyses.

This introductory paper is structured as follows. Chapter 2 explains the theoretical foundation of this dissertation. This chapter includes a review of literature on the different levels of process orientation as

⁴ This research question is not explicitly mentioned in the paper, but is included here for consistency reasons.

well as a review of literature on success factors for BPS. Chapter 3 presents the qualitative and quantitative research methods used in this dissertation, including the literature review, action design research, interviews, surveys, and card-sorting technique. Then, in chapter 4, the findings of the papers included in this dissertation are presented briefly. Based on these results, chapter 5 provides the main contributions to theory and practice. After discussing limitations in chapter 6 and future research opportunities in chapter 7, this introductory paper ends with a short conclusion in chapter 8.

2. Conceptual and theoretical foundation

In this chapter, several aspects of the theoretical background of this thesis are presented. I first briefly review the literature on process orientation and process standardization. Then I introduce several theories on which this dissertation builds. Finally, I review the literature on process change and process change acceptance, the central constructs in this dissertation.

2.1 The concept and benefits of process orientation

The literature contains various conceptualizations of process orientation. Generally, process orientation can be described as a multidimensional construct with several levels (Kohlbacher and Reijers 2013; Willaert et al. 2007). The review of the literature for this thesis structures these levels of process orientation.

Across conceptualizations, there is broad evidence that process orientation provides various benefits for the organization. Diverse studies show that process orientation can facilitate financial success (e.g., Bronzo et al. 2013; Gustafsson et al. 2003; Kohlbacher and Gruenwald 2011a). Other important advantages are improved customer orientation (e.g., Bronzo et al. 2013; Gustafsson et al. 2003), better collaboration among employees (e.g., Bronzo et al. 2013; Škrinjar et al. 2008), effective and efficient use of resources in an organization (e.g., Babic-Hodovic et al. 2012; Gustafsson et al. 2003), and higher process quality (e.g., Bronzo et al. 2013; Kohlbacher and Reijers 2013).

If an organization wants to achieve process orientation, it must encourage its employees to adopt process-oriented thinking and behavior and accept the process change. There have been different attempts to increase process orientation from a learning perspective. For instance, experimental results show that learning by doing is the most efficient method to learn process-oriented thinking (Leyer and Wollersheim 2013). The best results can be achieved by combining it with personal exchange (Leyer et al. 2015; Wollersheim et al. 2016). Employees who think and work in a process-oriented way know that they and their tasks are part of a bigger process but they are also aware of their tasks' impact on the outcomes of the process (Škrinjar and Trkman 2013). Consequently, the overarching process goals subsume one's own task goals (Kettenbohrer et al. 2016b). The relationship between the two constructs of process orientation and process change acceptance as well as the effect of different influencing factors is examined in this dissertation thesis.

2.2 Process orientation as a multilevel construct

Due to the intangible nature of process orientation, there is no unified definition of the construct (Kohlbacher and Gruenwald 2011a) and no clear roadmap to achieve it. This section aims to analyze conceptualizations of process orientation discussed in the literature and to provide an overview of the levels of and perspectives on process orientation which have to be considered while shifting an organization from a function orientation to a process orientation.

As process orientation is a phenomenon occurring in organizations, organizational requirements must be considered. Following organizational systems theory, organizations are multi-level systems (Lewin 1951) which are shaped by organizational climate (Kozlowski and Klein 2000). Organizational climate

has emerged as a central construct for understanding organizational effectiveness since the 1950s (Kozlowski and Klein 2000). Based on these insights, James and Jones (1976) distinguish two categories:

- Objective aspects of the organizational context, which can be assigned to the organizational and group levels
- Individual, subjective perceptions ascribing meaning to the context, which can be assigned to the individual level.

Accordingly, organizations are multilevel systems (e.g., Homans 1950; Kozlowski and Klein 2000; Lewin 1951) which are sliced into three levels: organization, group, and individual (Kozlowski and Klein 2000). In this thesis, I adopt these three levels and the differentiation presented by James and Jones (1976) to assign the characteristics identified in the literature review to the three levels of process orientation. Accordingly, I use the following categorization:

- Characteristics of the organizational level are provided by the organization to enable process-oriented thinking and behavior.
- Characteristics of the group level are performed together by a group of employees.
- Characteristics of the individual level are the personal responsibility of each employee.

In the literature, the terms ‘characteristics’, ‘dimensions’ and ‘critical success factors’ are often used synonymously in the context of process management and process orientation. I also use these terms synonymously to classify the different characteristics.

2.2.1 Organizational level

Most studies analyzing process orientation⁵ at the organizational level rely on a multi-faceted construct. Some scholars define three characteristics of process orientation: ownership, management and measurement of processes (Forsberg et al. 1999; e.g., Škrinjar et al. 2008; Tang et al. 2013). In contrast, Kohlbacher and Gruenwald (2011a) define nine characteristics, providing the most detailed conceptualization of the construct. Further measures to evaluate hypotheses regarding process orientation have been developed by Hellström and Eriksson (2008), Kumar et al. (2010), and Kohlbacher (2010).

In the following, the characteristics identified and analyzed in this literature review are grouped into three categories. The first category concerns the documentation and visualization of processes, which is seen as a prerequisite for becoming a process-oriented organization. Knowing which processes are performed and how they interrelate is the basis for managing business processes (Kohlbacher and Gruenwald 2011a). The second category concerns employee empowerment and encouragement, which is necessary to sustainably shift an organization from a function-oriented to a process-oriented company (Tang et al. 2013). The last category presents methods and tools for execution and improvement of processes. The different categories are explained in detail in the following.

The first step to become process-oriented is to analyze and map an organization’s business processes and their interdependencies by defining a business process model (Hammer 2007; Kohlbacher and Gruenwald 2011a) as the basis for efficient and effective process execution. To ensure correct execution, employees need to be empowered and encouraged to work and think according to the defined and modeled business processes. This means ensuring that the corporate culture is compatible with the process-oriented approach (Kohlbacher 2010; Kohlbacher and Reijers 2013). This ‘process-compatible’ culture includes an organizational structure supporting a process-oriented perspective on organizational activities (Kohlbacher and Gruenwald 2011a; Škrinjar and Trkman 2013). To highlight the importance of

⁵ The procedure of this literature review is explained in detail in section 3.1.

processes and to ensure their adequate execution, a process owner should be appointed to take on responsibility for the overall process and its performance across business units (Hammer 2007; Tang et al. 2013). Often, this role is performed by members of the management acting as role models and actively supporting the process-oriented mindset (Bucher and Dinter 2008; Kumar et al. 2011).

Even though an organization can provide the basis for becoming process-oriented, the change from function orientation to process orientation depends on employees executing the processes. To achieve best results, employees must be able and motivated to support the change. Employees must therefore first receive adequate training both on the processes relevant to their specific work tasks, but also on the big picture of business process management in general (Bronzo et al. 2013; Kohlbacher and Gruenwald 2011a). After ensuring these prerequisites, a reward system should motivate, appreciate and incentivize employees' work based on business process performance (Babic-Hodovic et al. 2012; Chen et al. 2009).

As process orientation highlights the importance of processes independent of hierarchies and thus makes the customer the center of attention (Khosravi 2016; Vuksic et al. 2011). A customer-centered focus often leads to diverse new processes and projects, which may be coordinated formally through a process manager role (Babic-Hodovic et al. 2012; Chen et al. 2009). Besides monitoring the efficiency and effectiveness of the organization's business processes (Bronzo et al. 2013; Škrinjar et al. 2008), such a process manager also provides methodologies for employees to continuously improve processes (Kohlbacher 2010; Zarei et al. 2014). This shift must be supported by process-oriented job design, such that job descriptions mirror business processes and corresponding tasks and specify dedicated requirements (Hammer 2007; Kohlbacher and Gruenwald 2011a). Process-oriented job design also requires a clear and transparent decision-making process (e.g., Kumar et al. 2010) as well as support by IT systems (Kohlbacher and Gruenwald 2011a; Reijers 2006).

These different conceptualizations are shown in detail in the following Table 1.

Characteristic	Exemplary quotation	Studies
Process documentation and visualization		
<i>Process design and documentation</i>	"[...] refers to the extent to which an organization documents and understands a business process across the organization [...]. It involves defining and modeling business processes." (Tang et al. 2013, p. 651)	(Babic-Hodovic et al. 2012; Chen et al. 2009; Gustafsson et al. 2003; Hammer 2007; Hellström and Eriksson 2008; Kohlbacher 2009, 2010; Kohlbacher and Gruenwald 2011a; Kumar et al. 2010; Kumar et al. 2011; Mutschler et al. 2006; Nilsson et al. 2001; Reijers 2006; Škrinjar et al. 2011; Tang et al. 2013; van Looy and Backer 2013; Vuksic et al. 2011; Zarei et al. 2014)
Employee empowerment and encouragement		
<i>Corporate culture</i>	"Only a culture based on teamwork, willingness to change, customer orientation, personal accountability, and a cooperative leadership style goes hand	(Bronzo et al. 2013; Kohlbacher 2010; Kohlbacher and Gruenwald 2011a; Kohlbacher and Reijers 2013; van Looy

	in hand with the process approach.” (Kohlbacher and Gruenwald 2011a, p. 273)	and Backer 2013; Vuksic et al. 2011; Zarei et al. 2014)
<i>Organizational structure</i>	“A process-oriented organization has adapted its structure to the process view.” (Kohlbacher and Gruenwald 2011a, p. 274)	(Bronzo et al. 2013; Kohlbacher 2009, 2010; Kohlbacher and Gruenwald 2011a; Kohlbacher and Reijers 2013; Leyer et al. 2014; Leyer and Woltersheim 2013; Reijers 2006; Škrinjar et al. 2011; Škrinjar and Trkman 2013; van Looy and Backer 2013; Vuksic et al. 2011; Zarei et al. 2014)
<i>Governance structure</i>	“The existence of process owners is the most visible difference between a process enterprise and a traditional organization” (Kohlbacher 2010, p. 136)	(Chen et al. 2009; Hammer 2007; Hellström and Eriksson 2008; Khosravi 2016; Kohlbacher 2009, 2010; Kohlbacher and Gruenwald 2011a; Kohlbacher and Reijers 2013; Reijers 2006; Škrinjar et al. 2008; Škrinjar and Trkman 2013; Tang et al. 2013; van Looy and Backer 2013; Weitlaner et al. 2012; Zarei et al. 2014)
<i>Management support</i>	“In a process-oriented organization, management needs to support the process program.” (Kohlbacher and Gruenwald 2011a, p. 270)	(Babic-Hodovic et al. 2012; Bucher and Dinter 2008; Khosravi 2016; Kohlbacher 2009, 2010; Kohlbacher and Gruenwald 2011a; Kohlbacher and Reijers 2013; Kumar et al. 2010; Kumar et al. 2011; Škrinjar et al. 2008; Škrinjar and Trkman 2013; Tang et al. 2013; van Looy and Backer 2013; Zarei et al. 2014)
<i>Employee training</i>	“People [have to be] trained to operate new or changed processes prior to their implementation.” (Škrinjar and Trkman 2013, p. 53)	(Bronzo et al. 2013; Gustafsson et al. 2003; Hammer 2007; Khosravi 2016; Kohlbacher 2009, 2010; Kohlbacher and Gruenwald 2011a; Nilsson et al. 2001; Škrinjar et al. 2011; Škrinjar and Trkman 2013; Tang et al. 2013; van Looy and Backer 2013; Vuksic et al. 2011; Zarei et al. 2014)
<i>Reward system</i>	“Employees are rewarded based on the performance of business processes in which they are involved.” (Chen et al. 2009, p. 220)	(Babic-Hodovic et al. 2012; Chen et al. 2009; Leyer et al. 2014; Leyer and Woltersheim 2013; van Looy and Backer 2013)
Execution and improvement of processes		
<i>Customer-oriented process execution</i>	“Centrality of the customer in the company’s business model. Development of relationships with suppliers.” (Bronzo et al. 2013, p. 306)	(Khosravi 2016; Škrinjar et al. 2011; van Looy and Backer 2013; Vuksic et al. 2011)

<i>Project management for process changes</i>	"[...] a formal instance coordinating and integrating all process projects within the process-oriented organization" (Kohlbacher 2010, p. 137)	(Babic-Hodovic et al. 2012; Bucher and Dinter 2008; Chen et al. 2009; Kohlbacher 2010; Kohlbacher and Gruenwald 2011a; Kumar et al. 2010; Škrinjar and Trkman 2013; Zarei et al. 2014)
<i>Process performance measurement</i>	"[...] the extent to which the efficiency and effectiveness (e.g., output quality, cycle time, process cost, and variability) of business processes are assessed" (Tang et al. 2013, p. 651)	(Bronzo et al. 2013; Bucher and Dinter 2008; Chen et al. 2009; Gustafsson et al. 2003; Hammer 2007; Hellström and Eriksson 2008; Khosravi 2016; Kohlbacher 2009, 2009, 2010; Kohlbacher and Gruenwald 2011a; Kohlbacher and Reijers 2013; Kumar et al. 2010; Kumar et al. 2011; Nilsson et al. 2001; Reijers 2006; Škrinjar et al. 2008; Škrinjar et al. 2011; Tang et al. 2013; van Looy and Backer 2013; Vuksic et al. 2011; Zarei et al. 2014)
<i>Continuous improvement methodologies</i>	"Assessments and improvements of the processes have been carried out." (Hellström and Eriksson 2008, p. 170)	(Hellström and Eriksson 2008; Kohlbacher and Reijers 2013; Weitlaner et al. 2012)
<i>Process-oriented job design</i>	"In a process-oriented enterprise, the process design should drive job descriptions." (Kohlbacher and Gruenwald 2011a, p. 275)	(Hammer 2007; Kohlbacher 2009, 2010; Kohlbacher and Gruenwald 2011a; Zarei et al. 2014)
<i>Systematic decision making processes</i>	"Systematic, well defined, continued, and integrated decision-making processes" (Kumar et al. 2011, p. 341)	(Kumar et al. 2010; Kumar et al. 2011)
<i>IT support</i>	"(Integrated) information systems support entire processes, controlled by a central system." (Reijers 2006, p. 406)	(Babic-Hodovic et al. 2012; Bucher and Dinter 2008; Hammer 2007; Khosravi 2016; Kohlbacher 2009, 2010; Mutschler et al. 2006; Reijers 2006; Škrinjar et al. 2011; Škrinjar and Trkman 2013; Vuksic et al. 2011; Zarei et al. 2014)

Table 1. Characteristics of process orientation at the organizational level

2.2.2 Group level

"Organizations do not behave; people do" (Kozlowski and Klein 2000, p. 4). But individuals rarely perform their jobs independently of their colleagues or in a vacuum. Employees interact in groups or subunits and are exposed to common events or features. As interpretations and ideas are shared, a consensual view emerges which in turn influences the organizational level but also the individual's opinion and behavior (Kozlowski and Klein 2000).

Process orientation on the group level refers to the interaction and collaboration between the different individuals performing diverse tasks within the process. Due to their interdependencies, employees cre-

ate a common view of the process. This common mindset can be fostered by connectedness and teamwork across departments or business units, which is called cross-functional coordination (Leyer et al. 2015).

The following Table 2 shows the characteristics dealing with the group level of process orientation.

Characteristic	Exemplary quotation	Studies
<i>Cross-functional coordination</i>	“Cross-functional coordination fosters connectedness and teamwork across departments and business units.” (Leyer et al. 2015).	(Babic-Hodovic et al. 2012; Forsberg et al. 1999; Kumar et al. 2010; Leyer et al. 2014; Leyer et al. 2015; Leyer and Wollersheim 2013)

Table 2. Characteristics of process orientation at the group level

2.2.3 Individual level

Enhancing process orientation on the organizational and group level also affects process orientation on the individual level as employees change the way they perform their daily work tasks. This requires increasing employees' understanding of their work as well as the nature and goals of their work (Tang et al. 2013). Individual process orientation can also be observed at the organizational and group level and refers to individual employees' attitudes and behaviors regarding their daily work activities (Leyer et al. 2015).

When an individual thinks in a process-oriented way, she focuses on processes rather on functions, hierarchies or organizational structures (Kohlbacher and Gruenwald 2011a). This requires comprehensive knowledge not only about individual tasks but also about the overall process (Leyer et al. 2015; e.g., Leyer and Wollersheim 2013). It is crucial to be aware of the customer's importance in the process but also of her impact on process tasks (e.g., Kumar et al. 2010; Leyer et al. 2014). Indeed, customer-oriented process execution is also relevant on the organizational level due to the importance of customers in the business model and the fact that satisfying customers' needs requires considering the whole process, within and across business unit borders. On the individual level, customer-oriented process execution refers to the employee's awareness and knowledge about the customer's importance for the whole process design as well as the individual's impact on customer satisfaction. Due to their influence on the overall process, employees should be able to regularly check whether the design and execution of their processes are customer-oriented (e.g., Kohlbacher 2010; Kumar et al. 2010), and need the support of management in doing so (Leyer et al. 2014; e.g., Leyer and Wollersheim 2013).

The following Table 3 shows the different characteristics of process orientation on the individual level identified in this literature review.

Characteristic	Exemplary quotation	Studies
<i>Process knowledge</i>	“A crucial factor for managing an organization in a process-oriented way is the employees' knowledge of the whole process beyond the individual area of responsibility.” (Leyer et al. 2015, p. 4)	(Chen et al. 2009; Hammer 2007; Leyer et al. 2014; Leyer et al. 2015; Leyer and Wollersheim 2013; Mutschler et al. 2006; Tang et al. 2013)
<i>Customer-oriented process execution</i>	“The starting and end point for a process should be the customer, i.e. his/her order” (Leyer et al. 2014, p. 4). So, “employees know	(Leyer et al. 2014; Leyer and Wollersheim 2013)

	the impact of their work with regard to customer benefits.” (Leyer et al. 2015, p. 4)	
<i>Continuous reflection and improvement</i>	“It is crucial that the individual continuously reflects on the processes within the company to identify existing problems and to implement suitable improvements.” (Leyer et al. 2015, p. 4)	(Leyer et al. 2014; Leyer and Wollersheim 2013; van Looy and Backer 2013)
<i>Individual management practices</i>	“Managers should mainly be coaches enabling the employees to perform the tasks independently.” (Leyer et al. 2014, p. 4)	(Leyer et al. 2014; Leyer and Wollersheim 2013)

Table 3. Characteristics of process orientation at the individual level

2.2.4 Summary

In summary, the literature distinguishes between three different levels of process orientation, i.e. process orientation on the organizational, group, and individual level.

Process orientation on the organizational level has been very well researched so far. The literature provides detailed characteristics which range from presentation of processes to cross-functional coordination of processes. In contrast, process orientation on the group level and the individual level are still under-researched topics. This finding is surprising, especially against the background that previous studies showed that the job-related behavior of employees is a major reason for failure of process-related projects (Cao et al. 2001b; Grau and Moormann 2014; e.g., Lee and Dale 1998). Research has also discussed the impact of human-oriented factors, such as top management support or communication, on process orientation (e.g., Bai and Sarkis 2013; Münstermann and Eckhardt 2009). But these aspects focus solely on the strategic level (Kokkonen and Bandara 2010) without giving equal consideration to employees doing their daily work (Kettenbohrer et al. 2015c). A first attempt to measure process-oriented thinking was made by Leyer and Wollersheim (2013). They derived seven characteristics by applying BPM logic to the individual level, i.e. by deriving work-related actions that demonstrate that employees are thinking and working in a process-oriented manner. In another paper, Leyer et al. (2015) talked about process-oriented behavior as an expression of individual thinking. Here, the authors proposed four characteristics of process-oriented behavior.

This dissertation intends to demonstrate that process orientation on the group and on the individual level have to be considered to the same extent as on the organizational level to successfully implement process orientation. We know from organizational systems theory that the micro (e.g. individual characteristics) and macro (e.g. group and organization characteristics) perspectives in an organization interact with each other. Micro phenomena are embedded in a higher-level context whereby macro events often have their origin in lower-level interactions and dynamics (Kozlowski and Klein 2000). Hence, I assert that focusing solely on a single perspective does not explain organizational behavior comprehensively: a solely organizational and group level perspective neglects the effect of individual behavior, perception, and interaction on higher-level phenomena, and an exclusively individual-level perspective overlooks relevant contextual factors (House et al. 1995; Klein et al. 1994; Kozlowski and Klein 2000). Transferring this knowledge to the context of process orientation requires awareness of different levels of process orientation, their characteristics, and their interdependencies. Aggregating measurements or data on

solely lower-level phenomena leads to errors and misspecifications (Kozlowski and Klein 2000). To successfully shift an organization from function orientation to process orientation requires focusing on each single level separately but simultaneously considering interdependencies and reciprocal influence.

2.3 The different dimensions of process change

2.3.1 Process change

Business process change (BPC) is a type of organizational change that focuses on adapting an organization's business processes rather than changing organizational structures. BPC emerged from business process reengineering (BPR), which is the fundamental and radical redesign of processes (Hammer and Champy 1993), as well as from total quality management (TQM), which focuses on continuously improving existing processes (Jurisch et al. 2014). The various forms of business process change, such as BPR and TQM, are often bundled under the term business process change and are used synonymously (Margherita and Petti 2010). The commonly accepted working definition of BPC is "a management concept that involves any type of process change – revolutionary (radical) or evolutionary (continuous)" (Jurisch et al. 2014, p. 50).

2.3.2 Business process standardization

A particularly comprehensive form of process change is business process standardization (BPS), which is when processes are harmonized or made to fit a top-down defined reference or best-practice across an organization in order to achieve global efficiency, to establish reliable quality standards or to achieve any other 'global' objectives. In the course of BPS, efficiency at the local level sometimes diminishes in favor of higher efficiency at the global, firm-wide level (Weitzel et al. 2006; Westarp et al. 2000). For instance, if an organization striving to standardize document management processes rolls out a global document data-base, local-level IT costs may rise if the local unit has been using an inexpensive off-the-shelf electronic spreadsheet program to manage their documents. From a global, organizational point of view, implementing the new database is beneficial because document handling costs can be lowered by storing and editing documents in a single centralized system instead of in multiple local sites. But from a local perspective, realizing the new standard process may require high financial and personnel investment, sometimes without at first seeing the local benefit (Kettenbohrer and Beimborn 2014). Local employees may perceive such changes as incomprehensible, unclear, and even threatening and thus decrease their willingness to accept and embrace the changes. Therefore, BPS requires special attention with regards to employee involvement and commitment in order to successfully and sustainably perform the induced changes.

2.3.2.1 Factors influencing business process standardization success

As organizational processes always develop further, process orientation within an organization is not a one-time project but rather a continuous cycle of assessing and further developing (Deming 1986). One possibility to enhance an organization's processes is BPS, which aims to make process activities across the organization transparent and uniform (Wüllenweber et al. 2008) to create a time-, cost-, and quality-optimal way of achieving the overall business processes' goal (Münstermann et al. 2010a). As such, BPS helps to address identified weak spots in an organization's processes and allows companies to meet their performance objectives by developing and implementing standardized procedures.

Since BPS offers many benefits, such as cost efficiency, reduced process cycle time, or higher quality process outcomes (Münstermann and Weitzel 2008; Swaminathan 2001), many firms have launched process standardization initiatives. For instance, CVS Pharmacy significantly raised customer satisfaction levels through process standardization (McAfee and Brynjolfsson 2008).

However, the results of such projects vary (Hall and Johnson 2009; Schäfermeyer et al. 2010) and the success of implementing BPS depends on different factors (Rosenkranz et al. 2010). Several studies have attempted to identify these success factors (Münstermann et al. 2010b; Münstermann and Eckhardt 2009; Schäfermeyer et al. 2010), but it remains untested to what degree the characteristics of process orientation (see section 2.2) can be transferred to the context of BPS. There is a need to consolidate and integrate the different, fragmented findings discussed in literature. In the following section, the critical success factors for BPS are structured and analyzed in terms of distinct areas that an organization needs to “get right in order [...] to successfully compete” (Finney 2007, p. 330). The following section provides a comprehensive overview of the factors influencing BPS success that have been identified, discussed, or empirically evaluated in the literature. This literature review will also help assess whether the characteristics of process orientation are applicable for BPS as well and to help direct future BPS research by identifying gaps in knowledge and emerging trends⁶.

To categorize the identified success factors for BPS, two schemes from the related research domains of information systems management and change management are used: Work Systems Theory (Alter 1999) and Diamond of Change (Leavitt 1965).

The Work Systems Theory provides a perspective for understanding the different systems within an organization and whether or not those systems use information technology (Alter 2013). Human participants are seen as part of the systems that create business results. Participants include not only the users of a technology, but also customers or co-workers. The theory views people but also business processes, seen beyond the technology use context, and the products/services produced and their values as relevant (Alter 1999, 2013).

Leavitt’s Diamond of Change (1965) is traditionally used to explain how various factors will change when technology is introduced or modified. In this dissertation, the two models (Work Systems Theory and Diamond of Change) are applied to the context of business process standardization and the BPS success factors are categorized along their dimensions.

Based on Work Systems Theory and the Diamond of Change, five categories of success factors are defined: process characteristics, participants, management, tools, and context. *Process characteristics* refer to characteristics which foster or hinder process standardization. The category *participants* is present as *participants* in Work Systems Theory and as *actors* in the Diamond of Change. *Participants* refer to actors involved in defining or executing standard processes, including characteristics like attitudes and perceptions. Top management support and involvement of employees are assigned to this category. *Management* is consistent with *structure* in Leavitt’s model. Leavitt (1965) defines *management* to include systems of communication, systems of authority (or other roles), and systems of work flow. In the context of process standardization, systems of work flow are transferred to procedure models to define a standardized process. Systems of authority and roles are transferred to governance to ensure compliant process execution according to the defined standard. *Tools* is derived by combining *technologies* from Work Systems Theory and *technology* from the Diamond of Change. In the context of process standardization, *tools* are used to define, execute and monitor a standard process. *Tools* focuses not only on hardware/software combinations used by employees or automated agents to work in accordance with the standard process, but it also includes other tools and methods such as documentation. Finally, *context* refers to factors related to the environment and circumstances of the organization aiming

⁶ To identify the success factors of BPS, a literature review was used. The research method is explained in detail in 3.1.

to standardize its processes, such as culture, regulations, mergers and acquisitions. Figure 3 summarizes the categories and success factors.

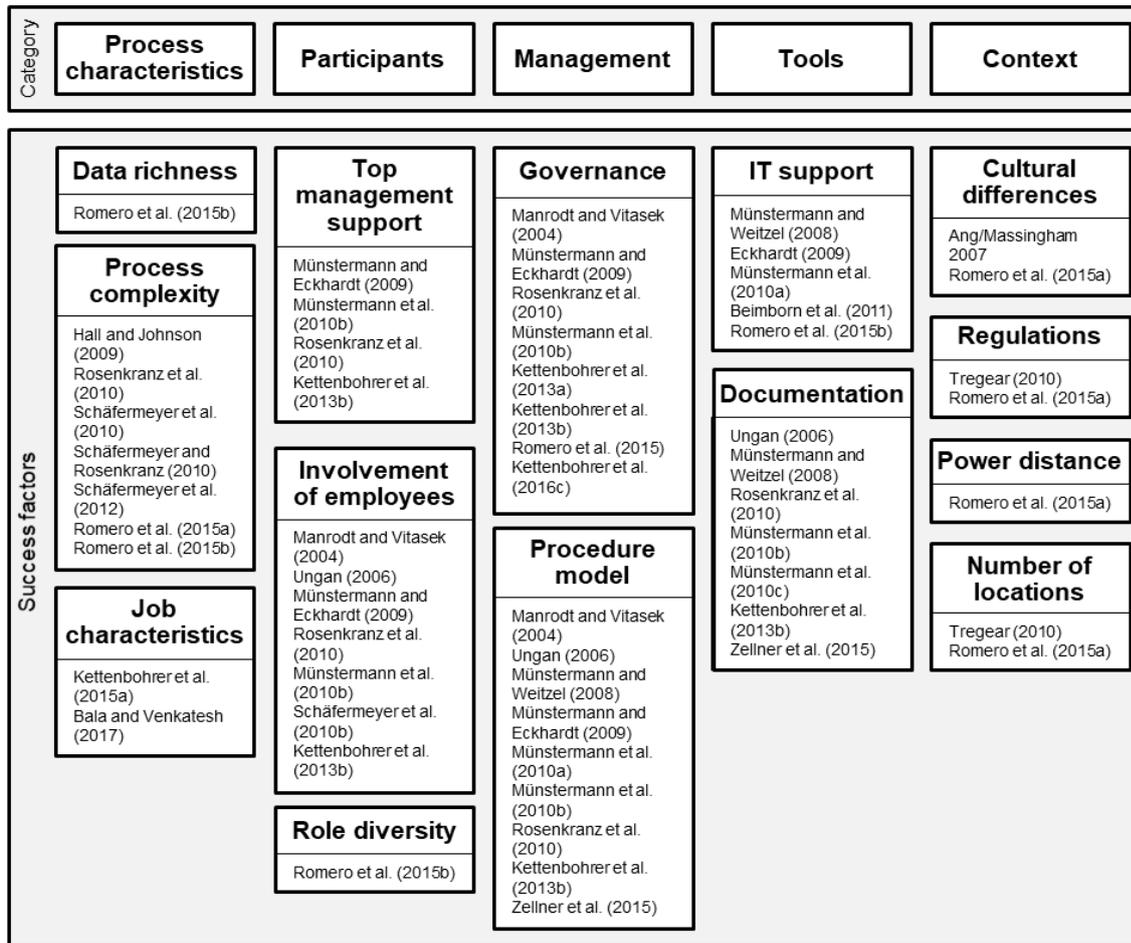


Figure 3. Success factors of BPS – based on literature review

In the following, the different success factors are described along the five categories mentioned above.

Process characteristics

Data richness

The first process characteristic influencing process standardization is the data richness of the process to be standardized. Data richness refers to “the technical design of the business process in terms of the activities that constitute the business process and in terms of the data items that are passed through the business process” (Romero et al. 2015b, p. 41). Romero et al. (2015b) show in a quantitative study that the percentage of the common activities in the process, the number of different documents used as input, and the number of different outputs significantly influence process harmonization success.

Process complexity

Process complexity is closely related to data richness and can be described as "a function of the number and variety of all activities forming the business process, their interrelations and dynamics" (Schäfermeyer and Rosenkranz 2011, p. 5). A process of high complexity is highly variable and consequently hard to analyze (Mani et al. 2010). In addition, high process complexity is characterized by high levels of non-routines, difficulty, uncertainty, and many interdependences to other business processes (Karimi et al. 2007).

In a quantitative study, Schäfermeyer et al. (2012) identify a significant negative impact of high process complexity on process standardization success. A similar finding is derived by Romero et al. (2015b) who also empirically demonstrate that organizations with less complex processes have more harmonized processes. Accordingly, to achieve harmonized and/or standardized processes, organizations should aim to reduce the complexity of their processes (Romero et al. 2015b).

Job characteristics

Besides data richness and process complexity, the basic characteristics of the jobs and tasks performed in a process also influence process standardization (Bala and Venkatesh 2017; Kettenbohrer et al. 2015a). Job characteristics and the underlying work design research have a long tradition. The original job characteristics model by Hackman and Oldham (1975, 1976) states job characteristics such as autonomy, skill variety, task identity, task significance, and feedback have a positive impact on employee motivation and performance. In the context of process standardization, Kettenbohrer et al. (2015a) examine in a quantitative study the impact of job characteristics on employee acceptance of process standardization. As employee acceptance is a prerequisite for process standardization success, it is crucial to analyze its influencing factors to successfully and sustainably achieve process standardization. Kettenbohrer et al. (2015a) find that skill variety is the most important job characteristic influencing BPS acceptance. In addition, autonomy has shown to have a negative effect on process standardization acceptance whereby task identity, task significance, and feedback have no impact. These results highlight that process standardization is not as threatening for employees as sometimes expected, especially not for employees performing jobs with a high degree of skill variety who are well trained and thus well prepared for other tasks. In addition, the results of the study also stress the importance of carefully identifying and choosing what processes to standardize. Standardizing a process consisting of highly autonomous tasks is less likely to be accepted. If such a process is supposed to be standardized anyhow, process managers should be particularly careful and consider how the affected employees can keep parts of their autonomy or can be involved in other ways during process standardization initiatives (2015a).

Participants

Top management support

Top management support refers to "the extent to which top managers in an organization provide direction, authority and resources" (Infinedo 2008, p. 555). My review of the literature indicates that top management support is strongly needed throughout the whole BPS project. Visible management support increases the commitment for the standardization initiative and highlights the importance of adopting the new standardized process (Münstermann et al. 2010b; Münstermann and Eckhardt 2009; Rosenkranz et al. 2010).

Involvement of employees

Involvement of employees refers to the extent to which employees are part of the design and the implementation of the standard process (Münstermann and Eckhardt 2009). In the case studies undertaken by Münstermann et al. (2010b), the degree of employee involvement during the definition of the new standard process emerges as crucial point for a standardization initiative's success. Pure top-down approaches would increase rejection and resistance to the standardized process. Hence, the active participation by and early inclusion of employees support the acceptance of the new defined standard process and prevent resistance (Münstermann and Eckhardt 2009).

Role diversity

Diversity of involved roles becomes apparent due to the percentage of common roles in the process as well as the number of different roles executing the same activity. In a quantitative study, Romero et al. (2015b) show that process harmonization is significantly influenced by the diversity of the roles performing tasks within the corresponding process. According to the authors, to successfully harmonize a process across an organization, one has to reduce the number of resources which differ between the processes (Romero et al. 2015b). For instance, consider a company intending to harmonize the purchase-to-pay process across sites A and B where an invoice control clerk and an accounting clerk perform the process together in site A and a single clerk performs the process in site B. In this case, it has to be determined whether the roles and their tasks differ, i.e. does the clerk in site B execute the same tasks as the two clerks in site A? In order to harmonize the process, the roles and their tasks have to be harmonized. In this example, the tasks of the two clerks in site A could be bundled into one role so the process is performed by a single clerk, or a further clerk role in site B could be created.

Management

Governance

In the context of process standardization, governance provides clearly defined responsibilities which help to define optimal workflows and procedures (Münstermann and Eckhardt 2009) and ensures effective implementation of the new standard processes by monitoring whether single workers or organizational units adhere to them (Kettenbohrer et al. 2013a). After implementing the standardized process, local process specialists will identify optimization potential for their unit and suggest or implement appropriate changes. A global governance structure is able to foster standard and guideline consistency by ensuring that such local changes comply with the defined standard process (Kettenbohrer et al. 2013a; Kettenbohrer et al. 2016c; Münstermann et al. 2010b; Münstermann and Eckhardt 2009).

Procedure model

A procedure model is a structured approach to systematically develop and define standardized business processes. The literature provides some recommendations for achieving a standard process. These approaches differ in the number of proposed steps ranging from only three steps (Kettenbohrer et al. 2013b; Münstermann et al. 2010b) to seven steps (Manrodt and Vitasek 2004; Ungan 2006).

Besides the different levels of detail, all analyzed procedure models start with documenting the existing processes. Then suitable processes for standardization have to be identified. Here, focusing on core processes (Münstermann and Weitzel 2008) or calculation of standardization potential of single processes (Kettenbohrer et al. 2013b) are recommended. To define a standard process, Münstermann and Weitzel (2008), Münstermann et al. (2010b), and Kettenbohrer et al. (2013b) propose gathering existing process variants and identifying a best-practice process which can be adapted to define the new standard process. In contrast, Manrodt and Vitasek (2004) and Ungan (2006) do not explicitly propose to consider existing best-practice processes in defining a process standard.

To facilitate implementation of the process, appointing process owners is recommended. Process owners are accountable for defining, improving, and coordinating the standardized process (Kettenbohrer et al. 2013b; Kettenbohrer et al. 2016c; Manrodt and Vitasek 2004; Münstermann et al. 2010b). Ungan (2006) and Münstermann and Weitzel (2008) do not outline how to ensure process standardization after defining the standard process.

Tools

IT support

In the following, IT support is understood as the support for process standardization as well as the daily process operations by information technology and information systems.

Eckhardt (2009) shows that the level of IS usage directly influences process standardization and Beimborn et al. (2009) propose that service-oriented architecture (SOA) eases process standardization. According to Münstermann and Weitzel (2008), the first step to standardize processes is to homogenize them internally. Beimborn et al. (2011) state that SOA fosters standardization by reusing the same service for the same sub-tasks. Organizations have to face two challenges when standardizing processes: existing legacy systems and standard software (Beimborn and Joachim 2011). Legacy systems hinder alteration of processes if the IT is not sufficiently flexible (Münstermann et al. 2010b). In addition, implementation of standard software often forces organizations to alter their processes to fit the software. SOA is flexible enough to support a wide range of business processes, facilitating loose coupling of business processes and supporting IT. Implementing SOA requires detailed and precise documentation of existing business processes, which is necessary for process standardization as well (see next section), thereby easing BPS (Beimborn and Joachim 2011). These findings are also supported by an empirical study by Romero et al. (2015b) that the kinds but also the diversity of information technology used in the execution of the process has a significant influence on process harmonization.

Documentation

Documentation is the graphical representation of a process (Ungan 2006). Process modeling as a specification of documentation shows the relations between activities, involved process participants, information, and process goals (Colquhoun et al. 1996).

Documentation is typically the starting point for every standardization project since it makes the different process variants in the organization transparent and analyzable. Therefore, some studies include documentation in their proposed procedure model (Kettenbohrer et al. 2013b; Manrodt and Vitasek 2004; Münstermann and Weitzel 2008). Accordingly, Ungan states that “a detailed process map must be created for standardization purposes” (2006, p. 139).

Context

Besides the specific success factors, Romero et al. (2015a) identify further contextual factors which have to be considered while aiming to standardize a process. According to them, contextual factors are “factors that drive the trade-off between uniformity and variability” (Romero et al. 2015a, p. 262). Factors that are exclusively contextual factors and not explained in the sections above are introduced in the following. In addition, the following sub-categorization is adopted from Romero et al. (2015a).

Cultural differences

Process standardization aims to create “a standard or best-practice process to be used as a template for all instances of the process throughout the organization” (Tregear 2010, p. 308). This standard process should be adopted throughout the whole organization which is especially challenging for globally operating organizations with a lot of sites worldwide. Ang and Massingham (2007) analyze the influence of national culture on the decision whether to standardize or adapt simultaneously. According to them, the greater the cultural differences across sites, the greater the difficulty of knowledge transfer across cultures (Ang and Massingham 2007; Romero et al. 2015a).

Regulations

Successful process standardization is influenced by different applicable (national) financial, tax and other regulations (Tregear 2010), which can mandate unavoidable differences in process designs (Romero et al. 2015a).

Power distance

Process standardization affects not only a single organization and its own processes, but inter-firm collaboration as well (Romero et al. 2015a). One important factor of this specific relationship among firms is power distance which refers to “the degree to which the less powerful members of a society accept and expect that power is distributed unequally” (Hofstede 1997, p. 28). Moffat and Archer (2004) reveal that companies with low power distance have a higher level of integration of their business practices, while organizations with medium and high power distance have a low level of integration (Moffat and Archer 2004; Romero et al. 2015a).

Number of locations

Organizations that aim to standardize their processes over disperse locations are challenged not only by different regulations but also by the diversity of individuals performing the single tasks within the processes (Romero et al. 2015a). Besides the personal way of performing a specific task, which is influenced by cultural background and other influences, there are also differences regarding the feasibility of the processes for reasons such as local market imperatives and resource allocation (Romero et al. 2015a). According to Tregear (2010), the effect of location cannot be isolated because there are several interdependencies to culture, customer expectations, market maturity, and local market conditions (Romero et al. 2015a).

2.3.3 Summary

To summarize, this literature review was undertaken to generate a comprehensive list of the factors that studies have shown influence BPS success, and these factors were structured. To my knowledge, this is the first such comprehensive and structured overview.

2.4 Research agenda for BPS research

The second benefit of this literature review⁷ on BPS is to identify gaps in knowledge and emerging research trends. To systematically derive a research agenda, I will start with methodological research gaps and end with content-based research gaps.

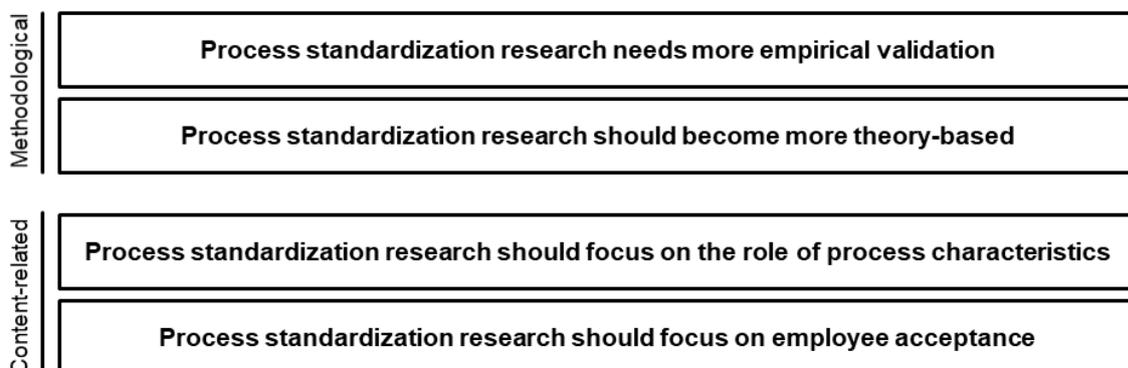


Figure 4. Research agenda

⁷ The research method is explained in detail in 3.1.

2.4.1 Process standardization research needs more empirical validation

Sixteen of the analyzed papers are empirical, and most use case studies. Only four use a survey-based approach. The remaining twelve are conceptual in nature e.g., proposing procedure models for BPS (e.g., Urgan 2006) without providing empirical evidence. Overall, there shows to be a strong need for more quantitative studies analyzing BPS success factors. The literature review presented above can serve as a starting point for other researchers to empirically validate the identified success factors and to examine the differential effects of the single factors on BPS.

2.4.2 Process standardization research should become more theory-based

Almost none of the analyzed papers develops a new theory or aligns their findings with existing theories. Only Urgan (2006) uses knowledge management theory to develop his procedure model. The lack of theoretical foundation in the majority of the analyzed papers may reflect the inherent complexity of the field. Process standardization inter-relates with organizational, managerial, IT, and social factors. However, the consequence is a lack of theoretical grounding and consequently a deep and generalizable understanding of both researchers' and practitioners' efforts in this area.

To ground BPS research more on existing theory, other research strands may serve as models. For instance, in the research strands of business process management, ERP implementation, and operations management, contingency theory and dynamic capabilities theory are frequently used to explain critical success factors (Morton and Hu 2008; Sousa and Voss 2008; Trkman 2010). Trkman (2010) finds that successful BPM needs a fit between the business environment and the business processes (contingency theory). To benefit from process management afterwards, continuous improvement efforts have to be made as claimed by dynamic capabilities theory (Trkman 2010). A combination of these two theories may prove promising for BPS research as well.

2.4.3 Process standardization research should focus on the role of process characteristics

BPS is an important step in the business process management lifecycle (Dumas et al. 2013). It is therefore surprising that existing research regarding process standardization has not examined the relationship between processes and their characteristics in an effort to sustainably standardize processes.

According to Nippa (1996) and Schmelzer and Sesselmann (2008), processes have seven primary characteristics: knowledge intensity, input, repetition, determinacy, complexity and variability, objectives, and strategic importance. Research analyzing the interplay between process standardization and other process characteristics, such as process flexibility (Münstermann et al. 2009), examine the influence of process standardization on a concrete process characteristic and not vice versa. Hence, these works cannot serve as a basis for this paper. In addition, Zellner (2012) and Zellner and Laumann (2013) derive criteria for evaluation processes regarding their potential for standardization. However, my review of the literature shows that process complexity is the only process characteristic whose influence on process standardization has been studied in depth (see Schäfermeyer et al. 2012). The impact of the other process characteristics, such as knowledge-intensity, on process standardization deserves further research.

2.4.4 Process standardization research should focus on employee acceptance

My review of the literature reveals individual employee acceptance as an under-researched aspect. Some scholars have implicitly discussed its importance and how it is driven by different of the considered BPS success factors, but no dedicated research on this phenomenon has appeared so far. For example, involving employees and governance increase employee acceptance (Münstermann et al. 2010b; Münstermann and Eckhardt 2009) whereas process complexity decreases it (Rosenkranz et al. 2010). As

employee acceptance is an important aspect of process standardization, it should be considered more intensively.

In the last years, researchers have increasingly analyzed the role of culture in process management (e.g., vom Brocke and Schmiedel 2011; vom Brocke and Sinnl 2011), stressing the importance of employee involvement (vom Brocke et al. 2014) and motivation (Tumbas and Schmiedel 2013) to increase process orientation. In accordance with this strand, organizational psychology and management research offer valuable theoretical groundings and transferrable models for analyzing employees' acceptance and motivation in the context of BPS. For example, the analysis of the impact of motivating factors of work on business outcomes (Hackman and Lawler 1971; Hackman and Oldham 1975) are promising. As process standardization and process change can occur in different forms and to different extents, it is often perceived as threatening by the affected employees (vom Brocke et al. 2014), which decreases their willingness to accept process changes. The literature has discussed some attempts to understand and explain the factors which drive employees' willingness to accept BPC. Most of the BPCs discussed in the literature are linked to the implementation of information systems (e.g., enterprise resource planning (ERP) systems) because it is one of the most pervasive organizational change initiatives (Morris and Venkatesh 2010). In contrast to other technologies, ERP systems lead to more changes for the employees and alters the nature of workflows, task, and jobs to a greater extent (Liang et al. 2007; Morris and Venkatesh 2010).

As we know from psychology research, employees' willingness to do or accept something is influenced by motivation (e.g., Deci and Ryan 1985, 2000; Hackman and Lawler 1971). In the context of BPC, employee motivation can be increased by involving them in the process change project. Especially for process reengineering projects, employee involvement has shown to be a crucial enabler to sustainably foster employee BPC acceptance (Lok et al. 2005).

Another explanation is linked to cognitive dissonance (CD) and absorptive capacity (AC) (Klun et al. 2016). According to CD, BPC can bring employees in cognitive dissonance (i.e., a state of psychological discomfort caused by an inconsistency among an individual's cognition, such as beliefs or attitudes). To leave this uncomfortable state, so-called CD resolutions can be applied: change one's cognition, reduce the importance of the dissonant cognition, or introduce a new cognition to counteract the dissonant cognition (Festinger 1957). These resolutions do not necessarily lead to acceptance, but can also bring negative reactions, such as resistance to change, to light. To reach a BPC-favorable resolution, employees should be guided by workshops, change-supportive communication or easy-to-access information (Klun et al. 2016). AC, which is defined as the ability to value, assimilate, and apply new knowledge (Cohen and Levinthal 1990), is also discussed as means to increase employees' BPC acceptance. Accordingly, the current AC of the company and the newly proposed changes have to be aligned (Klun et al. 2016) to better use new knowledge in the future (Francalanci and Morabito 2008). A means to do so is establishing communication channels which includes formal and informal meeting across the different affected teams to discuss and communicate the concrete changes (Harrington and Guimaraes 2005; Klun et al. 2016).

Further attempts to explain BPC acceptance is linked to job characteristics. Their impact is mostly discussed in the context of ERP implementation. Morris and Venkatesh (2010) examine the shakedown phase, which is the phase immediately following rollout, because the changes resulting from the ERP implementation are most strongly perceived in this phase. Their year-long study in a telecommunication firm of the impact of an ERP implementation on employee job satisfaction finds that the job characteristics *skill variety*, *autonomy*, and *feedback* positively affect employee job satisfaction before ERP implementation and negatively affect employee job satisfaction after ERP implementation. They also find that the job characteristics *task identity* and *task significance* equally positively affect job satisfaction before

and after ERP implementation. Finally, the study indicates that the ERP system implementation moderates the effects of *skill variety*, *autonomy*, and *feedback* on job satisfaction. In summary, the study underscores the dynamic relationship between job characteristics and job satisfaction over time (Morris and Venkatesh 2010).

Based on these results, Venkatesh et al. (2010) examine how the implementation of an information/communication technology system influences job characteristics and whether these characteristics influence employees' psychological states and their job-related outcomes. The results of their longitudinal field study in an Indian bank shows that the implementation of an IT system positively influences job characteristics but negatively influences job satisfaction and job performance (Venkatesh et al. 2010).

A further analysis of the impact of job characteristics on employees' satisfaction was conducted by examining changes to two *job demands* and *job controls* during the implementation of an ERP system (Bala and Venkatesh 2013). The findings indicate that process complexity strongly predicts a decrease in job control while perceived process radicalness strongly influences an increase in job demand.

To unearth the diverse reactions of employees to process change such as process standardization due to an IT system implementation, while not only focusing on job-related outcomes such as job satisfaction or job performance, Bala and Venkatesh (2017) conducted a qualitative longitudinal field study in the healthcare industry. The findings showed that employees reactions to process standardization differ depending on the phase of implementation: initiation, institutionalization, and routinization (Bala & Venkatesh, 2017).

2.5 Theories

As argued above, BPS research and especially research regarding process change acceptance should become more theory-based. This dissertation takes a step in this direction by applying several theories to examine the circumstances under which employees will accept process change. In the following section, individual level theories but also organizational level theories are discussed to cover process orientation and process change acceptance from the organizational perspective but also from the individual perspective (which is the focus of this dissertation thesis). The following section outlines job characteristics theory and theory of purposeful work behavior in detail because they are key to this thesis. Other theories, such as contingency theory or absorptive capacity, are only explained briefly because they are only used in related research⁸.

2.5.1 Contingency theory

According to contingency theory, there is no one best way to organize and lead an organization. According to Fiedler (1964), the most effective leadership style depends on various internal and external constraints. In other words, a management style could be effective in one situation, but it may not be in another. The four main aspects of the contingency theory are (Livari 1992; Rogers et al. 1999):

- There is no 'one-size-fits-all' way to manage an organization.
- The design of the organization as well as its subsystems has to be aligned with the organizational environment.
- The organization must be aligned to its environment, but also the different systems of the organization (such as business units and teams) must also be aligned.

⁸ Leavitt's Diamond of Change and the Work System Theory are explained in section 2.3.2. They are used for structuring the factors influencing BPS only. The four factor theory is not explained in the introductory paper.

- The needs of an organization can better be fulfilled if its design and management style are appropriate.

The research interest has shifted from identifying best practices for implementing BPM or justifying its value for an organization towards analyzing and understanding the contextual factors under which BPM is effective (Sousa and Voss 2008). Thus, the fit between the organization's characteristics and the design of the to-be-implemented processes have shown to influence implementation (Morton and Hu 2008). Given this interdependence, it is not enough to copy best-practice approaches which may have led to success in some case but might not bring the same benefits in another case. Each company should identify and analyze their contingencies first and then align their BPM project appropriately (Trkman 2010). All these aspects are transferrable to BPS research and thus makes contingency theory relevant for BPS research as well.

2.5.2 *Dynamic capabilities*

The RBV has been criticized for not considering how resources are developed, integrated in the organization or released. Dynamic capabilities (DC) theory aims to bridge this shortcoming by adopting a process approach (Vaidyanathan and Devaraj 2008). Dynamic capabilities are the ability to integrate, build, and reconfigure internal and external competencies to adapt to rapidly-changing environments (Teece et al. 1997). They act as a buffer between an organization's resources and the changing business environment and they support a firm to adjust its mix of resources and thereby maintain the sustainability of the organization's competitive advantage (Vaidyanathan and Devaraj 2008). In contrast to the RBV, which stresses resource choice, dynamic capabilities theory highlights the importance of resource development and renewal as well as the identification of difficult-to-imitate internal and external competences (Teece 2007; Trkman 2010).

Business processes are often considered a difficult-to-imitate competence (Hafeez et al. 2002) and BPM is thus considered as a management principle to support organizations to sustain their competitive advantages (Hung 2006). Taking a DC perspective on an organization's business processes, the dynamic capabilities are specific and identifiable processes, such as product development, alliances or strategic decision-making (Sher and Lee 2004). From the process perspective, analysis, design, management, and optimization of the dynamic structure of a business is possible (Strnadl 2006). Besides the business processes regarded as competences, there is also the dynamic aspect of dynamic capabilities which is related to the evolution of business processes. Consequently, BPM is not a one-time project but it should be continuously executed to ensure the improvement of an organization's business processes and thus its competitive advantage (Trkman 2010). As shown in previous studies (e.g., McAfee and Brynjolfsson 2008), BPS is one way to create competitive advantage.

2.5.3 *Absorptive capacity*

Absorptive capacity refers to an organization's ability to identify, assimilate, transform, and apply valuable external knowledge (Cohen and Levinthal 1990). This means absorptive capacity limits the rate or quantity of information which can be absorbed by a firm. So, it is very similar to information processing theory but it refers to the firm level rather than to the individual level. In 2002, Zahra and George extended the theory by distinguish between four distinct dimensions of absorptive capacity: acquisition, assimilation, transformation, and exploitation.

BPM and BPS as means for continuous process improvement and development go along with a lot of business process changes which fit under the organizational change perspective (Klun et al. 2016). So, the success of process changes depends on the fit between the planned changes and the AC of the corresponding organization and its inherent systems (e.g. business units). If the firm has a high level of AC during the initial process-related projects, it will be able to apply new knowledge gathered internally,

from external consultants or other partners to their processes but also in process improvement projects more easily (Francalanci and Morabito 2008; Klun et al. 2016; Manfreda et al. 2014). To improve processes, a certain level of AC has to be attained (Paim et al. 2008). Due to the fact that processes are performed by different employees in different departments, a proper level of AC is required for these departments. Therefore, AC is not relevant for employees only but also for the management. Consequently, to increase AC for organizational changes related to process orientation and, thus, address employees and management, communication channels including cross-functional teams, formal and informal meetings, and communication to all stakeholders are essential (Harrington and Guimaraes 2005; Klun et al. 2016). Using these elements provides experience and knowledge to the organization as a whole but also to the single employees, who are able to drive and continue a process-oriented view and working style even after dedicated BPM projects, which increases its absorptive capacity, an important precondition for further process improvement (Klun et al. 2016; Manfreda et al. 2014).

2.5.4 Cognitive dissonance

Cognitive dissonance theory focuses on the relationships between cognitions. According to Festinger (1957), individuals strive for consistency among their cognitions, which include attitudes and beliefs. When there is an inconsistency between a person's cognitions, cognitive dissonance, which is a state of psychological discomfort, is perceived. Its strength is affected by two factors: the number of dissonant beliefs and the importance of each belief. To settle cognitive dissonance, three reduction strategies can be applied: change one's cognition, reduce the importance of the dissonant cognition or introduce a new cognition to counteract the dissonant cognition (Festinger 1957). Cognitive dissonance serves an important function in assisting in the execution of effective behavior (Harmon-Jones and Harmon-Jones 2002), it affects the behavior and can predict subsequent attitude change (van Veen et al. 2009).

BPM and its characteristic of continuously improvement and development and thus the attempt to change the existing state of the organizations' processes can cause cognitive dissonance in employees because their current cognitions are confronted with the proposed changes. Due to this unpleasant mental state, employees have to apply a CD resolution strategy in an attempt to harmonize their contradicting states of beliefs (Klun et al. 2016). Consequently, CD resolution is latent and thus an organization should support employees towards a CD resolution which is positive for BPM and the overall goal to become process-oriented (Klun et al. 2016). To do so, Klun et al. (2016) suggested leading workshops, enabling communication, and supplying relevant information. In addition, different learning methods could be applied. For instance, Leyer et al. (2015) used cognitive dissonance as theoretical lens to explain the effectiveness of role plays on process-oriented behavior. They assumed that role plays are a dramatization because participants are supposed to perform a role or tasks which are unfamiliar. Cognitive dissonance arises by reflecting past actions, beliefs, and attitudes (Chen and Martin 2015). In the context of the role play, perceiving cognitive dissonance could be a step towards behavioral change (McGregor 1993) and thus learn process-oriented behavior (Leyer et al. 2015).

2.5.5 Job characteristics theory

The relationship between work design and employee reaction (including positive outcomes like motivation or work performance but also negative outcomes like absenteeism or turnover) has been examined in organizational psychology and management research over several decades (e.g., Hackman and Oldham 1975; Humphrey et al. 2007; Morgeson and Humphrey 2006; Turner and Lawrence 1965). The most important theory provided by the job design research strand was developed by Hackman and Oldham (Hackman and Oldham 1975, 1976), who defined five job characteristics that increase positive work outcomes such as work satisfaction, motivation, or work performance, and decrease negative work outcomes such as absenteeism and turnover.

Job characteristic	Description
Autonomy	The degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out.
Feedback	The degree to which carrying out the work activities required by the job results in the individual obtaining direct and clear information about the effectiveness of his or her performance.
Skill variety	The degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the person.
Task identity	The degree to which the job requires completion of a 'whole' and identifiable piece of work; that is, doing a job from beginning to end with a visible outcome.
Task significance	The degree to which the job has a substantial impact on the lives or work of other people, whether in the immediate organization or in the external environment.

Table 4. Job characteristics (Hackman and Oldham 1975, 1976)

The effect of the five job characteristics is mediated by three psychological states: meaningfulness of work, responsibility for outcomes of the work, and knowledge of the actual results of the work (Hackman and Oldham 1975, 1976).

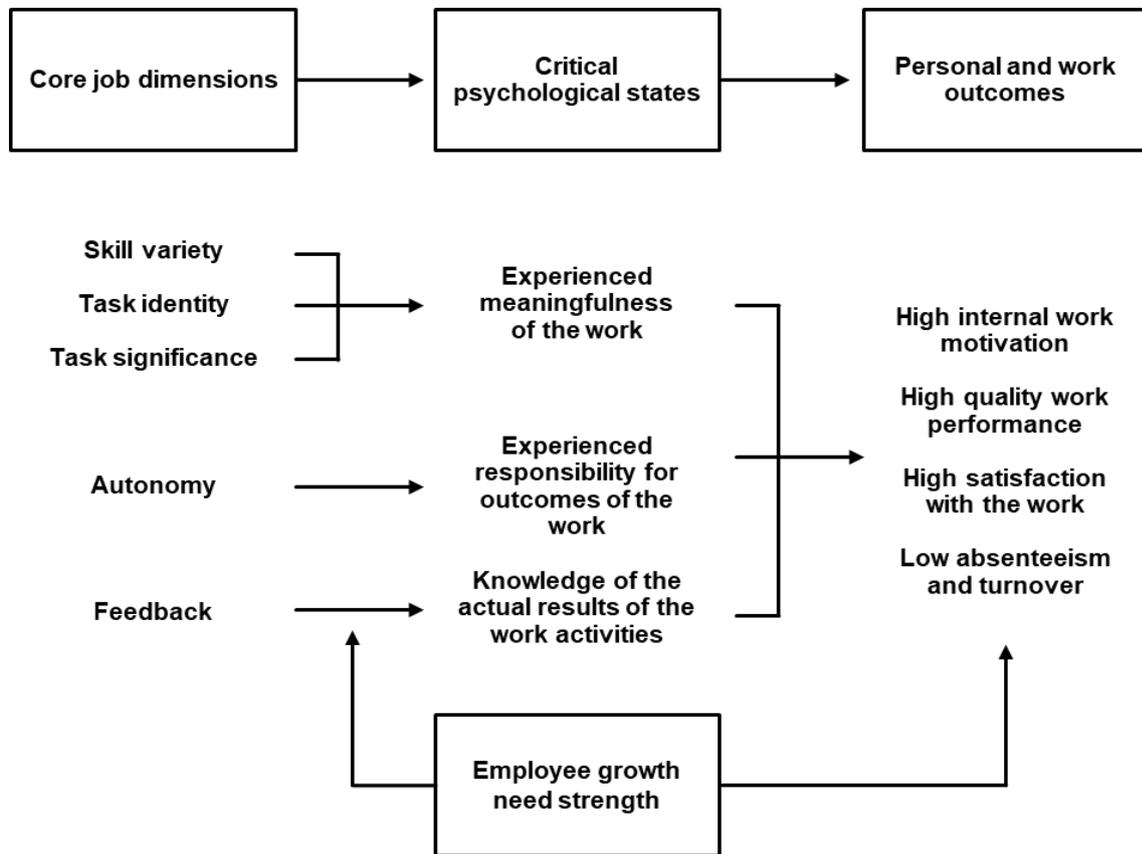


Figure 5. Job characteristics theory (Hackman and Oldham 1975)

The original job characteristics theory (JCT) by Hackman and Oldham (1975) has been extended by several authors. For instance, Kiggundu (1981, 1983) added a new job characteristic named 'task interdependence'. He distinguishes initiated from received task interdependence. Initiated task interdependence is defined as the extent to which work flows from one job to another. Employees performing a job with high initiated task interdependence directly affect their colleagues' jobs. In contrast, employees performing jobs characterized by high received task interdependence get input from multiple other colleagues and their jobs (Kiggundu 1981). Initiated task interdependence influences a person's experi-

enced responsibility for work (Thomas 1957; Turner and Lawrence 1965) while received task interdependence negatively affects experienced responsibility (Kiggundu 1981). According to the definition, task interdependence is very similar to autonomy, but task interdependence relates to experienced responsibility for dependent's work outcomes whereas autonomy is related to experienced responsibility for one's own outcomes. In an empirical test of his hypotheses, initiated task interdependence has shown to be related to experienced responsibility for dependents' work outcomes but no other psychological state. In contrast, received task interdependence has shown to have no negative effect on experienced responsibility (Kiggundu 1983). Autonomy has proven to be related to experienced responsibility to one's work outcomes as well as to all other psychological states (Kiggundu 1983) of the original model by Hackman and Oldham (1975).

Another extension is provided by Humphrey et al. (2007) who add five motivational characteristics to the original model: task variety, information processing, job complexity, specialization, and problem solving. In addition, they differentiate between three dimensions of autonomy: work scheduling autonomy, work methods autonomy, and decision-making autonomy, and add social and work context characteristics. Moreover, they extended the original model by adding work context characteristics including physical demands, work conditions, and ergonomics, as well as social characteristics including interdependence, feedback from others, social support, and interaction outside the organization. They also confirm the mediation of the critical psychological states, identifying meaningfulness of work as the strongest mediator. Besides the work design characteristics and the mediators, they also extend and divide work outcomes into four categories: behavioral outcomes, attitudinal outcomes, role perception outcomes, and well-being outcomes (Humphrey et al. 2007).

The job characteristics theory is appropriate to use in the context of BPM and BPS and is relevant to business process changes as a means for process development and improvement (Klun et al. 2016). As such, it is typically accompanied by job and/or process reengineering. To understand the consequences of business processes changes on employees' behavior, a deeper understanding of the design of work and tasks within target processes is required. Morris and Venkatesh (2010) used the job characteristics theory as a theoretical lens to analyze the impact of an ERP implementation on employees' jobs. They show that the influence of the different job characteristics on job satisfaction is not static, especially following an ERP system implementation (Morris and Venkatesh 2010).

2.5.6 Self-determination theory and theory of purposeful work behavior

To experience meaningfulness in work, it essential to pursue cherished goals. Two theories, i.e. the self-determination theory and the theory of purposeful work behavior, explain this pursuit of goals.

2.5.6.1 Self-determination theory

The self-determination theory (SDT) has an organismic-dialectical perspective which postulates humans are active and growth-oriented organisms. They naturally tend to integrate their psychic elements into a unified sense of self and themselves into a larger social structure. Their organismic activities and propensities require nutriment in the form of experienced competence, relatedness, and autonomy. Natural processes, such as instance intrinsic motivation, operate perfectly if sufficient nutriment is present and the individual has the opportunity to fulfill these needs and the result is well-being. In the case of insufficient nutriment, such as in a very controlled or over-challenging situation, organismic processes are hindered and self-protective or defensive behavior such as psychological withdrawal or antisocial activity results. Accordingly, the human psyche is concerned by the innate psychological needs for competence, relatedness, and autonomy. Consequently, the pursuit of goals, domains, and relationship is a direct corollary of the SDT perspective. This pursuit allows and supports individuals need satisfaction (Deci and Ryan 1985, 2000).

Need	Description
Competence	The propensity to have an effect on the environment as well as to attain valued outcomes within it
Relatedness	The desire to feel connected to others, to love and care, and to be loved and cared for
Autonomy	The desire to self-organize experience and behavior and to have activity be concordant with one's integrated sense of self

Table 5. Needs in SDT (Deci and Ryan 2000, p. 230)

In SDT theory, needs are considered innate instead of learned (as understood by drive theories). In drive theories, needs are seen as deficits that disturb a human's equilibrium and push the human to behave in certain learned ways that the person expects to satisfy the needs and thus re-achieve equilibrium. According to drive theories, a human's set point is passivity or quiescence, need satisfaction refers to remedying deficits and it is the only purpose for behavior. Contrary, in SDT, a human's set point is growth-oriented activity which includes the inclination to act in response to the inner and outer environment, performing activities fitting to one's own interests, and moving toward personal and interpersonal coherence. Consequently, pushing is not needed and behavior is not solely aimed at need satisfaction (Deci and Ryan 1985, 2000; Ryan and Deci 2000).

2.5.6.2 Theory of purposeful work behavior

The theory of purposeful work behavior explains how the strive to fulfill goals lead to experience meaningfulness. According to Barrick and Mount (2013), humans strive for higher-order implicit goals. These are goals to which an individual strives for subconsciously.

Higher-order implicit goal	Description
Communion	Individuals are motivated to achieve meaningful contact, get along with others
Status	Desire to extent power and influence over others
Autonomy	Motivated to gain control and understanding of important aspects of the work environment and to pursue personal growth opportunities
Achievement	Need to demonstrate personal competence and a sense of accomplishment

Table 6. Higher-order implicit goals (Barrick and Mount 2013)

In the theory of purposeful work behavior, purposefulness is seen as a dynamic motivational process in which the goals fulfilment is closely related to the individual acting according to the own personality. As with the SDT, the focus is on volitional behavior which gives the individual the control and freedom over her own goals and the corresponding behavior. In situations which do not allow this degree of freedom (e.g. due to strict regulation), individuals do not feel comfortable because their higher-order implicit goals as well as personality do not fit the respective job. These so called 'discordant work situations' hinder individuals from fulfilling their higher-order goals, which leads to the perception of threat and discomfort. Consequently, the perceived meaningfulness of work decreases (Barrick and Mount 2013).

The self-determination theory as well as the theory of purposeful work behavior are relevant theories which have to be considered in BPM and BPS research. As BPM and BPS can create discordant work situations and thus cause resistance, motivational factors have to be analyzed carefully to enhance employees' acceptance towards process standardization. The two theories highlight the fact that work behavior (such as performance and motivation) depends on the possibility of fulfilling certain needs or higher-order implicit goals. If this striving is hampered by changed processes, the acceptance toward them can dramatically decrease. Having the impact of needs and higher-order implicit goals in mind, the process standardization initiatives can be designed adequately to facilitate employees' striving for their goals. For instance, employees can be involved in designing new processes so that their need for competence as well as their higher-order implicit goal of achievement can be fulfilled.

2.5.6.3 Theory of reasoned action

According to theory of reasoned action (TRA) (Ajzen and Fishbein 1973; Fishbein and Ajzen 1975), an individual's behavior is driven by behavioral intentions, which are the sum of the individual's attitudes towards the behavior, perceived norms surrounding performance of the behavior, and perceived behavioral control as extended by Fishbein and Ajzen's (2010) reasoned action approach.

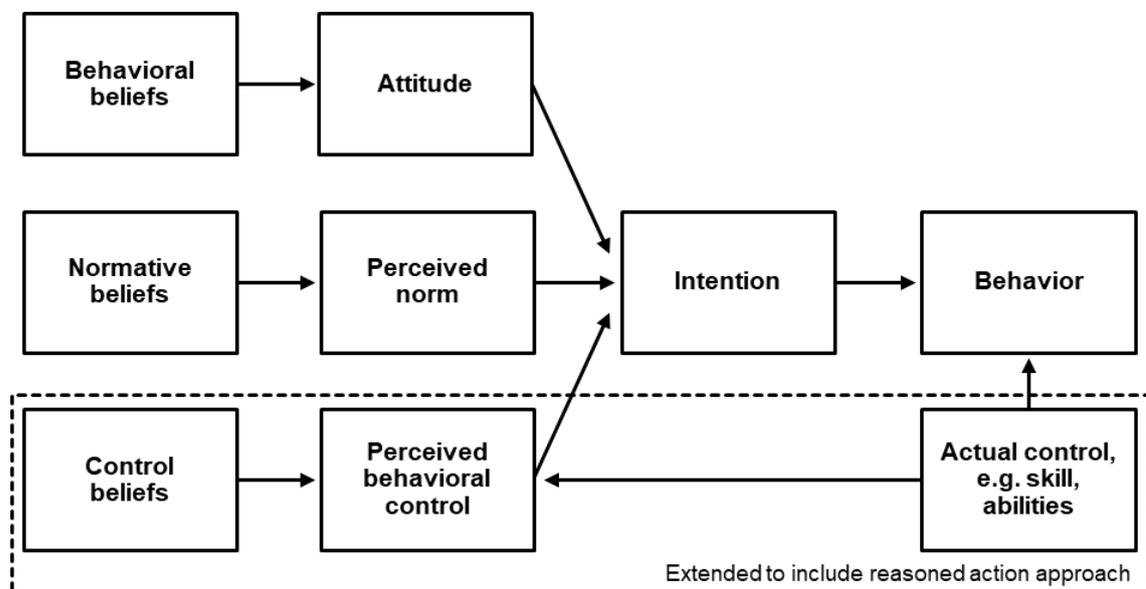


Figure 6. Theory of reasoned action

Attitude towards the behavior refers to the individual's feelings about performing a certain target behavior. Attitude is determined through an assessment of the individual's beliefs regarding the consequences arising from the behavior and an evaluation of the desirability of these consequences. The overall attitude is influenced by the individual consequences and the desirability assessments for all expected consequences of the behavior. Perceived norm refers to an individual's perception of whether other subjectively important persons think that she should or should not perform the behavior in question. Perceived norm reflects the sum of the individual perception and motivation assessments for all relevant referents (Ajzen and Fishbein 1973; Fishbein and Ajzen 1975). Perceived behavioral control refers to the individual's perception of whether she is capable of, or has control over, performing the behavior in question. The more positive the attitude towards a certain behavior, the perceived norm and the perceived behavioral control, the more likely it is that the individual will perform the respective behavior. Major antecedents for attitude, perceived norm and perceived behavioral control are beliefs about behavior, norms and control (Fishbein and Ajzen 2010). In summary, performing a certain behavior entails comparing and selecting among the attitudes, perceived norms and perceived behavioral controls associated with each of the alternative behaviors in the choice set (Sheppard et al. 1988).

TRA is relevant for BPM and BPS research because it explains human behavior and thus also provides explanations why employees behave in a certain way while working in processes. Even though processes define the sequence of activities, employees performing these activities do not always adhere to them in the predefined way. Thus, to achieve compliant process execution, antecedents for employees' behavior have to be analyzed in detail. Employees first have to be convinced of the idea of process orientation. Then, the more process-oriented thinking, the more process-oriented the behavior will be.

3. Research methodology

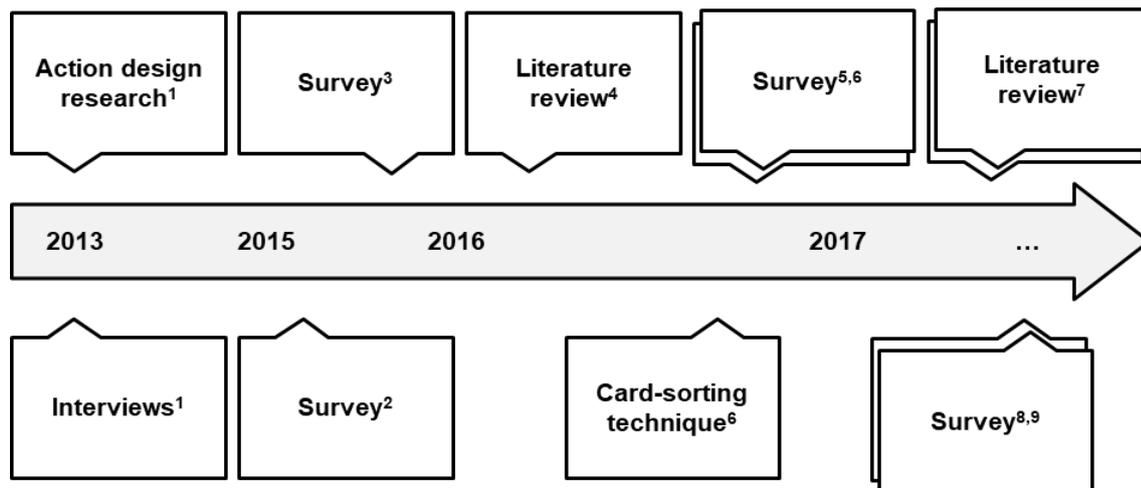
This dissertation includes a literature review, applies the action design research approach, interviews, surveys, and card-sorting technique to address the research questions and the identified research directions. The multi-method approach was chosen to gain insights into new phenomena by conducting explorative research and to provide empirical evidence and generalize results by following confirmatory research. In the following sections, the methodologies used in the single papers are explained in detail. The following Table 7 shows the different research methodologies used in this dissertation thesis.

Study	Research context	Study objective	Research methodology	Affected/asked participants	Reported in
I	Process orientation	Analyzing the different levels of process orientation	Literature review		Introductory paper (see 2.2)
II	Process management in general	Analyzing people's roles in BPM	Literature review		Paper I
III	Process standardization	Developing and implementing a governance model for effective and sustainable process standardization	Action design research	30	Paper II
			Interviews	7	Paper II
IV			Action design research	20,000	Unpublished
V			Action design research	120,000	
VI			Process standardization	Examining the influence of job characteristics on employees' process orientation	Survey
	Job construals	Developing and operationalizing the construct of job construals	Card sorting technique	17	Paper V
VII	Process standardization	Analyzing the impact of job characteristics	Survey	40 employees (39 responses)	Paper IV

		on employees' acceptance of process standardization			
VIII	BPM system use	Examining the impact of BPM system use on employees' process orientation	Survey	20,000 employees (1,170 responses)	Paper VII
IX		Examining the impact of BPM system use on individual process innovation	Survey	61,572 participants (1,054 responses; 171 matches from the first and the second round)	Paper VIII
X	Business analytics tool usage	Examining the impact of behavioral antecedents on business analytics tool usage	Survey	933 participants (332 responses)	Paper IX

Table 7. Research methodologies used in this dissertation

The chronological sequence of the different research methods is illustrated in Figure 8.



The respective research method is used in the following paper:

- 1 Kettenbohrer et al. (2013a): Developing a governance model for successful business process standardization
- 2 Kettenbohrer et al. (2015a): Analyzing the impact of job characteristics on employees' acceptance of process standardization
- 3 Kettenbohrer et al. (2016a): Examining the influence of job characteristics on employees' process orientation
- 4 Kettenbohrer (2016): A literature-based analysis of people's roles in business process management
- 5 Kettenbohrer et al. (2016): Examining the impact of business process management system use on employees' process orientation
- 6 Kettenbohrer et al. (unpublished): Good cop or bad cop? How meaningfulness of work and job construals affect process change acceptance
- 7 Introductory paper
- 8 Leyer et al. (unpublished): How to provoke individuals' contributions to process innovation – The role of process management systems
- 9 Strohhecker et al. (under review): This analytics tool looks nice, but... I am still happy without it

Figure 7. Chronological sequence of research methodologies

3.1 Literature review

This dissertation includes three literature reviews. The first is included in this introductory paper and reviews the process management literature to identify and understand the levels of process orientation discussed in the literature. The second literature review structures and analyzes success factors of process standardization and is also included in this introductory paper. The third literature review (in Paper I) summarizes process management literature on employee roles in this research strand.

All three literature reviews use the steps proposed by vom Brocke et al. (2009). As the procedure of the literature review in Paper I, is explained in the paper extensively, I will explain the procedure of the literature reviews regarding the different levels of process orientation and the success factors of process standardization in detail in the introductory paper.

Vom Brocke et al. (2009)'s framework proposes five stages, namely (1) definition of research scope, (2) conceptualization of the topic, (3) literature search, (4) literature analysis and synthesis, and (5) research agenda. The first stage (definition of research scope) of this literature review is presented in Table 8.

Characteristic	Categories			
	Focus	Research outcomes	Research methods	Theories
Goal	Integration	Criticism		Central issues
Organization	Historical	Conceptual		Methodological
Perspective	Neutral representation		Espousal of position	
Audience	Specialized scholars	General scholars	Practitioners/ politicians	General public
Coverage	Exhaustive	Exhaustive and selective	Representative	Central/pivotal

Table 8. Taxonomy of the literature review (vom Brocke et al. 2009)

The literature reviews presented in this introductory paper focus on the conceptualization of process orientation as well as on the structuring of process standardization success factors (step 1). The results were integrated with regard to the different levels of process orientation respectively process standardization success factors. The literature reviews are organized as literature analyses with a conceptual focus. The audience addressed by this review are specialized scholars but also practitioners interested in process orientation and process standardization. The coverage of this literature review can be described as representative.

The next step (2) highlights the point that “the author of a review article must begin with a topic in need of review and a broad conception of what is known about the topic” (Torraco 2005, p. 359). My literature search targeted journals and conference papers (step 3). As a starting point, the literature retrieval for both literature analyses was based on the eight journals included in the AIS senior scholar basket, organization science outlets ranked as A+, A or B by the German JOURQUAL 3.0 ranking published by the German Academic Association for Business Research (VHB), and the Business Process Management Journal, the leading journal of process management. In addition, four major conferences in our field (ICIS, ECIS, HICSS and AMCIS) were considered to include current research on process orientation. To receive relevant results, a query using the keywords process(-)orientation, process(-)oriented, process(-)driven, and process(-)centered for the literature review regarding process orientation was conducted. For the literature review regarding BPS success factors, the keywords process(-)standardization, process(-)harmonization, process(-)optimization, process(-)homogenization, and process(-)reuse in American and British notation were used. If the title and the keywords of the resulting articles were relevant to the construct of process orientation respectively BPS success factors, the abstract was screened before a final decision was made on whether to include the article in the review. Based on the initial findings, I conducted a forward and backward search to get a comprehensive overview. The coverage of both of the literature reviews was from 2005 to 2017, but the backward search also identified relevant articles published before 2005. In total, 30 articles relevant to process orientation conceptualization and 23 ar-

ticles relevant to success factors of BPS were analyzed. The fourth step (literature analysis and synthesis) were described in Section 2.2 above and the fifth step (research agenda) is explained in Section 2.2 and Section 2.3.2 above.

3.2 Action design research approach

Paper II develops a governance framework for sustainable and effective business process standardization (Paper I). Action design research is an integrative approach combining action research (AR) and design science (DS) (Sein et al. 2011). Action research is “an interventionist approach to the acquisition of scientific knowledge that has foundations in the post-positivist tradition” (Baskerville and Wood-Harper 1996, p. 237) aiming to “solve current practical problems while expanding scientific knowledge” (Baskerville and Myers 2004, p. 329). Although various forms of AR exist, most of the AR in the context of IS research uses an approach consisting of a series of stages that can be cycled through either in their entirety or in parts. It is considered important that researchers and practitioners interact with each other while cycling through the single stages (Davison et al. 2004; Papas et al. 2011). The most frequently used AR approach is a five-stage model consisting of problem diagnosis, action planning, action taking, evaluation, and learning (Baskerville and Wood-Harper 1998; Papas et al. 2011).

In contrast, in DS, “an understanding of a problem and its solution is achieved in the building and application of the designed artifact” (Hevner et al. 2004, p. 75). Researchers interact with practitioners to design an artifact produced to address a specific problem and simultaneously test an extant theory. According to Hevner et al. (2004), an artifact is a wide-ranging term and can cover any type of research product such as models, methods or prototypes. The most widely used DS methodology in IS research consists of six stages: problem identification, definition of objectives for a solution, design and development, demonstration, evaluation, and communication (Pefferers et al. 2007).

IS researchers have considered some similarities but also some differences between AR and DS. For instance, Pefferers et al. (2007) state that AR is an alternative or complementary research methodology to DS, perhaps because both methodologies are executed as cyclical processes (Järvinen 2007). Other researchers focus on the differences and state that “design science is not action research [since] action research is clearly centered on discovery through action [whereas] design science is clearly centered on discovery through design” (Baskerville 2008, p. 442). However, DS generates design knowledge relevant for practitioners (Hevner et al. 2004) but does not fully recognize the role of organizational context or conduct continuous evaluation of the artifact (Sein et al. 2011).

As one possible answer on this debate, Sein et al. (2011) propose a research method that combines AR and DS: Action design research. As such, it aims to generate prescriptive design knowledge through building and evaluating ensemble (IT) artifacts in an organizational setting. It tries to deal with two challenges: solving a problem encountered in a specific organization by intervening and evaluating, and building and evaluating an artifact that addresses the problem typified by the encountered situation. To address these two challenges, ADR focuses on building, intervention, and evaluation of an artifact that not only reflects the theoretical precursors but also influence the affected organization (Sein et al. 2011).

As ADR is a method which focuses on ensemble artifacts, it has to consider different issues: Evaluation cannot follow building in a sequence, controlled evaluation is difficult to be designed and conducted, and innovation must be defined for the class of systems which is typified by the artifact (Sein et al. 2011).

To address these issues, ADR contains of four stages and seven principles. The first stage, problem formulation, starts with a problem perceived by practitioners or users in practice or anticipated by researchers. The problem is articulated by formulating an initial research question, and an initial scope, the roles of researchers and practitioners, and the manner of practitioner participation are determined. It is crucial to secure the long-term commitment of organizations and practitioners involved and to define

the problem as an instance of a class of problems. These aspects draw on two principles: practice-inspired research and theory-ingrained artifact. The principle of practice-inspired research views field problems as opportunities to create knowledge. As such, ADR researchers are not supposed to act as consultants or software engineers who solve the problem per se but they should generate knowledge which can be applied to the class of problems. The principle of theory-ingrained artifacts views ensemble artifact built and evaluated by applying ADR as inspired by theories (Sein et al. 2011).

The problem formulation and theoretical premises adopted in stage one are then used in stage two, building, intervention, and evaluation, to generate the initial design of the artifact. This initial artifact is then further shaped by implementing in the organization and the subsequent design cycles. This phase is carried out as an iterative process which connect the three important elements of ADR: building the artifact, intervening in the organization, and evaluating the artifact (BIE). During this stage, the problem and the designed artifact are evaluated continually and the design principles are articulated for the class of problem. The outcome of this stage is the realized design of the artifact and the result of this stage depends on whether the research is IT-dominant (i.e., the aim is to create an innovative technological design) or organization-dominant (i.e., the aim is to generate design knowledge where the primary source is organizational intervention). In case of an IT-dominant BIE, the iterations stop when a more mature artifact, such as a beta version is implemented in the organization. Here, the researchers exit or a new BIE cycle starts. In case of an organization-dominant BIE, the iteration stops when the organization decides to implement or reject the developed artifact, and/or the contributions of additional iterations are only marginal. The second stage draws on three principles: reciprocal shaping, mutually influential roles, and authentic and concurrent evaluation. The third principle (reciprocal shaping) highlights the fact that the artifact and the organizational context are inseparable. Principle four (mutually influential roles) emphasizes the importance of mutual learning among participants. Researchers apply knowledge of theory and practitioners supply practical examples and expertise in organizational work practices. It is crucial to assign clear roles and responsibilities to reflect the experience of each participant. The fifth principle (authentic and concurrent evaluation) stresses the fact that evaluation is not a separate stage but it is interwoven with designing, shaping, and reshaping the artifact (Sein et al. 2011).

The third stage, reflection and learning, is a continuous stage that progresses parallel to the first two stages. This stage serves to apply the learning of the first two stages to a broader class of problems, recognizing that the research process is more than just solving a problem but it also includes continuous reflection on the problem/theories and adjustment to the process based on the evaluation results. The principle on which this stage is drawn is called guided emergence. It highlights the fact that the developed artifact is not only based on the initial design by the researchers but it is shaped and further developed by organizational use and the involved participants (Sein et al. 2011).

The fourth stage, formalization of learning, aims to formalize the learning into a general solution for a class of problems. This stage draws on the principle of generalized outcomes. Generalization is challenging because ADR and its outcomes are of highly situated nature. In other words, the artifact developed via ADR is a specific solution to a specific problem. To move this specific-and-unique solution to a generic-and-abstract one, Sein et al. (2011) propose three levels: generalization of the problem instance, generalization of the solution instance, and derivation of design principles from the design research outcomes.

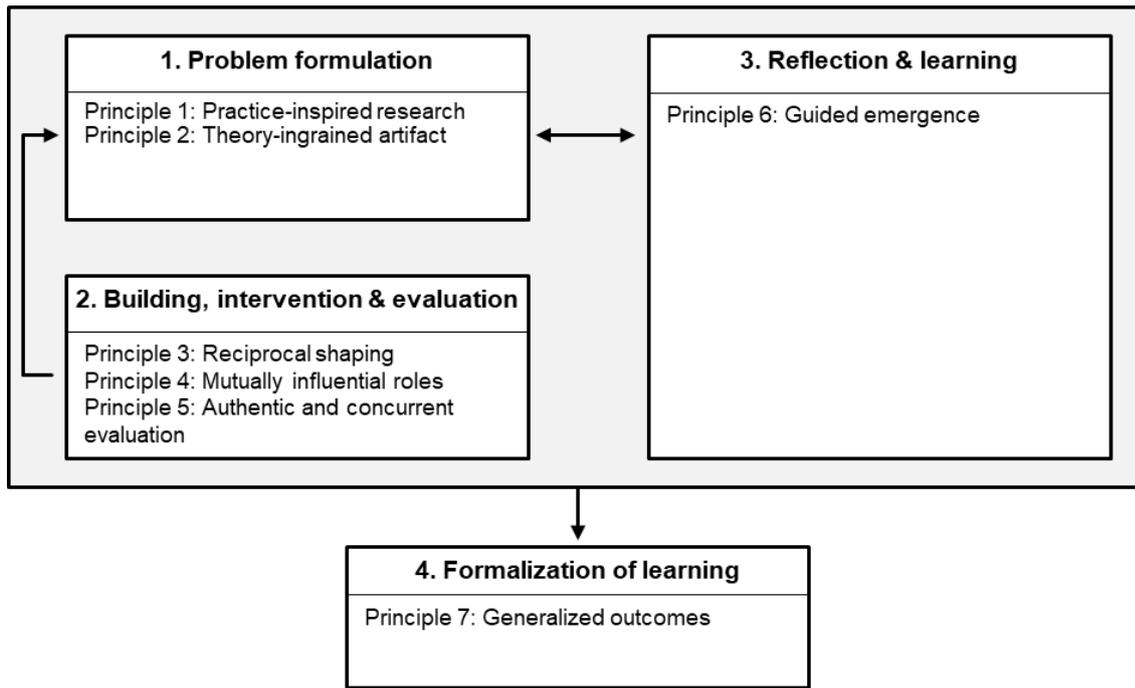


Figure 8. Action design research phases and principles (Sein et al. 2011)

In this dissertation thesis, ADR was applied to develop a governance model for sustainable and effective business process standardization (Framework for Assignment of Responsibilities (FAR+), Paper II). The artifact (i.e., the governance model) was built and evaluated in the context of study III at Lufthansa Technik AG (LHT), the technical division of the Lufthansa Group which provides aircraft maintenance, repair, and overhaul services to about 800 customers across the world. The organization's headquarters are located in Germany (around 10,000 employees) and there are more than 30 other subsidiaries worldwide. In all, around 20,000 employees perform tasks in the context of aircraft overhaul, component maintenance, and V.I.P. cabin completion. Guidelines for all aircraft-related tasks are the approvals by the respective aviation authorities from currently 60 countries. To receive these approvals, Lufthansa Technik has to demonstrate compliance with international laws and standards to the regulatory authorities. To ensure compliance with these requirements, the company implemented a process-oriented integrated management system called IQ MOVE and modeled a wide range of its processes in an easy-to-understand methodology. So, processes are charted in swimming lane-oriented process models, where activities within the swimming lanes are performed by separate roles. The main target group of the system is the employees who are supposed to find all relevant procedures quickly and easily⁹.

Table 9 summarizes the subsequent research procedure as conducted and shows how ADR stages and principles from Sein et al. (2011) were followed. To develop the governance model, the ADR approach was chosen to combine forces of practice and academia to solve a specific organizational problem in an area where practical experience is scarce and which has received little research attention (Stage 1). The close cooperation during the development cycle (Stage 2 and 3) was supposed to strengthen the applicability of the artifact at LHT. In addition, applicability of the artifact at LHT shall be supported by the transferability of the generalized outcome of the ADR approach to other organizations (Stage 4).

⁹ A detailed description of the process management system IQ MOVE as well as the modeling and editorial process can be found in the following paper: Kloppenburg M., Kettenbohrer J., Beimborn D., Bögle M. (2018): Leading 20,000+ Employees with a Process-Oriented Management System: Insights into Process Management at Lufthansa Technik Group. In: vom Brocke J., Mendling J. (eds) Business Process Management Cases: Digital Innovation and Business Transformation in Practice, Springer, Cham

Stage	Principle	Key considerations of research project
1. Problem formulation	P1: Practice-inspired research	<ul style="list-style-type: none"> • Identification and elaboration of field problem: <ul style="list-style-type: none"> ○ Increasing complexity due to internationalization to be managed ○ Weak perception of 'Process Owner' as management role ○ Missing assignment of process and disciplinary responsibility to management roles ○ Non-uniform implementation of existing initial process management role concept without clearly defined cross-linking of processes and structure by these roles ○ Internal and external benchmarking to get practically inspired ideas for solutions
	P2: Theory-ingrained artifact	<ul style="list-style-type: none"> • Analysis of existing research on governance models to identify applicable theories to solve the field problem
2. Building, intervention, and evaluation	P3: Reciprocal shaping	<ul style="list-style-type: none"> • Initial design of FAR+ role concept as artifact by project team (see Paper II) • Discussion of initial FAR+ concept within the project team • Evaluation of FAR+ in the context of a pilot process to collect feedback on the influence of the role concept on BPS and its applicability to practice • Further improvement of the concept by the project team • Specialized application of the FAR+ concept to LHT organizational context and integration into the existing LHT management processes (e.g., by LHT-specific bundling of Resource Responsible and Administrative Responsible to one role named Line Manager)
	P4: Mutually influential roles	<ul style="list-style-type: none"> • Project team consisted of BPM experts at LHT and university researchers. One researcher was on-site at LHT during the project.
	P5: Authentic and concurrent evaluation	<ul style="list-style-type: none"> • Continuous evaluation of concept within the project team and pilot process while defining further details • Several cycles to define the FAR+ concept
3. Reflection and learning	P6: Guided emergence	<ul style="list-style-type: none"> • Circular discussion of FAR+ concept with scholars • Circular discussion of FAR+ concept with project review board consisting of LHT managers
4. Formalization of learning	P7: Generalized outcomes	<ul style="list-style-type: none"> • Generalized formulation of FAR+ concept according to level one and level two of this ADR principle:

		<ul style="list-style-type: none"> ○ Generalization of problem instance by ensuring organization-neutral description of the field problem ○ Generalization of solution instance by removing LHT specific aspects of the FAR+ concept (e.g., bundling and naming of roles) ● Specialized application of the FAR+ concept to LHT
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Table 9. Key considerations of ADR stages and principles in the research project, according to (Sein et al. 2011)

In Paper II, the initial design of the governance model and the results of a first evaluation cycle (ADR stage 2) are explained. To implement the governance model, a combined top-down/bottom-up approach was chosen (see Table 9).

First, workshops with the individuals responsible for modeling the processes were held to help prepare them to act as moderators for the subsequent workshops (phase 1). In phase 2, workshops with the Process Domain Owner, Process Owners, Process Architects, and the Process Managers were held to define process domains and end-to-end processes and nominate and assign roles¹⁰. In phase 3, the operations involving board meetings started.

Additional ADR design cycles were performed while implementing the FAR+ concept to further improve the concept. For instance, further interviews were conducted or workshops, in which roles were assigned and boards were planned, hosted and moderated. In contrast to its initial design, the current design of FAR+ has some small differences in wording (e.g. ‘process responsibility’ and ‘resource responsibility’ are changed into ‘design’ and ‘execution’)¹¹ and the RACI¹² matrix is used to better distinguish the accountabilities and responsibilities of the different roles. In the meanwhile, the governance model affects about 120,000 employees working in different companies in the Lufthansa Group, supporting the generalizability of the model.

3.3 Qualitative research

Qualitative research is “a research strategy which focuses on understanding the dynamics present within single settings” (Eisenhardt 1989, p. 534) and thus allows “to retain the holistic and meaningful characteristics of real-life events” (Yin 2009, p. 4). As such, qualitative research and particularly case study research is suitable to answer ‘how’ and ‘why’ research questions and in the case of unknown relationships between contexts and phenomena (Yin 2009).

3.3.1 Interviews

To evaluate the governance model built via ADR, interviews were conducted (see Paper II). The initial design of the governance model was piloted in a BPS project at eleven Lufthansa Technik AG subsidiaries in eight European countries. For the first evaluation, seven interviews with managers involved in the BPS project were conducted, five interviews in person and two interviews by phone. To get detailed and comprehensive insights into the influence of the developed artifact on BPS, all process management

¹⁰ The different roles of the governance model are explained in Paper II.

¹¹ The design changes can be found in Paper VI.

¹² RACI is used to connect roles and tasks. R=Responsible, A=Accountable, C=Consulted, I=Informed

levels contained in the governance model were considered in the interviews. Here, not only all future but also all current process management roles were considered. Table 10 gives an overview of the positions and process management roles of the interviewees.

Inter- viewee	Position	Current process management role	Future process management role
1	Vice president	<ul style="list-style-type: none"> • Process Owner • Resource Responsible 	<ul style="list-style-type: none"> • Process Domain Owner • Resource Responsible
2	Director	<ul style="list-style-type: none"> • Process Owner • Resource Responsible 	<ul style="list-style-type: none"> • Process Domain Owner • Resource Responsible
3	Head of	<ul style="list-style-type: none"> • Process Owner • Resource Responsible 	<ul style="list-style-type: none"> • Process Architect • Resource Responsible
4	Head of	<ul style="list-style-type: none"> • Process Owner • Resource Responsible 	<ul style="list-style-type: none"> • Process Manager • Resource Responsible
5	Head of	<ul style="list-style-type: none"> • Process Owner • Resource Responsible 	<ul style="list-style-type: none"> • Process Manager • Resource Responsible
6	Director	<ul style="list-style-type: none"> • Process Owner • Resource Responsible 	<ul style="list-style-type: none"> • Resource Responsible
7	Employee	<ul style="list-style-type: none"> • Employee 	<ul style="list-style-type: none"> • Process Manager

Table 10. Overview of positions and process management roles of the interviewees

Based on the recommendations of Eisenhardt (1989) and Yin (2009), the interviews followed semi-structured guidelines with open-ended questions. The interview guideline consisted of three sections. In the first section, the differentiation of the various roles defined in the governance model were discussed by questioning the general understanding of different areas of responsibility, the pros and cons, and the necessity of differentiation among these roles. The second section focused on the governance model by analyzing the role definitions, possible training and communication measures, and the influence of the model on BPS effectiveness. In the third section, first the overall understanding and attitude of the interviewee towards BPS were determined before the pros and cons of the governance model were evaluated with regards to its contribution to BPS.

All interviews were held in German by at least two researchers (Eisenhardt 1989). The interviews lasted between 45 minutes and 1 hour and were digitally recorded. Finally, each interview was transcribed and analyzed afterwards with the tool MAXQDA. Complementary sources such as process models and organizational documents (e.g., power point presentations or excel sheets) were used when possible to gain additional insights (Yin 2009).

3.4 Quantitative research

3.4.1 Data collection

Most of the papers of this dissertation use a quantitative research approach to answer the research question by evaluating different research models using empirical data collected in different surveys.

Most of the data for this dissertation thesis were collected at Lufthansa Technik AG (Paper II, Paper III, Paper V, Paper VI, Paper VII; also see 4.6). For the different studies, data were collected in different contexts. In Paper III and Paper V, we used data from a survey sent out while the company was undertaking a process change initiative (i.e., implementation of the governance model which was developed by using an action design research approach; see section 3.2, Paper II). This change directly affected 650 employees because they were supposed to take on at least one of the new process management

roles. The process change initiative basically consisted of the implementation of a new governance structure comprising standardized processes for communication with responsible decision makers. The data collection took place in July and August 2015. We sent online surveys to all 650 employees and collected data at two points in time. In the first round, we received 191 completed questionnaires (response rate of 29.4%) and the second round 137 completed questionnaires (response rate of 21.1%).

For the study in Paper VII, we also collected data at Lufthansa Technik but the target group of survey participants was much bigger than and not as selective as in the studies before. For this study, all employees with access to the organization's BPM system, IQ MOVE, were invited to participate in the study. We provided a link that popped up when the system was opened. A call for participation was also posted on the company's intranet homepage. The data collection took place in July and August 2015. Overall, we received 1,170 completed questionnaires (response rate of 5.85%). Double participation could be excluded because the survey tool checked the IP addresses.

Another kind of organization was contacted for the study in Paper IV. Here, data were collected in a German non-profit organization during a process standardization initiative. The non-profit firm is structured as a holding organization of more than 60 institutions providing social care including elder care, youth welfare services and work with the disabled. The holding organization's 2,000 employees are organized in service units providing both stationary and ambulant services. The holding is responsible for all financial, technological, and HR related issues. The observed process standardization initiative comprises a standardization of the billing and accounting process between the holding organization and a service unit for care of disabled people. In total, 40 employees were affected by process standardization, 16 of them working in the holding organization and 24 working in the service unit. To collect data for this study, an online survey from August 2014 until September 2014 was conducted. Of the 40 employees, 39 replied, representing a response rate of 97.5%.

For Paper VIII, data from employees of the financial industry were collected. A non-public university mailing list was used to email an invitation letter and a link to our online survey to 61,572 valid email addresses. The recipients are employees of various firms of the German financial industry and perform various hierarchical positions. At the beginning of the online survey, a filter question was used to sort out participants in managerial positions in order to ensure that only process workers who perform tasks within the different processes were contained in the sample. Moreover, only individuals working in organizations that operate a BPM system which displays business processes and provides process-oriented documentation to the users, were asked. This precondition was assured by stating the focus of the survey clearly at the beginning as a condition to participate in the survey. In total, 1,054 responses were received. 296 of these participants agreed to answer a second questionnaire and were asked to choose an anonymous but unique identification code. They were contacted two months later with a shorter questionnaire, containing measures for the dependent variable; 171 responses were received in this second stage. Participation was anonymous in the second stage as well. The identification code was used to match the individuals' answers from both survey rounds.

Data from the financial industry were also used in Paper IX. Here, data was also collected by sending out an online questionnaire using a non-public mailing list. The online system recorded 933 entries, including 268 blank responses. Of the 665 remaining responses, 333 were incomplete and had to be deleted resulting in a sample of 332 employees.

3.4.1.1 Card-sorting technique

In Paper V, a new construct named job construals was developed, which was tested for reliability and construct validity using the card-sorting technique and factor analysis. This construct is also used in Paper VII. The methodology developed by Churchill (1979) was used to operationalize the construct.

Churchill identifies three stages for construct development: In stage 1 the domain of the construct is defined; In stage 2 the construct is operationalized by proposing and developing a measurement scale, e.g. creating survey items; In stage 3, data received by using the measurement instrument are statistically analyzed to prove the construct's reliability and validity (Churchill 1979). Stages 1 and 2 are presented in Paper V as well as in this introductory paper, and stage 3 is reflected in Paper V and Paper VII.

The core goal of stage 2, the generation of a measure, is to ensure content validity, that is, to ensure that the measure adequately measures and empirically reflects the theoretical construct (Lewis et al. 1995). To derive a relevant measurement scale for job construals and to ensure content validity of our measures, the items were designed by adapting multi-item measures from existing psychology and management research on self-construals and task interdependence. In addition, self-developed items were added. Existing measurement scales were not blindly adapted but rather their appropriateness was tested by discussions with seventeen BPM experts, who all work in the process management department of Lufthansa Technik AG and work in and with processes as process modelers, process owners or process participants on a daily basis.

In the following, the development of the new multi-item measurement scale for job construals is discussed following established guidelines (Moore and Benbasat 1991). Table 11 lists the relevant literature screened for the item development.

Construct	References
Self-construal	(Cross 1995; Cross et al. 2000; Jenkins et al. 1975; Singelis and Sharkey 1995)
Task interdependence	(Aiken and Hage 1968; Billings et al. 1977; Lynch 1974; Mohr 1971; Overton et al. 1977; Thomas 1957)

Table 11. Literature sources for adapted multi-item measures for job construals

Based on the literature screening, 58 appropriate items could be identified. The items were rephrased depending on their origin: items originally measuring self-construals were changed from self-perception to job-perception. For example, item "To what extent does the individual depend on his/her colleagues for doing his/her job?" (Jenkins et al. 1975, p. 177) was adapted to "My task within the process depends directly on tasks performed by other colleagues". Items derived from task interdependence were changed from an objective view to an individual perceptual view. Table 13 shows the adaptation of the items.

To evaluate the content validity of the derived items, a card-sorting procedure was applied, in which experts assigned the items to the new construct of job construals. In the first round, each of the 58 items was discussed with six BPM experts.

Table 12 summarizes the number of experts involved in each round as well as their work experience and their expertise in terms of BPM.

	1 st round			2 nd round			Overall		
	Average (years)	Minimum (years)	Maximum (years)	Average (years)	Minimum (years)	Maximum (years)	Average (years)	Minimum (years)	Maximum (years)
Company affiliation	10.4	1	30	11	1.5	19	10.8	1	30
Work experience	13.7	2	30	15.5	4	26	14.8	2	30

Experience in BPM	7.7	2	15	9.5	1.5	25	8.9	1.5	25
Number of experts	6			11			17		

Table 12. Expert qualification for each round

Furthermore, the construct definition was discussed with the experts so that they had the opportunity to report on poor wording or potential misunderstandings. To guarantee construct validity of potential items and to identify poorly worded or ambiguous terms, the experts were asked to sort the items into three construct categories: job construal, autonomy, and “other”. To check for discriminant content validity, the 58 items included four items measuring autonomy (Morgeson and Humphrey 2006), a construct that is strongly related to task independence, in the card-sorting procedure. In the job characteristics model by Hackman and Oldham (1976), autonomy is defined as “the degree to which the [design of the] job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out” (Hackman and Oldham 1976, p. 258). All six experts sorted these four items to the category ‘autonomy’, which indicates high content-wise differentiation among the two constructs. We also added the category ‘other’ to provide a kind of container category for all items which the experts seemed to be neither suitable for job construals nor for autonomy. As a result of the first round, eleven out of the 58 items showed high values of substantive validity (listed in Table 13 and Table 14). Unclear or poorly formulated items were also identified and the items were reworded before round 2 according to the answers of the participants.

Item	Original construct	Original item	Reference	Adapted item
JC1	Self-construal	When I think of myself, I often think of my close friends or family also.	(Cross et al. 2000)	It is also part of my job to know the tasks of my colleagues.
JC2		To what extent does the individual depend on his/her colleagues to do his/her job?	(Jenkins et al. 1975)	My task within the process highly depends on tasks of other colleagues.
JC3	Task interdependence	I have to talk to other workers to get my job done.	(Billings et al. 1977)	I need to communicate with my colleagues to carry out my work.
JC4		I must wait for someone to finish their job before I can do my job.	(Billings et al. 1977)	I need to wait until others have finished their task so that I can start with my work.
JC5	Self-developed items	My job is of great importance for my company/organization.		
JC6		My task is a step in a longer process chain, a small step to fulfill a bigger task (to work on the assembly line).		
JC7		Tasks of others directly depend on mine.		
JC8		Work activities highly depend on the work of other people.		
JC9		The completion of my work depends on the work of many other people.		
JC10		The successful fulfillment of my task highly depends on intensive consultation with my colleagues.		

JC11		If others do not finish their job, I cannot get my job done.
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Table 13. Adaptation and assignment of items

In the second round, the sorting task was repeated: Here, 11 other BPM experts were asked in face-to-face conversations to sort the 58 items into the three constructs: job construals, autonomy, and other. To ensure comprehensibility, the experts categorized the items and also reported on problems with wording of the single items. This round, seven (JC1, JC2, JC3, JC6, JC7, JC9, and JC11) out of 58 items were chosen (listed in Table 3 and Table 4). To predict the measure's performance, a pre-test assessment of the measure's substantive validities proposed by Anderson and Gerbing [46] were used. A measure's substantive validity is a major prerequisite for construct validity. In addition, the small-sample nature of substantive validity assessments is appropriate for pre-tests. To assess substantive validity, card-sorting is necessary. As described above, the experts sorted the single items to the constructs they thought the item best fit. To analyze the assignments of the experts, Anderson and Gerbing [46] propose two indices: proportion of substantive agreement (P_{SA}) and substantive validity coefficient (C_{SV}). The proportion of substantive agreement is defined as "the extent to which an item reflects its intended construct. [But it] does not indicate the extent to which an item might also be tapping other, unintended constructs" [46, p.734]. Therefore, the substantive validity coefficient is applied. The C_{SV} index "reflects the extent to which respondents assign an item to its posited construct more than to any other construct" [46, p.734]. The values for P_{SA} range from .0 to 1.0 and for C_{SV} from -1.0 to 1.0. A higher value indicates a greater substantive validity for both indices, with .5 being the recommended threshold for sufficient substantive validity [46]. The following Table 14 shows the different values per item.

Item	1 st round		2 nd round	
	P_{SA}	C_{SV}	P_{SA}	C_{SV}
JC1	1.00	1.00	.91	.91
JC2	.83	.67	.82	.73
JC3	.83	.67	.82	.73
JC4	.83	.67	.64	.45
JC5	1.00	1.00	.64	.36
JC6	1.00	1.00	.82	.73
JC7	.83	.67	.73	.55
JC8	.83	.67	.55	.27
JC9	.83	.67	.82	.73
JC10	.67	.50	.64	.45
JC11	.67	.50	.73	.64

Table 14. Substantive validity pre-test per item

3.4.1.2 Factor analysis

The factor analysis technique is either applied to confirm a priori assumptions and established theories or to identify patterns and relationships in the data (Hair et al. 2017). There are two different types of factor analysis: confirmatory factor analysis (CFA) and exploratory factor analysis (EFA). While CFA runs with a fixed number of factors, EFA determines the number of factors applying the algorithm. This means CFA requires a priori hypotheses which are then tested, which requires estimating the number

of factors. In contrast, EFA needs no a priori knowledge regarding the relationships between the different factors.

The most common approach for factor analysis is principal component analysis (PCA), which is frequently used to test the validity of newly developed constructs (Straub et al. 2004), as is the case in this thesis. The results of an EFA with PCA include *eigenvalues*, which refer to the variances of each factor. A high eigenvalue reflects a high total variance caused by the factor. To ensure construct validity, eigenvalues should be at least equal to 1 and the loadings of each items on its factor should be higher than 0.4, while the cross-loadings to the other factors should be lower (Straub et al. 2004). In addition, other techniques, such as scree plots for identifying underlying factors or extracting factors that are interpretable (Backhaus et al. 2008) or varimax rotation for interpreting the identified factors (Bühl 2008) are applied.

3.4.2 Data analysis

To evaluate the hypotheses formulated in this thesis and to analyze the collected data, several techniques were used which are explained in the following sections.

3.4.2.1 Structural equation modeling

Structural equation modeling (SEM) techniques come under the term of multivariate analysis and allow researchers to test a set of hypotheses by performing path-analytic modeling with latent variables (Chin and Newsted 1999). They combine different aspects of regression with aspects of factor analysis. SEM techniques are considered a better approach to testing path diagrams empirically than linear regression because they allow “the creation and estimation of models with multiple dependent variables and their interconnections at the same time” (Gefen et al. 2011, p. iv). Consequently, SEM methods are the method of choice when it comes to analyzing path diagrams involving latent variables with multiple indicators (Gefen et al. 2011).

Latent variables, which are also referred to as in-/dependent variables, exogeneous/endogenous variables or constructs, are of theoretical interest but cannot be measured directly. To measure the unobservable latent variables, a measurement instrument has to be used which consists of indicators or observed variables that correspond to specific questions or statements (i.e., items). The indicators are rated on a scale such as a 5-point Likert scale with anchors from 1 (fully disagree) to 5 (fully agree). An example for a latent variable used in several papers of this dissertation is job construals. To observe job construals, several indicators are rated by survey participants, such as “My task is a step in a longer process chain, a small step to fulfill a bigger task (to work on the assembly line).”

In SEM, these indicators are used to evaluate the relationships between unobservable latent variables. Depending on whether indicators reflect or form the latent variables, indicators are defined as reflective or formative measurement model (Bagozzi 2011). In a reflective measurement model, the indicators reflect the latent variable and the construct causes the measurement. In other words, if the value of the construct changes, all indicators are expected to change accordingly. In contrast, in a formative measurement model, indicators form the construct, which means that if one of the indicators change, the latent variable is expected to change accordingly. Reflective measures have an error term representing the unexplained variance when path models are estimated. In formative measure, there is no error term as the relationship goes from the indicator to the latent variable. Looking at the statistics, indicators of a reflective measurement model should correlate closely with each other while indicators of a formative measurement model should not correlate closely to avoid multi-collinearity (Hair et al. 2017). In this dissertation, all constructs were operationalized by reflective multi-item measures.

SEM models consist of the measurement model and the structural model. While the measurement or outer model reflects the relationships of the latent variables and their indicators, the structural or inner

model comprises the hypothesized causal relationships between endogenous and exogenous variables (Hair et al. 2017).

In IS research, there are two main approaches to analyzing the relationships between latent variables in a structural equation model: partial least squares (PLS-SEM) and covariance-based structural equation modeling (CB-SEM) (Gefen et al. 2011; Hair et al. 2017). The appropriateness of these approaches depends on the research contexts, characteristics and objectives. PLS-SEM is a variance-based approach which is prediction-oriented, whereas CB-SEM is covariance-based and parameter-oriented (Rigdon 2012). Thus, PLS-SEM is better suited for exploratory research and CB-SEM for confirmatory research (Chin and Newsted 1999; Gefen et al. 2011). This makes PLS-SEM the primary approach for research where the phenomenon analyzed is relatively new, such as process change acceptance among employees, and where measures and theoretical models have not yet been well defined in prior research (Chin and Newsted 1999; Gefen et al. 2011; Hair et al. 2017).

A crucial conceptual difference between the two approaches is how each model treats latent variables. In CB-SEM, the constructs are represented as common factors which explain the covariation between its associated items. To estimate the model parameters, these common factors are neither needed nor known. In contrast, PLS-SEM uses proxies for the examined constructs. These proxies are weighted composites of indicator variables for a certain construct (Hair et al. 2017).

To apply PLS-SEM and thus evaluate the measurement models regarding reliability and validity, SmartPLS2 and SmartPLS3 software were used in this dissertation thesis. The software was also used to check for common method bias and examine mediation and moderation effects in the data which is explained in Sections 3.4.2.3 and 3.4.2.4 below.

3.4.2.2 Criteria for evaluating the measurement and the structural model

The measurement and the structural model are validated and evaluated based on different criteria (see Table 15). For reflective measurement models, reliability and validity needed to be examined. The indicator reliability refers to the rate of variance of an indicator that comes from the latent variables, whereby more than 50 percent of a latent variable's variance should be explained by the indicators and each indicator's absolute standardized loading should be at least 0.707 (Carmines and Zeller 2008). Construct reliability refers to composite reliability which measures internal consistency. This measure should be greater than 0.70 (Nunnally and Bernstein 1994). To check the validity of reflective measurement models, convergent and discriminant validity have to be assessed. One criterion to examine convergent validity is the average variance extracted (AVE), which should be at least 0.5 to ensure that a latent variable explains, on average, at least the half of the variance of its indicators (Henseler et al. 2009).

There are three principle methods to check discriminant validity: the Fornell-Larcker criterion, cross-loadings or the heterotrait-monotrait ratio (HTMT) (Hair et al. 2017). The Fornell-Larcker criterion compares the square root of the AVE values with the latent variable correlations. The criterion is met when each latent variable is higher than the squared correlations with all other latent variables so that the shared variance of each latent variable is higher with indicators of the same constructs than with indicators of other constructs (Fornell and Larcker 1981; Hulland 1999). Cross-loadings can be used to ensure that each indicator has the highest correlation with its latent variable and not with other latent variables (Hair et al. 2017).

However, recent research indicates that neither of these two approaches reliably detects discriminant validity issues (Hair et al. 2017; Henseler et al. 2015). The Fornell-Larcker criterion and cross-loadings especially fail to identify a lack of discriminant validity when two constructs are highly correlated. The Fornell-Larcker criterion improves a little bit when indicator loadings differ more strongly (Henseler et al. 2015; Voorhees et al. 2016). As a remedy, the HTMT has been proposed, which refers to the between-

trait correlation relative to the within-trait correlations. In other words, the HTMT is the ratio of the mean of all correlations of indicators across constructs measuring different constructs to the geometric mean of the average correlations of indicators measuring the same construct. So, it estimates the true correlation between two constructs if they were perfectly measured (Henseler et al. 2015).

For formative measurement models, the evaluation criteria used for reflective measurement models cannot be transferred. Concerning formative measures, the underlying theoretical justification and the opinions of experts are important (Rossiter 2002). Besides, weights of formative measurement models and multicollinearity, which is high correlation between two or more variables, have to be checked to assess formative measurement models. Thus, weights of formative measurement models should be significant and multicollinearity should not be present. One of the most frequently methods to detect multicollinearity is checking the variance inflation factor (VIF) which has to be lower than 5 (Hair et al. 2017; Rogerson 2001).

The structural model can be evaluated by using the coefficient of determination (R^2) and the significance level of each path coefficient (Chin 1998). R^2 reflects the proportion of variability in the data explained by the statistical model, which should be as high as possible to explain the dependent variables' variance well. The path coefficients are standardized beta coefficients which are calculated in ordinary least squares regressions. To determine whether a path coefficient is significant and at which level, bootstrapping can be used (Hair et al. 2017).

Measurement model	Reflective	<i>Indicator reliability:</i> Indicator loadings >0.707
		<i>Convergent validity:</i> Average variance extracted (AVE) >0.50
		<i>Internal consistency reliability:</i> Composite reliability >0.70
		<i>Discriminant validity:</i> AVE > construct's highest squared correlation with another latent construct Indicator's loadings > all of its cross loadings HTMT <0.90
	Formative	Examining/reporting <i>indicators' weights</i> (relative importance) and <i>loadings</i> (absolute importance); Using <i>bootstrapping</i> to determine significance
<i>Multicollinearity:</i> Variance inflation factor (VIF) < 5		
Structural model	<i>R² values:</i> R ² > 19% = weak R ² > 33% = moderate R ² > 67% = substantial Note: These R ² thresholds are general recommendations and can vary depending on the field of research.	
	<i>Level and significance of path coefficients</i> (Bootstrapping to determine path coefficients' significance); t-values for a two-tailed test: 1.65 = 10% significance level 1.96 = 5% significance level 2.58 = 1% significance level 3.29 = 0.1% significance level	

Table 15. Criteria for evaluating measurement and structural model (Hair et al. 2016b; 2017)**3.4.2.3 Common method bias**

The surveys used in this dissertation thesis are based on self-reported data. The results derived using this data is evaluated based on perceptual and subjective measures which make them prone to common method bias (CMB). CMB refers to the variance that is “attributable to the measurement method rather than to the constructs measures are assumed to represent” (Podsakoff et al. 2003, p. 879).

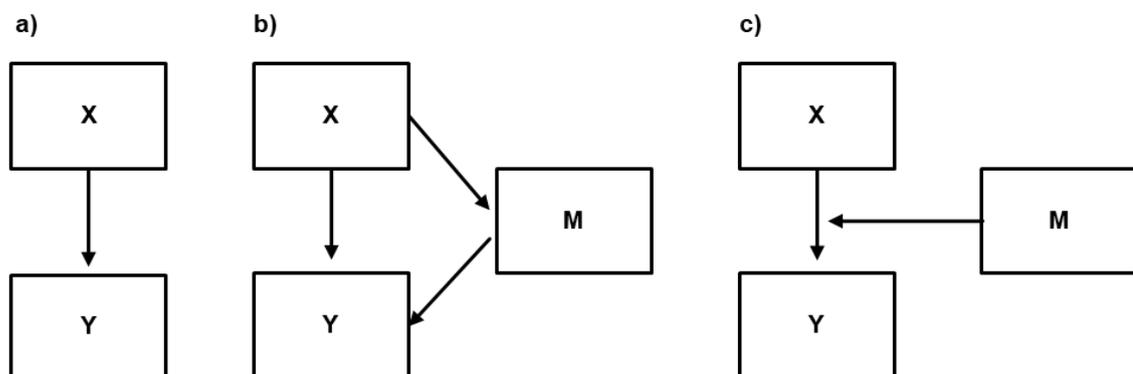
In each paper using quantitative data, we tested the validity of the results for potential CMB by applying two ex-post techniques: Harmon’s single factor test (Podsakoff et al. 2003) and the unmeasured latent marker construct (ULMC) (Liang et al. 2007; Podsakoff et al. 2003).

In Harmon’s single factor test, an exploratory factor analysis is conducted including each indicator as well the unrotated solution is analyzed. In case of CMB, one single factor will account for the majority of the variance among the variables or a single factor will occur from the factor analysis.

In the ULMC method, a latent variable in terms of an aggregate of each indicator included in the study is used to represent and partial out CMB. In case of CMB, the factor increases the R^2 significantly and has significant path coefficients (Liang et al. 2007; Podsakoff et al. 2003).

3.4.2.4 Mediation and moderation analysis

Relationships between variables are often not only characterized by a simple direct influence of a variable X on a variable Y (a) but this relationship can also be dependent on a third variable M. This variable is either a mediator or moderator (see Figure 9). Both models techniques are explained in the following.

**Figure 9. Direct model (a), mediator model (b), and moderator model (c)**

A direct effect (a) means that there is a direct relationship between variable X and variable Y. A mediation effect (b) means that the effect of variable X on variable Y can be, at least partly, influenced by a third variable M. In this case, in addition to the direct effect of variable X on variable Y, variable X could affect variable M and variable M could affect variable Y. Mediation is either full or partial. In the case of partial mediation, variable X would have a smaller but still significant effect on variable Y. In the case of full mediation, variable X would no longer have a significant effect on variable Y (Hair et al. 2017).

Sobel’s z-test is the most frequently used approach to determine the level of statistical significance of the mediation effect (Baron and Kenny 1986; Shrout and Bolger 2002). In this test, the direct relationship between the independent and the dependent variable are compared with the indirect relationship between the independent and the dependent variable, which includes the mediator (Helm et al. 2010). Despite its popularity, the Sobel test has limitations. As the Sobel test assumes a normal distribution, it is not consistent with the PLS-SEM method which is non-parametric method. A further limitation is that the normal distribution assumption does not hold for the indirect effect because the multiplication of two normally distributed coefficients leads to a non-normal distributed product. In addition, for small sample

sizes, the test lacks statistical power. Finally, the test requires unstandardized path coefficients for its statistic (Hair et al. 2017).

To partly overcome these limitations, bootstrapping of the sample distribution of the indirect effect is recommended recently to be applied to determine mediation effects (Klärner et al. 2013; Sattler et al. 2010). This non-parametric test helps to avoid making any assumption of normality or sample sizes (Preacher and Hayes 2004).

In a moderation model (c), there is no direct relationship between variable X and variable M, but the variable M changes the strengths or even the direction of the relationship between the variable X and the variable Y. In this case, the variable M is called the moderator (Baron and Kenny 1986). Both the mediator and moderator concept influence the strength of a relationship between two variables, but there is crucial difference: The moderator variable does not depend on the independent latent variable (Hair et al. 2017).

There are two types of moderating relationships: continuous and categorical moderating effects. A moderating effect is called continuous if the moderating variable is measured metrically. The term categorical is used if the moderating variable is categorical (e.g., gender). When a moderator variable is categorical, it can be used to split the data into subsamples which are usually compared by multigroup analysis (Sarstedt et al. 2011b) (see 3.4.2.7).

3.4.2.5 Higher-order models

Higher-order models often include testing second-order models which contain two layers of constructs: a more general construct, which is measured at a higher level of abstraction (i.e., higher-order construct), and several sub-constructs (i.e., lower-order constructs), which refer to more concrete characteristics of this construct. Higher-order models reduce the number of relationships within a structural model while simultaneously expand the content covered by the construct under consideration (Hair et al. 2017).

Higher-order models require careful and theory-based considerations. Accordingly, four major types of higher-order models can be used: reflective-reflective, reflective-formative, formative-reflective, and formative-formative. Each of these types describe a specific relationship between the higher-order construct and the lower-order constructs as well as the underlying measurement model, which is used to operationalize the constructs of the lower-order level. In general, the reflective-reflective and the formative-reflective higher-order models depict a more general construct while explaining all the lower-order constructs. In the reflective-formative and formative-formative higher-order models, the lower-order constructs form the higher-order models (Hair et al. 2017).

3.4.2.6 Observed and unobserved heterogeneity

When PLS-SEM is used for structural equation modelling, usually the full set of data is analyzed. The underlying assumption is that the used data stems from one single and homogenous population. But this assumption is often unrealistic because individuals are very diverse in terms of their experience and their behavior and organizations are diverse in terms of their structure and history. So pooling data from different sources or across observations might create misleading results. Due to this reason, heterogeneity in the data has to be identified, assessed, and treated (Becker et al. 2013; Hair et al. 2017).

There are two forms of heterogeneity: observed and unobserved heterogeneity. Observed heterogeneity refers to differences between two or more groups according to observable characteristics such as age, gender, or work experience. These observable characteristics can be used to split the data into separate groups of observations and conduct group-specific analyses, such as multigroup analyses, to test statistically significant differences (Hair et al. 2017).

Unobserved heterogeneity refers to not a priori known observable characteristics. To identify and partition the data in corresponding groups, latent class techniques are proposed. The identified groups can then be compared for statistically significant differences by running a multigroup analysis (Hair et al. 2017).

3.4.2.7 Multigroup analysis

To test for significant differences between identical models estimated for different groups of respondents, multigroup analysis can be conducted. To do so, the same model is compared across different samples of respondents. There are several approaches to multigroup analysis, which are illustrated in the following Figure 10.

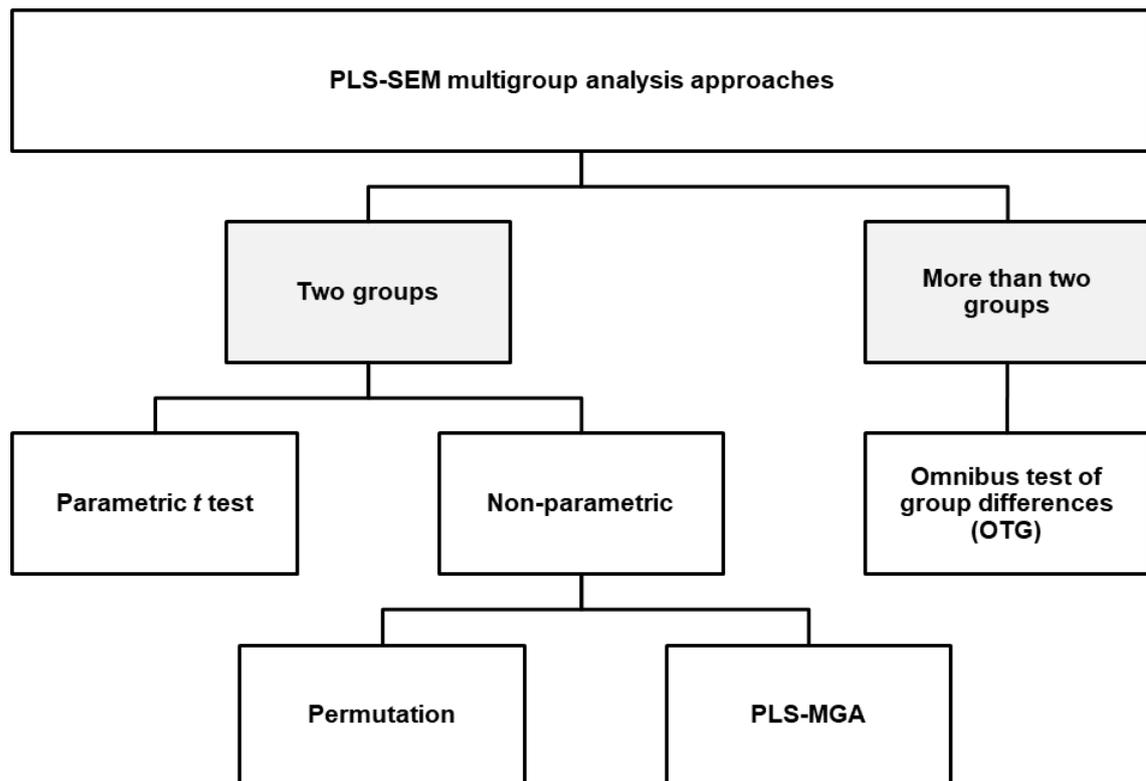


Figure 10. Multigroup analysis approaches in PLS-SEM (Hair et al. 2017, p. 293)

When comparing two groups of data, there is the parametric approach and several non-parametric approaches. The parametric approach (Keil et al. 2000) is a modified version of a standard t test with two independent samples. The independent t test relies on standard errors deriving from bootstrapping. Depending on whether the variances of the analyzed population is equal (i.e., homoscedastic) or unequal (i.e., heteroscedastic), the parametric approach has two versions (Sarstedt and Mooi 2004). The parametric approach is assumed to be rather liberal and likely subject to type-I errors (Sarstedt et al. 2011b) and relies on distributional assumptions (Hair et al. 2017).

Against this background, some non-parametric tests, in particular the permutation test and the PLS-MGA, have been proposed. The permutation test refers to a randomly exchange of observations between the groups and a re-estimation of the model for each permutation (Chin and Dibbern 2010). This approach is similar to the parametric approach but is less liberal in identifying significant differences and requires similar group sizes (Hair et al. 2017).

Another non-parametric multigroup analysis, building on bootstrapping results, is PLS-MGA (Henseler et al. 2009). In this approach, each bootstrap estimate of one group is compared with all other bootstrap estimates of the same parameter in the other group (Hair et al. 2017). A probability value for a one-tailed

test is derived by counting how frequently the bootstrap estimate of the first group is larger than those of the second group. The PLS-MGA requires a large number of comparisons and is used to test one-sided hypotheses (Hair et al. 2017).

To test the differences between two or more groups, the omnibus test of group differences (OTG) has been proposed (Sarstedt et al. 2011b). The probability value of the variance explained by the grouping variable is derived using a combination of bootstrapping and permutation. If this variance is significant, the group-specific coefficients are significantly different (Hair et al. 2017).

3.4.2.8 Latent class techniques

Multigroup analysis can be used in the case of observed heterogeneity. But often, heterogeneity can hardly be foreseen and known completely a priori. So, there could be unobserved heterogeneity in the data which produces misleading results. To check for and, if necessary, treat unobserved heterogeneity, latent class techniques can be applied (Hair et al. 2017).

The most prominent latent class technique is finite-mixture PLS (FIMIX-PLS) (Hahn et al. 2002; Sarstedt et al. 2011a). This approach, which is based on the mixture regression concept, simultaneously estimates the path coefficients of each observation's group membership for a predefined number of groups. By doing so, it evaluates whether the data is distorted by unobserved heterogeneity. A limitation of the approach is that FIMIX-PLS only identifies heterogeneity in the structural model (Hair et al. 2017; Wilden and Gudergan 2015). Besides FIMIX-PLS, there are further approaches which are either distance-based (e.g., PLS-TPM, PLS-GAS or PLS-POS) or regression-based (e.g., PLS-IRRS). As in this thesis FIMIX-PLS is only used as a latent class technique, the other approaches are not explained in detail. Nonetheless, they are illustrated in the following Figure 11.

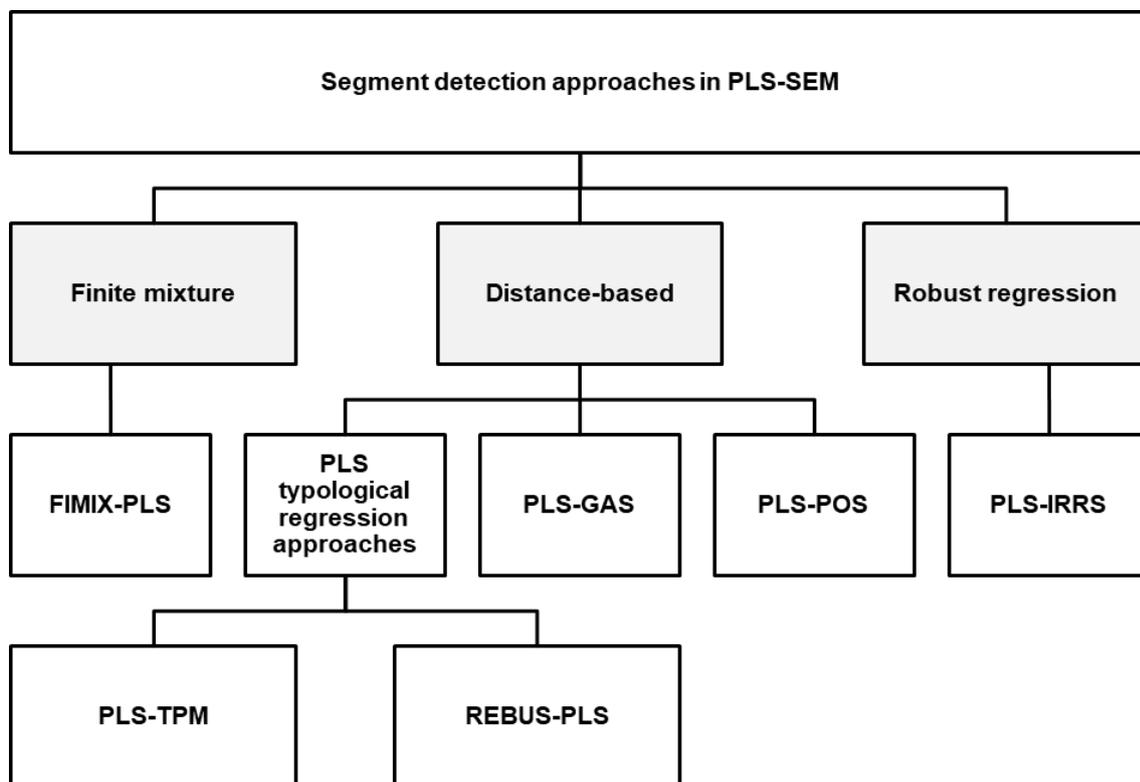


Figure 11. Latent class techniques (Hair et al. 2017, p. 296)

4. Main research results

This section summarizes each paper of this cumulative dissertation and presents the main results.

4.1 Paper I¹³

The first paper of this cumulative dissertation thesis is a literature review, which is an adequate means “to reveal open research gaps and are part of a larger research endeavor” (vom Brocke et al. 2009, p. 11). The research question of this paper is:

How are people considered in the BPM literature and which roles do they perform?

To answer this research question, the paper follows general guidelines for literature reviews (Webster and Watson 2002) as well as a structured literature review approach (vom Brocke et al. 2009) (see 3.1). I identified, screened, and categorized 52 articles published between 2004 and 2014 and synthesized existing research on the role of people in BPM literature.

Overall, three key concepts which dominate the BPM literature regarding people are investigated: expertise, empowerment, and commitment.

- *Expertise*: In the context of BPM, new requirements for the organizations arise which also go along with new qualification profiles for the employees. Consequently, employees need to be trained and gain expertise accordingly. Process-related knowledge and expertise is predominant in BPM literature regarding people (de Bruin and Rosemann 2007; Rosemann and vom Brocke 2010) not only because it is relevant for the daily execution of processes but also for an organization’s journey towards process orientation (Willaert et al. 2007). In addition, process-related training enables employees to act responsible, solve problems (vom Brocke and Schmiedel 2011), and adopt process changes more easily (McCormack et al. 2009).
- *Empowerment*: In management research, empowerment refers to the “granting of power and decision-making authority” (Menon 2001, p. 155) and is supposed to increase employees’ motivation and thus positive work outcomes (Bennis and Nanus 1985; Thomas and Velthouse 1990). Transferred to BPM, empowerment refers to assessing process-related accountabilities and responsibilities which is often implemented as process governance. In a process-oriented organization, different tasks, accountabilities and responsibilities are bundled into different roles and assigned to employees. These roles have to be organized in a superior governance structure to create the structures and boundaries (Spanyi 2010) but also a certain freedom for defining, improving, and monitoring processes (Schmelzer and Sesselmann 2008).
- *Commitment*: In the organizational commitment literature, commitment is distinguished into behavior and attitude. Commitment-related behavior relates to complying formal and/or normative expectations (Mowday and Steers 1979). Attitudinal commitment is when employees feel connected to their company and share goals with the organization (Hall. et al. 1970; Mowday and Steers 1979). In the context of BPM, commitment is shown in the willingness to take responsibility and accountability for process decisions (Schmiedel et al. 2013), which is closely related to the organizational and BPM culture (Kohlbacher and Gruenwald 2011a; vom Brocke and Sinnl 2011). The literature mentions a classic top-down approach (vom Brocke and Sinnl 2011)

¹³ Kettenbohrer, J. (2016): A Literature-Based Analysis of People’s Roles in Business Process Management, Proceedings of the 22th Americas Conference on Information Systems (AMCIS), San Diego (CA)

or the implementation of cultural values, such as training, teamwork, involvement, and governance (Tumbas and Schmiedel 2013) as common ways to achieve BPM culture.

Besides the key concepts, the literature review shows that BPM literature deals with people in three roles: supporter, owner and performer. The key aspects of each role are explained in the following:

- *Supporter*: The supporter role is assigned to top management (Kohlbacher and Gruenwald 2011a; Schmelzer and Sesselmann 2008). As supporter, top management initiates BPM projects and ensures implementation (Ewusi-Mensah and Przasnyski 1994). But top management should go beyond passive support, such as establishing adequate leadership behavior, reward structures, and governance practices (vom Brocke et al. 2014), but rather be actively involved participants, such as by acting as a role model for employees and introducing and sustaining a common understanding of processes (Indulska et al. 2006; vom Brocke et al. 2014).
- *Owner*: For successful BPM, a person who is accountable and responsible for process definition, implementation, and operation of processes is needed. In the BPM literature, the term 'process owner' is prevalent. This role is typically assigned to executives or managers (Kohlbacher and Gruenwald 2011b; Neubauer 2009) because they are more involved in the every-day work of their employees and are thus better informed about the daily execution of processes than top management.
- *Performer*: Employees who perform tasks and activities within the business processes are called performers. Performers and their commitment are crucial for the company because the most effective and efficient processes are worthless if employees do not use them efficiently or at all (Jeston and Nelis 2008).

The literature review synthesized the existing research from 52 BPM papers dealing with people and offers a categorized overview of the existing body of knowledge as well as directions for future research. Related research is also presented to embed the literature review in current BPM research. The core of the proposed future research is the suggestion to focus more on process performers as well as their commitment and motivation to successfully implement BPM.

4.2 Paper II¹⁴

This paper responds to the issue identified by Münstermann and Eckhardt (2009) that organizational governance is a key driver of business process standardization success. Although there are also other governance models (e.g., Gadatsch 2005; Nesheim 2011; Osterloh and Frost 2006; Rohloff 2011) which differ between various roles, there is no governance model which combines process responsibility and disciplinary responsibility in one model and explains how the respective roles coordinate to sustainably implement business process standardization. Thus, the underlying research question of this paper is:

How needs a governance model to be designed in order to ensure effective and sustainable business process standardization?

To answer the research question, the ADR approach (see 3.2) was followed to develop a governance model called 'Framework for Assignment of Responsibilities' (FAR+) to achieve effective and sustainable BPS. As this ADR project is still an ongoing project, only the initial design of the governance model (reported in the paper) is presented in the following.

¹⁴ Kettenbohrer, J., Beimborn, D., and Kloppenburg, M. (2013a): Developing a Governance Model for Successful Business Process Standardization, Proceedings of the 19th Americas Conference on Information Systems (AMCIS), Chicago (IL)

The FAR+ concept is designed with consideration of other governance models and organizational concepts (Gadatsch 2005; Koch 2011; Osterloh and Frost 2006). Its innovative characteristic lies in the separation of disciplinary and process responsibility to avoid conflicts and to clarify competences and distribution of tasks. The disciplinary responsibility is then further divided into resource responsibility and administrative responsibility.

- **Disciplinary responsibility:**
 - **Administrative responsibility:** Initial responsibility which signs legal contracts and issues the power of attorney to resource and process responsibility.
 - **Resource responsibility:** Defines the business strategy for its organizational unit and derives business goals as well as is accountable for their fulfillment. In this context, among others, it also plans and controls revenues, earnings and costs as well as assigns roles and tasks to the employees.
- **Process responsibility:** Defines process-related strategy as well as the process design itself which also includes monitoring process performance and defining process trainings for employees.

In the FAR+ concept, these responsibilities are granted to several roles (see Figure 12). The different roles are explained in the following.

- The *Process Domain Owner* is responsible for one process domain (i.e., a bundle of processes) and appoints the different Process Owners of the single processes in his/her domain.
- The *Process Owner* is responsible for defining, documenting and further improving a single process.
- The *Process Architect* supports the Process Owner by defining and improving the processes on an operational level.
- The *Process Manager* supports the Process Owner and the Resource Responsible by coordinating the product-, location- or customer-related process execution on an operational level.
- The *Administrative Responsible* is responsible for the administrative management of the employees (e.g. by signing contracts).
- The *Resource Responsible* assigns (process) roles to his/her employees and defines target agreements. In addition, he/she monitors the personnel development of his/her employees and the process accomplishment in his/her organizational unit.

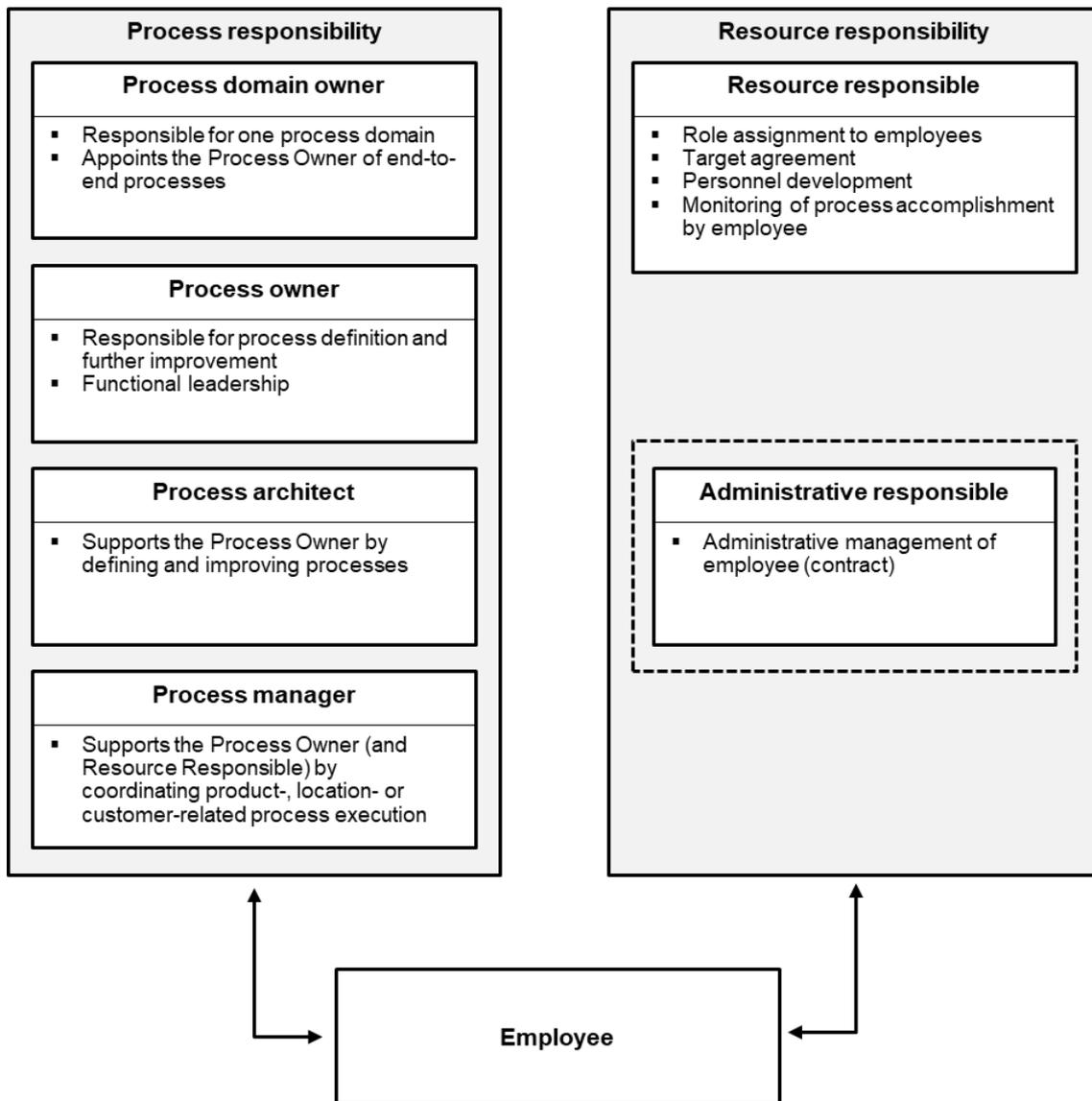


Figure 12. FAR+ roles

The FAR+ concept does not only define process management roles but it also suggests process-related boards to support the collaboration and coordination of the process participants. These boards are explained in the following.

- The *Process Domain Board* consists of the Process Domain Owner and his/her subordinate Process Owners. The aim of this board is to review the domain's processes on a regular basis to facilitate strategic optimization and further development by focusing on the improvement of process interfaces and interaction between processes.
- The *Process Operations Board* consists of the Process Owner, his/her assigned Process Architects and a representative subset of subordinate Process Managers. The aim of this board is to review process operations and improve the corresponding process on a regular basis.
- The *Process Review Board* consists of the Process Owner and a representative number of Resource Responsibles of employees participating in the process. The aim of this board is to facilitate coordination between process responsables and disciplinary responsables with regard to process goals and resulting performance parameters for employees.

The FAR+ concept was evaluated as part of the ADR approach. First the concept was piloted in a BPS project at eleven LHT subsidiaries in eight European countries. We collected data by conducting interviews with managers involved in the project. The interview results show that a separation between process and disciplinary responsibility is necessary to manage large and internationally operating organizations. Especially, clearly defined responsibilities, tasks, consistent structures as well as less involved responsible persons help to simplify the definition and consequently the operation of process standards.

The FAR+ concept proposed in this paper proved a successful governance model for effectively and sustainably implementing BPS in the target organization and has been adopted as the binding process management governance framework in the whole Lufthansa Group, affecting 120,000 employees worldwide.

4.3 Paper III¹⁵

Although organizations striving for process orientation invest extensive time and resources in implementing BPM systems and governance models, but still struggle to shift from function to process orientation (Leyer et al. 2015). In addition to lacking methods (Schäfermeyer et al. 2012) and facing cultural resistance (vom Brocke and Sinnl 2011), a lack of process orientation among employees (vom Brocke and Sinnl 2011) is a major obstacle on an organization's journey towards process orientation.

In order to facilitate a change in employees' mindset towards process orientation, employees must develop the abilities and capabilities but also the willingness to change their way of thinking and working towards process-oriented work procedures (Kumar et al. 2010; Leyer et al. 2015; Tang et al. 2013). Consequently, organizations have to consider their employees extensively to understand what drives their willingness and motivation to achieve process orientation. The impact of BPM culture (e.g., Hammer 2007; vom Brocke and Sinnl 2011; Willaert et al. 2007) and employee training and empowerment (e.g., Kohlbacher and Gruenwald 2011a; Škrinjar and Trkman 2013) on process orientation have been examined extensively over the last years. But the focus lies more on creating process management knowledge (e.g., Hammer 2007; Kohlbacher and Gruenwald 2011a) without giving equal consideration to the nature of the jobs (i.e. job characteristics) performed within the processes.

Organizational psychology and behavioral management research shows that these job characteristics are associated with and influence work-related outcomes (Hackman and Lawler 1971; Hackman and Oldham 1975, 1976). As such, they might also influence the way the individual employees perceive the process they are working in (i.e. process orientation). Hence, the aim of this paper is to analyze the impact of job characteristics on employee process orientation. Thus, the paper is guided by the following research question:

How do job characteristics affect employees' process orientation?

Drawing on organizational psychology and behavioral management research, especially on job characteristics theory (section 2.5.5), five hypotheses regarding how job characteristics influence employees' process orientation are derived. All job characteristics are assumed to positively influence employee process orientation. The paper also considers the impact of five control variables to respect alternative theoretical explanation. To evaluate the hypotheses, data from study VI is used and validated by applying PLS (section 3.4.2.1) and the SmartPLS software (Ringle et al. 2015).

¹⁵ Kettenbohrer, J., Beimborn, D. and Eckhardt, A. (2016a): Examining the Influence of Job Characteristics on Employees' Process Orientation, Proceedings of the 24rd European Conference on Information Systems (ECIS), Istanbul, Turkey

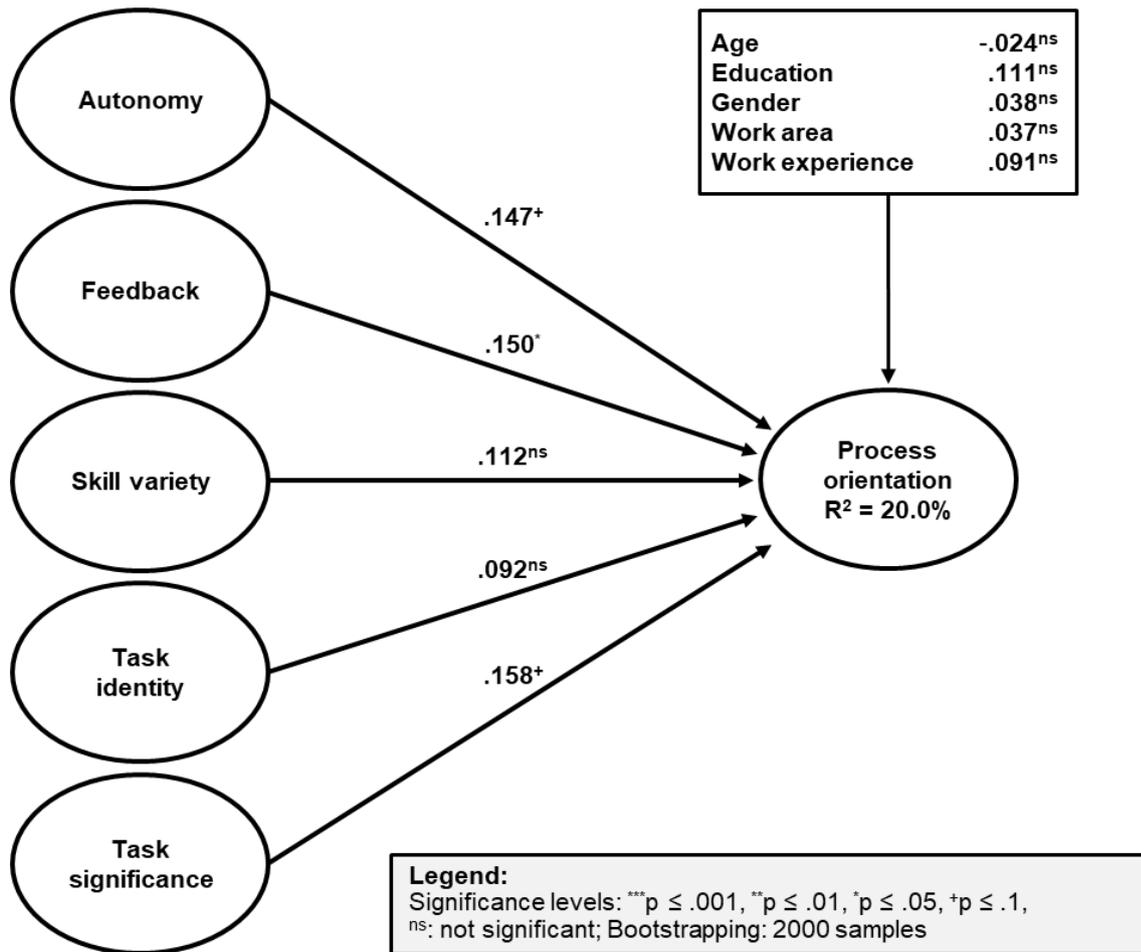


Figure 13. Research results for examining the influence of job characteristics on employees' process orientation

The results of the empirical study with 191 employees (study VI) show that the three job characteristics autonomy, feedback, and task significance are significantly positively related to process orientation. The other two job characteristics, skill variety and task identity, show no impact on process orientation.

The job characteristic exhibiting the strongest effect is feedback. This result highlights that feedback about the job from colleagues or customers increases employees' perception of their jobs embeddedness in a larger process and thus their process orientation. Autonomy shows at least a weak significant effect on process orientation which indicates that employees executing highly autonomous jobs also know and consider the overall process and the interfaces between their own and their colleagues' tasks, which consequently increases process orientation. A job with high task significance has proven to significantly positively influence process orientation of the employees. Individuals exhibiting those jobs have great impact on their colleagues' jobs (Hackman and Oldham 1976) which requires them to know the interfaces between their own tasks and the tasks of their colleagues. Consequently, process orientation increases. Unexpectedly, the remaining two job characteristics skill variety and task identity have a very weak relationship to process orientation.

This study identifies the impact of job characteristics on employee process orientation. The results indicate that not only empowerment and training are important prerequisites, which have been discussed extensively in recent BPM literature (e.g., Kohlbacher and Gruenwald 2011a; Škrinjar and Trkman 2013; vom Brocke et al. 2014), but also the different characteristics of jobs executed by the employees have to be considered to increase process orientation.

4.4 Paper IV¹⁶

Similar to Paper III, this paper examines the impact of motivational factors of the work itself, which are often conceptualized as job characteristics. But in this paper, the focus is different. Rather than process orientation, the dependent variable is now acceptance of process change, specifically employee acceptance of standardization. BPS is a comprehensive form of process change because it comprises significant organizational changes to workflow, tasks and governance (Borgen et al. 2010) and thus often leads to resistance (Bala and Venkatesh 2013; Madison 2005). This paper responds to the call to stress the importance of the role of the affected employees and to analyze their involvement and motivation (e.g., Tumbas and Schmiedel 2013; vom Brocke et al. 2014). From a practitioner's perspective, it is important to consider the employees' perspective because their willingness to change as well as their motivation are crucial factors influencing the success of process change (Baumöl 2010). To analyze which job characteristics and to what extent these job characteristics drive employee acceptance of BPS initiative, the paper's underlying research question is:

How do job characteristics affect BPS acceptance of employees?

To answer the research question, the paper draws on organizational psychology and behavioral management research, particularly on job characteristics theory (e.g., Barrick and Mount 2013; Hackman and Oldham 1975, 1976) (see section 2.5.5), and derives five hypotheses about how job characteristics influence BPS acceptance of employees. In contrast to Paper III, some job characteristics (i.e., skill variety and task significance) are assumed to have a positive but also a negative effect on process standardization acceptance, and control variables are considered. To evaluate the research model, data collected for study VII is used and validated by applying PLS (section 3.4.2.1) and the SmartPLS software (Ringle et al. 2005). The relative small data set (39 responses) used in this paper does not meet the 'rule of 10' for a combined PLS model with five exogenous variables and three controls. So, the impact of each construct on BPS acceptance is measured both separately and within one combined PLS model.

Job characteristic: (models 1 to 5)		<i>Skill variety</i> (model 1)	<i>Task identity</i> (model 2)	<i>Task significance</i> (model 3)	<i>Autonomy</i> (model 4)	<i>Feedback</i> (model 5)
<i>Path coefficient (β) and sig. level</i>		.361*	.001	.125	-.281*	.063
<i>Paths (β) of controls and sig. level</i>	<i>Age</i>	.208+	.358*	.304*	.388**	.352*
	<i>Work experience</i>	.179*	.222+	.239*	.114	.219+
	<i>Educational degree</i>	.143	.176	.158	.217+	.168
<i>R² (BPS acceptance)</i>		.295	.194	.214	.241	.198
<i>R² (BPS acceptance), controls only</i>		.194	.194	.194	.194	.194

Table 16. Test results of separate models (: p<.01, *: p<.05, +: p<.1)**

¹⁶ Kettenbohrer, J., Beimborn, D., and Eckhardt, A. (2015a): Analyzing the Impact of Job Characteristics on Employees' Acceptance of Process Standardization, Proceedings of the 23rd European Conference on Information Systems (ECIS), Münster

In summary, the paper provides empirical evidence that some job characteristics significantly influence employee BPS acceptance. The strongest positive effect is exhibited by skill variety, defined as the degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the person. Autonomy has a significant negative impact on BPS acceptance and is thus a clear inhibitor for BPS. The remaining three job characteristics, task identity, task significance, and feedback, have a very weak relationship to BPS acceptance. The control variables indicate that age has a strong effect on BPS acceptance, such that older employees are more likely to accept standardization initiatives.

The results of this paper provide insights into what kind of processes are more likely to be standardized successfully because employees will accept the newly designed process. Being aware of the great impact of job characteristics such as skill variety and autonomy on BPS acceptance can help practitioners derive the right management actions to increase acceptance.

The results of this study appear to partly conflict with the study of how job characteristics influence employee process orientation (Paper III). For instance, while skill variety has a significant positive effect on process acceptance, it has little to no effect on process orientation. These deviating results can be explained by the nature of BPS which goes along with a lot of changes (Kettenbohrer et al. 2015a) and is thus often perceived as restrictive and unpleasant (Kettenbohrer et al. 2015c). The deviating results also highlight the fact that process orientation and process change acceptance are two different constructs which have to be examined separately.

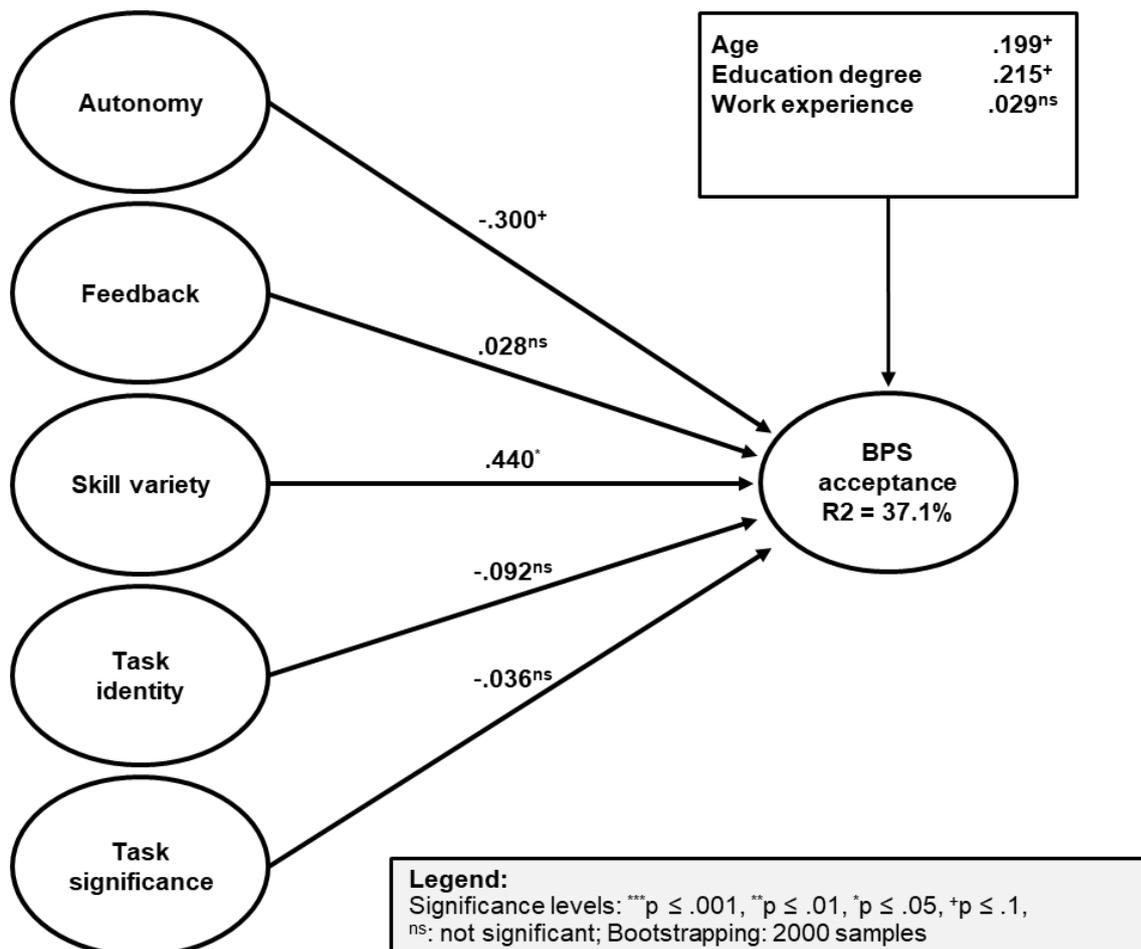


Figure 14. Test results of the combined model

4.5 Paper V^{17 18}

Changing processes and the way people work in an organization is a complex and difficult management endeavor. As the previous papers in this dissertation thesis show, a lack of acceptance by the employees affected is one of the biggest inhibitors for successful process change. Two elements which influence acceptance are the perceived meaningfulness of the work itself as well as the perceived embeddedness of employees' tasks in an overall process (i.e. job construals). Although these two concepts are closely related, there are some differences, which cause a certain rivalry between the two. While meaningfulness of work refers to the connection between the employees and their higher-order goals, job construals reflect the mental connection between an employee's activities and the corresponding activities in the process. The study in Paper V aims to analyze the impact of meaningfulness of work and job construals on process change acceptance by employees and examine which one of the two concepts has the strongest effect on acceptance. In addition, the antecedents of these two constructs (i.e., job characteristics, co-worker relations, and work-role fit) were also taken into account. Thus, the paper is guided by the following research questions:

What influences an employee's willingness to accept process change? And what has the greater impact: meaningfulness of work or job construals?

To evaluate the hypotheses, data was collected by surveying 191 employees of a global aviation service company.

¹⁷ Kettenbohrer et al. (under review): Good Cop or Bad Cop? How Meaningfulness of Work and Job Construals Affect Process Change Acceptance

¹⁸ Earlier and conceptual version: Kettenbohrer, J., Beimborn, D., and Eckhardt, A. (2015c): A Theoretical Perspective on Meaningfulness of Work and the Success of Business Process Standardization Initiatives. In: 12. Internationale Tagung Wirtschaftsinformatik. Osnabrück, Germany.

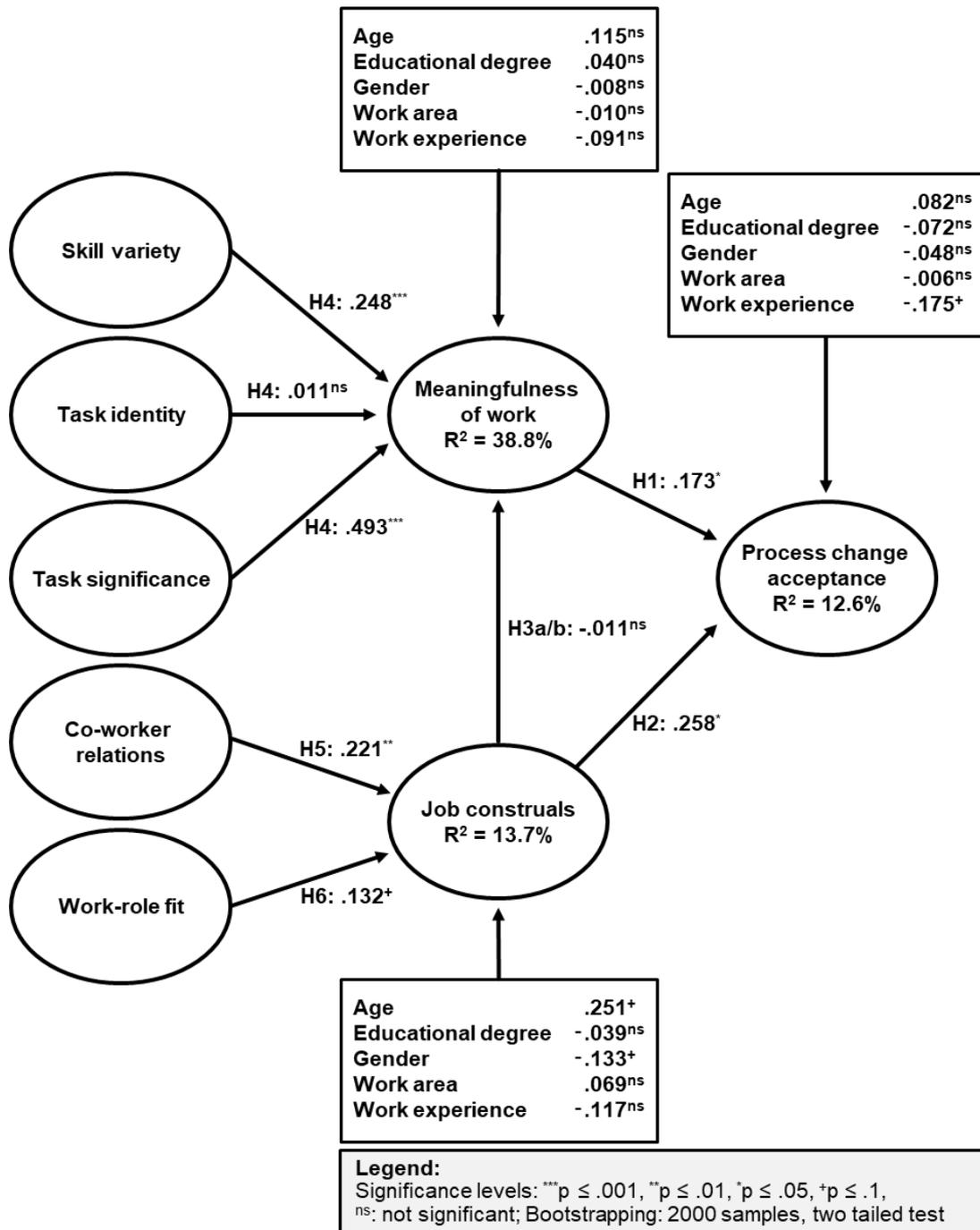


Figure 15. Research results regarding the impact of meaningfulness of work and job construals on process change acceptance

The results (see Figure 15) show that, contrary to initial hypotheses, meaningfulness of work has a significantly positive effect on process change acceptance. In addition, although both meaningfulness of work and job construals have a significantly positive effect on process change acceptance, job construals has the stronger effect. The interplay between meaningfulness of work and job construals have is shown to be non-existent, i.e. the perception of being embedded with their own tasks in an overall process has no impact on the meaningfulness of work. The two job characteristics skill variety and task significance have a significant positive effect on meaningfulness of work while task identity has no effect. In addition, co-worker relations and work-role fit significantly positively influence job construals.

The results of this study highlight that successful process change does not only depend on good process management practices, but also requires focusing on employees' psyches by taking employees' attitudes, concerns, and motivational factors into account. First, the study stresses the impact of how meaningful employees perceive their work to be as well as the impact of job construals on process change acceptance. Second, it highlights the importance of employees' perception of their task's embeddedness in an overall process by developing, introducing, and examining the concept of job construals. Besides contributions for research, this study also provides detailed implications and suggestions for practice how to enhance employees' process change acceptance, such as through job rotation or role play.

4.6 Paper VI¹⁹

Paper VI introduces the main research partner of this dissertation thesis and the process management system it uses. The effect of this process management system on the employees' process orientation is examined in Paper VII.

As the maintenance, repair, and overhaul (MRO) division of Lufthansa, Lufthansa Technik is required to provide structured documentation of its processes to gain the authorities' approvals. In the past, processes were documented as PDF documents, which increased complexity and frequently resulted in missing relevant information and failure to meet authorities' requirements for easy-to-understand work instructions. To provide concise and easy-to-read documentation to employees, Lufthansa Technik Group implemented a process-oriented management system called IQ MOVE in which processes are documented in the form of process maps and swim-lane-based descriptions. The design of the system ensures the integration of normative as well as legislative requirements into the processes to avoid cross-references. To manage the processes spanning from defining to monitoring the respective processes and to strengthen process management roles as well as increase employees' acceptance, the "Framework for Assignment of Responsibilities" (FAR+, see Section 4.2) was applied.

Lufthansa Technik is a well-suited object of analyzes for this dissertation and the respective research questions because the company is already highly process-oriented. In addition, due to the high demands of regulation (due to national and international aviation authorities), it is constantly facing diverse process changes. Furthermore, due to the wide range of services the company offers, employees working in administration units but also in production units could be asked by different questionnaires and interviews.

4.7 Paper VII²⁰

To support employees in shifting their mindsets towards process orientation, they should be provided with process-oriented knowledge (Kohlbacher and Gruenwald 2011a). Employees need to know and

¹⁹ Kloppenburg M., Kettenbohrer J., Beimborn D., Bögle M. (2018): Leading 20,000+ Employees with a Process-Oriented Management System: Insights into Process Management at Lufthansa Technik Group. In: vom Brocke J., Mendling J. (eds) Business Process Management Cases. Management for Professionals. Springer, Cham;

A former version was published at the BPM conference and received the Best Industry Paper Award:

Kloppenburg, M., Kettenbohrer, J., Beimborn, D., and Bögle, M. (2015): Leading 20,000+ employees by a process-oriented management system - insights to process management at Lufthansa Technik Group, Proceedings of the 13th Business Process Management Workshops (used to be: Proceedings of the International Conference on Business Process Management (BPM)), Innsbruck, Austria, Best Industry Paper

²⁰ Kettenbohrer, J., Beimborn, D., and Leyer, M. (2016b): Examining the Impact of Business Process Management System Use on Employees' Process Orientation, Proceedings of the International Conference on Information Systems (ICIS), Dublin, Ireland

understand that their work intersects with several processes and must be coordinated with the work of colleagues both within and across business units (Škrinjar and Trkman 2013). Organizations can share this knowledge with employees by providing training and documented knowledge. Previous research has analyzed the impact of different learning modes on process-oriented thinking (e.g., Börner and Leyer 2010; Wollersheim et al. 2016). This paper extends this research by examining the role of information technology systems in employee process orientation. BPM systems cover a variety of functionalities supporting the design, execution, and control of processes (Reijers 2006). These systems can be used by employees working in processes (e.g., clerks or mechanics) to watch process maps and get a broader understanding of the process in which they perform different tasks. Through built-in tools for managing and executing processes, BPM systems and their usage might have an impact on employee process orientation. Thus, this paper is guided by the following research question:

How does BPM system use influence the process orientation of employees?

To answer the research question, the paper draws on previous research examining the impact of different learning modes on process-oriented thinking (e.g., Leyer et al. 2015; Wollersheim et al. 2016) as well as on the IS success model (DeLone and McLean 1992, 2003) by focusing on the impact of an IT system on process orientation. Drawing on this research, five hypotheses regarding how a BPM system influences process orientation by the employees are derived. The paper considers the newly developed construct 'job construals' and includes seven control variables relevant to alternative theoretical explanations.

The proposed research model was evaluated through an empirical study of 1,170 employees (study VIII), revealing that BPM system use has a direct significant positive effect on employee process orientation and an indirect effect mediated by job construals. In addition, job construals positively influences employee process orientation. Furthermore, information quality and system quality have a significantly positive impact on BPM system use. Of the seven control variables, perceived skills in using the system has the strongest effect on the dependent variables.

Comparing the results for different process management roles show that the effect of job construals on process orientation is higher for employees not performing a management role. In terms of work areas, system quality is more important for employees using the BPM systems in production, whereas information quality is more important for administration employees. Moreover, the effect of job construals on process orientation is higher for production employees than for administration employees. However, overall, BPM system use more strongly affects the process orientation of administration employees than of employees in production.

The results of this paper indicate that BPM system use is important to increase employee process orientation but should be complemented by helping employees understand overall processes and perceive their own role in the process (i.e., job construals). The latter is especially important for employees not performing a process management role. In addition, the paper provides insights into efficient BPM system design: such a system is not beneficial per se but it has to be designed according to the needs of its target group. As the results show, administration employees have other needs and demands than employees working in production.

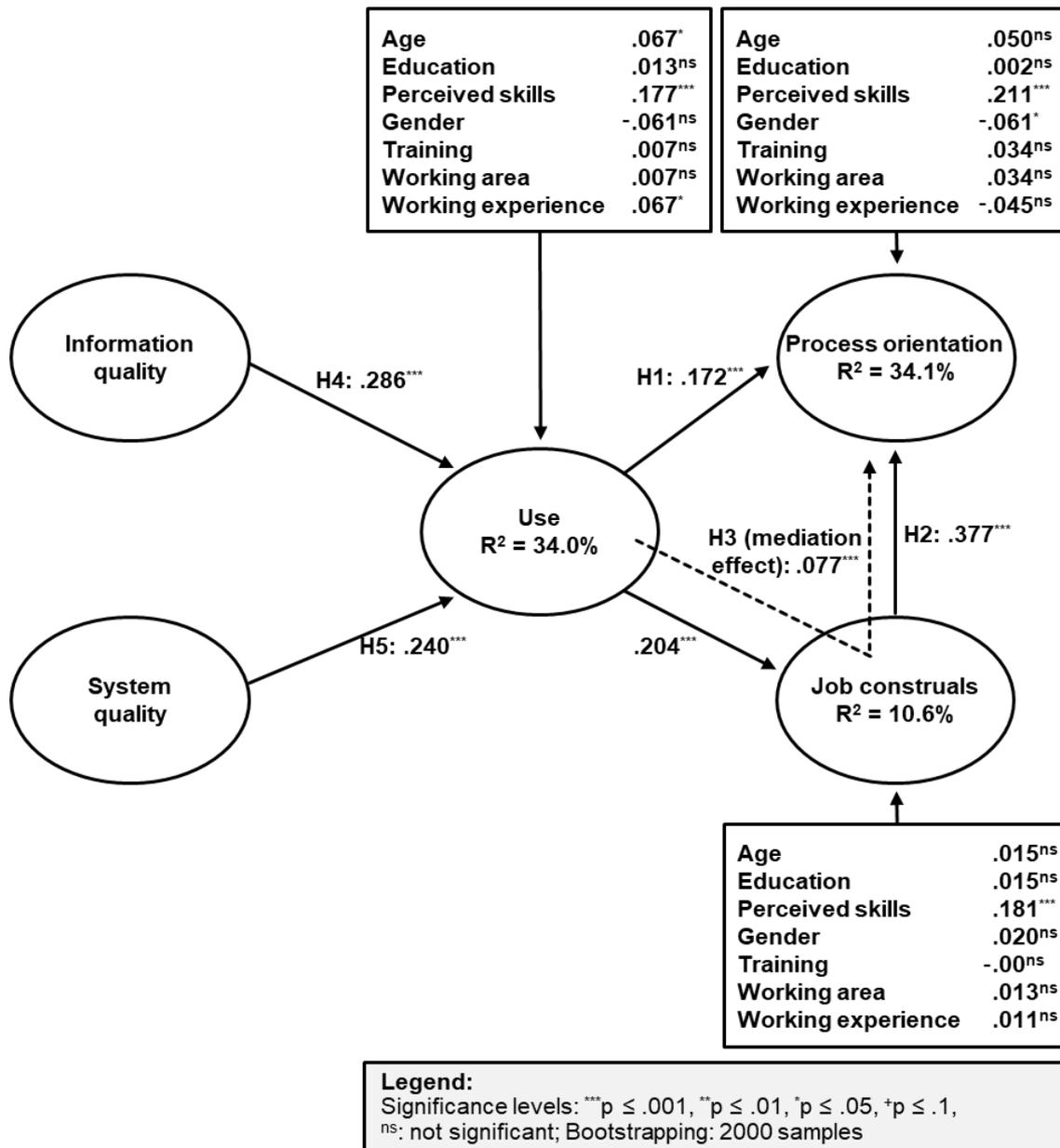


Figure 16. Research results for examining the impact of BPM system use on employees' process orientation

4.8 Paper VIII²¹

Paper VIII investigates the impact of BPM systems on individual process innovation behavior. Process innovation, referring to the creation of new processes or the substantial improvement of existing processes (Peng et al. 2008), is considered essential to achieving and maintaining competitive and financial performance (Piening and Salge 2015). However, many companies struggle to establish a holistic process innovation approach involving all employees intended to be the main resource for generating, championing and implementing process innovation ideas (Anderson et al. 2014). Process innovation has received much less research attention than product innovation, such that the factors influencing the success of process innovation are largely unknown (Keupp et al. 2012). The IS literature has provided substantial evidence for the important role of IT systems for organizations' innovation capabilities (e.g., Ahuja and Chan 2014; Alavi and Leidner 2001; Sabherwal and Sabherwal 2005; Tanriverdi 2005), but

²¹ Leyer, M., Kettenbohrer, J., Beimbom, D. (unpublished yet): How to Provoke Individuals' Contributions to Process Innovation – The Role of Process Management Systems.

IS and innovation management research into process innovation drivers at the individual level and the value contribution of user-oriented information systems is scarce, even though it is clearly users who create value out of systems and thus contribute to an organization’s success (Bala et al. 2017).

This paper analyzes how BPM systems software can help people engage in process innovation. The study investigates whether employees using such systems regularly will be stimulated to develop a process-oriented working attitude and whether that, in turn, positively impacts their process innovation behavior. Thus, this paper is guided by the following research question:

Does and – if yes – how does a BPM system contribute to employees’ process innovation behavior?

Applying the four-factor theory of work group innovation (West 1990; West and Anderson 1996) to data from a survey in the German financial industry (171 answers at two different points of time), the study reveals that employees who regularly use BPM systems exhibit a stronger process-oriented attitude and thus contribute more to process innovation than employees who do not regularly use BPM systems.

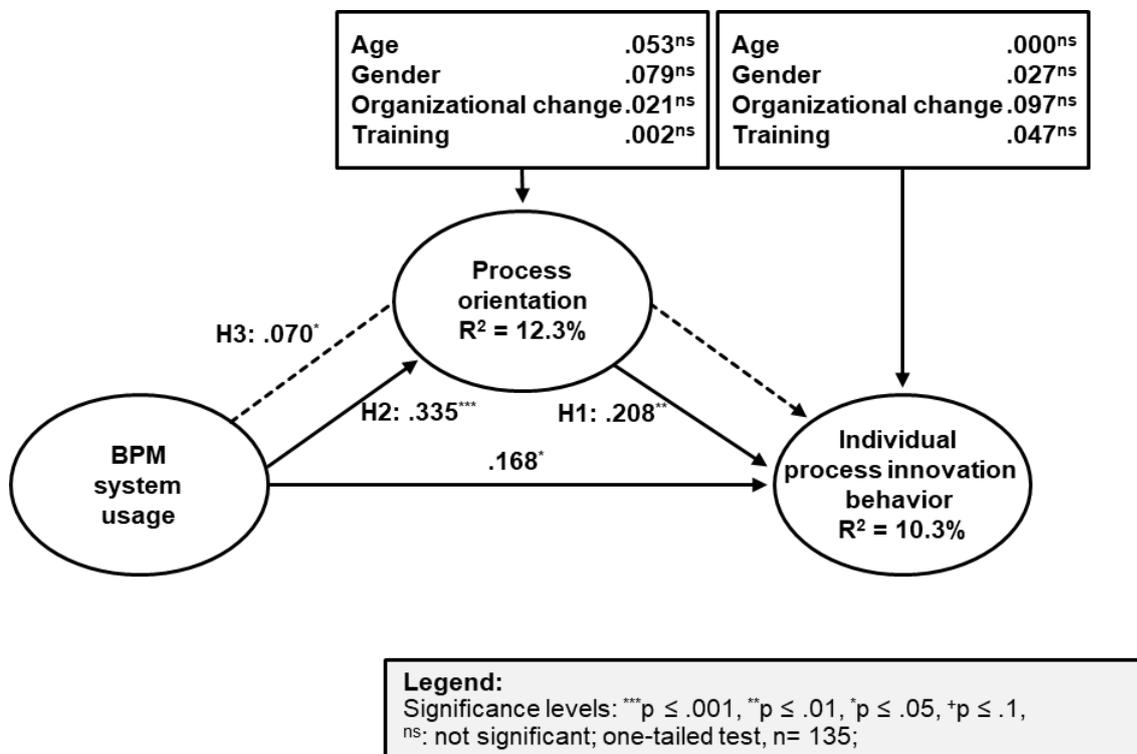


Figure 17. Results of the research model

The study reveals that BPM system usage has a positive effect on a person’s process innovation behavior with individual process orientation being an important mediator. Post-hoc tests show the relevant mechanisms in detail. The relative strength of the effect of regular BPM system use varied depending on the three types of process innovation behavior (idea generation, idea championing, and idea implementation). Its relatively weak effect on idea generation may be attributable to other factors more powerfully affecting idea generation. A BPM system provides the environment to understand the process and provides a starting point for idea generation, but the effect is stronger when it comes to championing and implementation. Here, the software provides an environment for joint work activities with colleagues and helps to manifest an idea in the existing process landscape.

In addition, the results reveal that process orientation is an important mediator for the impact of BPM systems on individual process innovation behavior. It is important that a BPM system fosters understanding and interaction in processes, i.e. how employees are integrated in processes, which then leads to more innovation behavior. Hence, the study also shows that the degree of how much employees are

already embedded in processes independent of using a BPM system also affects individual process innovation behavior.

4.9 Paper IX²²

Process change also implies working with new technology, which often causes hesitation among employees. A prominent example is business analytics (BA) tools. Due to the exponentially increasing amount of data being collected by organizations, BA tools are used more often for statistical and quantitative analysis to support managerial decision making and drive action (Davenport and Harris 2007). Paper IX examines how employees' behavioral antecedents influence the degree of information technology use (in particular business analytic tools) in organizations. The paper is guided by the following research question:

Which behavioral antecedents influence the degree to which BA tools are used in organizations?

To answer this research question, a psychological perspective is taken and the theory of reasoned action is applied. The TRA posits attitudes, norms and control as explanatory antecedents for behavior. The underlying assumption is that organizational transformation towards evidence-based organizations depends on the behavior of its employees. By introducing TRA as relevant behavioral theory at the individual level, this paper intends to explain the intensity of usage of different types of analytics tools from a behavioral perspective. Rather than focusing on adoption at the level of the organization, the study considers the intensity of usage of BA on an individual level – which is poorly understood to date – particularly for different types of analytics tools (Côte-Real et al. 2014).

To test the proposed model, 332 analytic tool users and non-users in the financial services industry were surveyed. The financial industry was chosen because it places strong emphasis on providing information-centric services and a high availability of data, and is thus a likely industry to consider the deployment of analytical tools.

²² Strohhecker, J.; Leyer, M.; Kettenbohrer, J. (under review): This Analytics Tool Looks Nice, But... I am Still Happy Without It. In: Journal of the Operational Research Society.

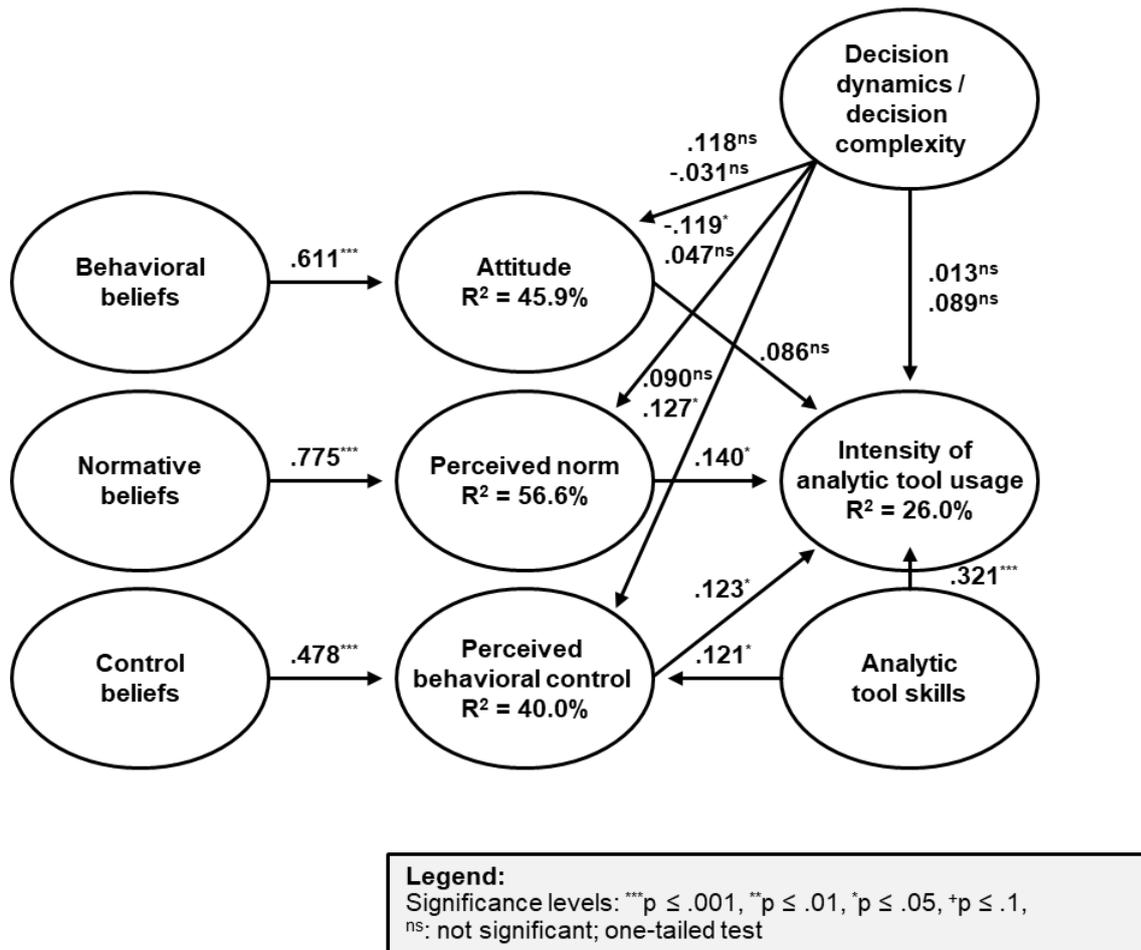


Figure 18. Results of the general research model

The results of the study reveal that the individually perceived utility of BA tools does not play a significant role in BA use behavior, but individual skill level is of high importance. From an organizational perspective, normative beliefs and accessibility are important, which underscores the importance of the work environment in which employees are embedded. Simply knowing how to use a tool does not guarantee adoption. Rather, employees should be encouraged to use it. Differentiating between levels of sophistication of BA tools revealed differences in the strength of the influential factors. For instance, being convinced of the value of a tool is very important for forecasting tools, but irrelevant for statistical analysis and predictive modelling. Such differences should be addressed when trying to foster a data-driven culture.

5. Contribution

This section summarizes the implications of this thesis for scholars (5.1) and practitioners (5.2).

5.1 Findings and implications for research

The nine papers of this dissertation contribute to scholarly research with respect to the construct of process change acceptance as well as to the dimensions process characteristics, participants, management, tools, and context. This section is organized in line with the research questions presented in section 1.

Process orientation:

What levels of process orientation are discussed in the literature? (RQ1a)

Process orientation can be described as a multidimensional construct that has both tangible and intangible elements (Kohlbacher and Reijers 2013; Willaert et al. 2007). Several scholars have clustered and structured the different characteristics of process orientation (e.g., Kohlbacher and Gruenwald 2011a; Leyer et al. 2015), but while these studies focus principally on the organizational level and rarely on the individual level of process orientation, little to no attention has been paid to the group level. The literature review in the introductory paper reveals and structures previously identified characteristics of process orientation to show that process orientation takes place at several levels. Thus, the literature review is a starting point for researchers who are interested in process-related questions.

Business process standardization:

What factors influence BPS success? (RQ1b)

What are the gaps and emerging trends in BPS success factor research? (RQ1c)

As mentioned above, BPS is a comprehensive form of process change which requires special attention to be successfully implemented in organizations. The literature review provided in the introductory paper retrieves, structures and analyzes BPS success factors identified in previous literature. The review included relevant outlets of the BPM community and further qualitatively high outlets. Whereas some success factors have been derived from case studies, this is the first comprehensive and structured overview of these factors for BPS I am aware of. The review also reveals several gaps in knowledge, which can guide future BPS success factors research. The findings and implications regarding process orientation and process orientation are summarized in the following Table 17.

Findings and implications	This dissertation...
Structure the different levels of process orientation	<ul style="list-style-type: none"> • reveals the different characteristics of process orientation • structures these characteristics into three levels: <ul style="list-style-type: none"> ○ Organizational level ○ Group level ○ Individual level
Comprehensive picture of all so-far researched success factors of BPS	<ul style="list-style-type: none"> • identifies success factors identified by extant research • clusters these success factors into five categories: <ul style="list-style-type: none"> ○ Process characteristics ○ Participants ○ Management ○ Tools ○ Context
Identification of research gaps as well as emerging trends regarding BPS	<ul style="list-style-type: none"> • identifies research gaps: <ul style="list-style-type: none"> ○ Lack of empirical validation ○ Lack of theory • reveals emerging trends as well as promising research areas in the context of BPS research: <ul style="list-style-type: none"> ○ Process characteristics ○ Employee acceptance

Table 17. Research contribution concerning process orientation and business process standardization

The role of people in BPM literature:

How are people considered in the BPM literature and which roles do they perform? (RQ2)

Research on BPM and process orientation has shifted significantly over the last years. A solely technological focus has given way to a more holistic approach highlighting the importance of employees for BPM (de Bruin et al. 2005; de Bruin and Rosemann 2007; Rosemann and vom Brocke 2010). But questions remain about how to sustainably manage business processes, especially by considering and involving employees (vom Brocke et al. 2014).

Paper I is the first step toward a comprehensive understanding of employees' roles in BPM as well as their needs. The paper provides an overview of three key people-related concepts discussed in BPM literature (expertise, empowerment, and commitment) and explains three roles employees take on in BPM (supporter, owner, and performer). Paper I contributes to BPM literature in two ways. First, previous literature identifies expertise and empowerment as the predominant topics in BPM literature regarding people. Although employee commitment and motivation are considered as important drivers for process orientation, they have not been studied as extensively as expertise and empowerment. Second, the literature review distinguishes people's roles and assigns them to certain levels. Although some scholars (e.g., Palmberg 2009) categorize process management roles, they fail to explicitly assign these roles to levels. Paper I shows that BPM research focuses primarily on top management and management as BPM supporters and owners, paying less attention to staff as BPM performers.

The findings and implications are summarized in the following Table 18.

Findings and implications	This dissertation...
Three key concepts discussed in BPM literature	<ul style="list-style-type: none"> • identifies three key concepts discussed in BPM literature regarding employees: <ul style="list-style-type: none"> ○ Expertise ○ Empowerment ○ Commitment
Three roles performed by employees in the context of BPM	<ul style="list-style-type: none"> • identifies three roles employees can take on and assigns them to certain levels <ul style="list-style-type: none"> ○ Supporter: top management ○ Owner: management ○ Performer: staff
Staff's commitment is an under-research topic	<ul style="list-style-type: none"> • reveals that expertise and empowerment are the predominant topics in BPM literature • reveals that BPM literature mostly focuses on top management and management but do not consider staff to the same extent • identifies the need for further research on staff motivation and commitment

Table 18. Research contribution concerning the role of people in BPM

Participants and management:

How needs a governance model to be designed in order to ensure effective and sustainable business process standardization? (RQ3)

In this thesis, a governance model for business process standardization is developed taking an ADR approach. In addition to top management support and cooperation of involved departments, Münster-

mann and Eckhardt (2009) identify organizational governance as a key driver of BPS. In addition, implementing a governance model while involving relevant stakeholders also fulfills the call for more employee involvement (vom Brocke et al. 2014) to increase employees acceptance of the newly designed process. To date, however, research on the organizational aspects of successful BPS has been quite scarce (Becker et al. 2012).

Paper II contributes to BPM research by providing a governance model that not only focuses on process management roles but also on the interdependencies and interactions with roles of the resource responsibility. The artifact explained in Paper II was inspired by other governance models and organizational concepts (Braganza and Lambert 2000; Creed et al. 2008; Gadatsch 2005; Osterloh and Frost 2006; Rubach and Sebora 1998; Spanyi 2010; Spender and Kessler 1995). But in those models, the role of the process owner often includes the responsibility for cross-functional processes. This challenges him/her to find the best way to manage relationships with functional (disciplinary) managers to get a good process outcome (Braganza and Lambert 2000; Doebeli et al. 2011). A special requirement for the FAR+ concept was to especially cover the needs for the development, implementation, and operations of standardized processes at different locations by a single process owner and multiple disciplinary managers to avoid such kinds of conflicts and related efforts (Spanyi 2010). So, the new and innovative core of the governance model presented in Paper II lies in its focus on the separation of disciplinary responsibility and process responsibility. In addition, it not only outlines different roles but also suggests to boards how these roles should interact and communicate in order to effectively and sustainably standardize an organization's processes. Furthermore, the artifact is not limited to its initial design and its first evaluation presented in Paper II, but rather has proven to be applicable and effective for several companies (section 3.2).

Findings and implications	This dissertation...
Development of a governance model	<ul style="list-style-type: none"> • develops a governance model for effective and sustainable process standardization by applying an ADR approach • provides dedicated process management roles with defined role descriptions to ensure clearly separated accountabilities and responsibilities • provides a board structure to guide the communication and coordination of the involved process management roles
Alignment of requirements of the process and resource responsibility	<ul style="list-style-type: none"> • provides a solution to align requirements of process and resource responsibility, and • to simultaneously avoid and/or decrease conflicts between the two responsibilities
Proven generalizability	<ul style="list-style-type: none"> • provides proven evidence that the concept enables effective and sustainable BPS

Table 19. Research contribution concerning participants and management

Process characteristics:

How do job characteristics affect employees' process orientation? (RQ4)

How do job characteristics affect BPS acceptance of employees? (RQ5)

What influences an employee's willingness to accept process change? And what has the greater impact: meaningfulness of work or job construals? (RQ6)

This dissertation thesis provides a first definition of the construct of process change acceptance. Previous research focuses on process-oriented thinking and behavior only (e.g., Leyer and Wollersheim 2013) or deals with resistance toward process management (e.g., Grau and Moormann 2014). When aiming to enhance employees' acceptance of altered processes, it is important to explicitly examine factors increasing process change acceptance because simply reducing resistance is insufficient.

This dissertation thesis goes one step further by not stopping at the prerequisite of process change acceptance (i.e., process orientation) and not focusing on the negative counterpart (i.e., process resistance). To operationalize the construct, measures from organizational change management literature (Bovey and Hede 2001) were adapted to a process context and validated using several empirical studies.

Considering process change acceptance as a further outcome of process orientation extends BPM literature, shifting the focus from technology to the human factor of BPM. Thus, this dissertation thesis responds to the call to identify how to motivate employees to support and embrace BPM (vom Brocke et al. 2014). In addition, this thesis partly explains how employee motivation and willingness to work in a process-oriented way and accept processes can be enhanced.

This dissertation thesis applies job characteristics theory (Hackman and Oldham 1975, 1976) in the context of process management by revealing that some job characteristics positively influence employee process orientation (Paper III) but have no impact on process change acceptance (Paper IV). Considering and analyzing the importance of job characteristics further extends BPM literature. For instance, previous research identifies employee empowerment and training (e.g., Kohlbacher and Gruenwald 2011a; Škrinjar and Trkman 2013; vom Brocke et al. 2014) and BPM culture (vom Brocke and Sinnl 2011) as relevant factors to consider when successfully implementing BPM and establishing process orientation. This dissertation thesis adds that the characteristics of the tasks executed by the employees must also be considered.

Finally, this dissertation thesis discovers another central factor for employee process orientation and process change acceptance. As process orientation means that employees work together with colleagues in an overall process even if they are distributed across different business units or departments, it is crucial for employees to be aware of the importance of their tasks in and for the overall process. This dissertation finds that successful business process management and thus successful process changes do not depend solely on good process management practices and training, but also require focusing on employees' psyches by considering their attitudes, concerns, and motivational factors. In this dissertation, a new construct named job construals was developed to take this crucial perception into account. Besides the theory-based development and definition of job construals, a scale for measuring the construct was developed by applying the card-sorting technique and validating it in several studies.

In summary, the results of this dissertation thesis confirm a study by Bala and Venkatesh (2013) who examined changes in employees' job characteristics after an enterprise system implementation. They called for further research focusing on all job characteristics as well as other aspect of employees' jobs (e.g., motivation, work context or role perception) to more completely understand changes in employees' jobs following IS implementation and BPC (Bala and Venkatesh 2013). Indeed, this dissertation does not examine how job characteristics change after IS implementation and BPC, focusing instead on what job characteristics and other aspects of employees' jobs (e.g., co-worker relations, work-role fit, and job construals) increase the acceptance of those changes.

Findings and implications	This dissertation...
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Definition and operationalization of process change acceptance	<ul style="list-style-type: none"> • provides a definition for process change acceptance • adapts and validates measures for process change acceptance from organizational change management literature
Explanation for drivers of employee motivation and willingness to accept processes	<ul style="list-style-type: none"> • contributes to BPM literature by hanging in on the human factor • suggests ways to increase employee motivation and willingness to work in a process-oriented way and accept processes
Some job characteristics influence employee process orientation and process change acceptance	<ul style="list-style-type: none"> • contributes to job characteristics theory • reveals the impact of job characteristics on process orientation of employees: <ul style="list-style-type: none"> ○ Autonomy, feedback, and task significance have a positive impact on employee process orientation ○ The remaining two job characteristics (skill variety and task identity) have no effect on process orientation • reveals the impact of job characteristics on process change acceptance: <ul style="list-style-type: none"> ○ Skill variety positively influences process change acceptance ○ Autonomy has a negative effect on employee process change acceptance ○ The remaining three job characteristics (feedback, task identity, and task significance) have no effect on process change acceptance • extends BPM literature by revealing the impact of job characteristics and thus highlights a further central aspect to sustainably implement process management and successfully enhance process orientation in an organization
Development of a new construct	<ul style="list-style-type: none"> • identifies job construals and meaningfulness of work as further relevant factors influencing employee process orientation and process change acceptance • develops a new theory-based construct named 'job construals' to consider the perceived embeddedness of employees' tasks in an overall process • develops and validates a scale for measuring job construals using card sorting-technique and multiple studies • applies job characteristics theory in the context of process management

Table 20. Research contribution concerning process characteristics

Tools and context:

What BPM system design ensures effective and sustainable BPM success?²³ (RQ7)

²³ This research question is not explicitly mentioned in the paper. But due to consistency reasons, the research question is listed here.

How does BPM system use influence the process orientation of employees? (RQ8)

Does and – if yes – how does a BPM system contribute to employees' process innovation behavior? (RQ9)

Which behavioral antecedents influence the degree to which BA tools are used in organizations? (RQ10)

To ensure the success of an organization's journey from function orientation toward process orientation, employees must change their mindsets (Wollersheim et al. 2016). This goes beyond participating in training to gain new skills and learn new methodologies for process execution and improvement to include developing a new way of process-oriented thinking (Škrinjar and Trkman 2013). In this context, the dissertation thesis at hand investigates how and to what extent BPM system use influences the process orientation of employees. Paper VII not only contributes to works examining the impact of different learning modes on process orientation but also to the still lacking analyses of the importance of information systems for process orientation.

Based on previous research studying the impact of the combination of different learning triggers on process-oriented thinking (e.g., Leyer et al. 2015; Wollersheim et al. 2016), this dissertation reveals that a BPM system combines the learning modes learning-by-doing and using documented knowledge and shows that using a BPM system continuously can reduce extensive training efforts (Paper VII).

In addition, Paper VII contributes to general BPM and process orientation literature by proving that using BPM systems has a positive impact on individual process orientation. BPM and its corresponding tools are seen as means to manage organizational processes and establish a process-oriented organizational structure (Trkman et al. 2015). Škrinjar and Trkman (2013) identify IS support as a critical success factor for process orientation, but no evidence of the positive influence of establishing a BPM system on enhance process orientation has been provided to date. Only Reijers (2006) has examined the effect of (organizational) process orientation on the implementation success of a BPM system, focusing on the opposite effect and considering only the organizational perspective. The evidence provided by this dissertation that BPM system use has a positive effect on process orientation therefore represents a significant contribution to BPM literature in general and to process orientation research in particular, underscoring the importance and relevance of BPM systems for organizations in achieving employee process orientation and justifying further research in this area.

Furthermore, Paper VII reveals that the usage of a BPM system should be connected to a personal context (i.e., job construals) to achieve the desired benefits. A BPM system should provide relevant and up-to-date information on the processes in which employees are working to support daily work activities but also a better general understanding of processes.

Paper VIII takes up the idea of Paper VII and analyzes if and how BPM system usage influences individual process innovation. The results of this paper provide evidence of the positive impact of BPM system usage on process innovation and thus contribute to the IT business value discussion. In addition, the paper explains the mechanisms of BPM system usage on the individual level by showing that BPM system usage increases individual process orientation which leads to increased individual process innovation. The results of the paper are in line with and extend research by Leyer et al. (2017), who show that organizational structure can support individual process innovation behavior. Moreover, the findings extend Lee and Walsh's (2016) research by showing that BPM systems contribute to innovation activities by fostering the importance of cross-functional connection among employees.

This dissertation also examines behavioral antecedents of the usage of business analytic tools which are embedded in employee work processes. Paper IX contributes to information technology adoption literature as well as operational research by revealing that relevant significant constructs for business

analytics tools usage beyond tool functionality and perceived applicability. The results emphasize that more understanding of how organizational conditions can be set to develop better decision-making tools and thus encourage their usage. Paper IX reveals that the antecedents of BA adoption on the individual level cannot be separated from the work and process environment the individuals are embedded in. While individually perceived utility of BA tools does not play a role, the individual skill level is of high importance. On an individual level, self-efficacy regarding tool application should be strengthened. On the organizational side, normative beliefs and accessibility are important; in other words, the work environment in which employees are embedded in is decisive. The results of the study show that the influence comes not from employees with whom the individual works within processes, but rather supervisors and colleagues doing similar work. This means that a wider organizational setting than the direct work environment has to be considered.

The importance of taking the broader work environment into account when examining employees tool usage is also reflected by the results regarding knowledge. Knowledge has shown to be an important antecedent for tool usage but, interestingly, does not have a significant effect on perceived behavioral control. This means that the more knowledge employees have regarding a certain BA tool, the more they use that tool. However, at the same time, knowledge does not influence the individual's perception of being capable of using the tool. This finding seems to be related to the fact that learned theoretical information must be implemented in practice before employees have the feeling of really understanding and mastering the subject. Prior research has shown that training employees on a new subject and sharing knowledge about the subject are only beneficial if the employee has been trained in an appropriate context, regularly gets feedback regarding the application and has the chance to practice the subject in exercises and real-life situations (Gonzalez et al. 2003).

Findings and implications	This dissertation...
Enriched possibilities to learn process-oriented thinking	<ul style="list-style-type: none"> • reveals that BPM systems combine different learning modes: learning-by-doing and using documented knowledge • shows that continuous BPM system use can avoid extensive training efforts
Evidence for the positive impact of BPM system use on individual process orientation	<ul style="list-style-type: none"> • provides initial evidence for the positive impact of BPM system use on process orientation • reveals that BPM system usage should be linked to a personal context (i.e., job construals) to achieve process orientation
Evidence for the positive impact of BPM system usage on individual process innovation	<ul style="list-style-type: none"> • contributes to IT business value discussion • provides an understanding of the mechanisms of the BPM system usage on the individual level • reveals that BPM systems positively influence innovation activities by fostering the importance of cross-functional connection among employees • shows that a process-oriented thinking style, triggered by using a BPM system, is important for innovation activities

Uncovering antecedents for business analytics tool adoption	<ul style="list-style-type: none"> • reveals behavioral antecedents of business analytics tool adoption • highlights that antecedents of business analytics tool adoption on the individual level cannot be separated from the work and process environment the individuals are embedded in • emphasizes that learned theoretical information must strengthened through practical training before employees feel capable on the subject
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Table 21. Research contribution concerning tools and context

5.2 Findings and implications for practice

Besides the theoretical contributions, this dissertation also has implications for practice. Those can also be classified along the dimensions participants and management, process characteristics, and tools and context which are discussed in the following.

Process orientation and business process standardization

The two literature reviews presented in the introductory paper present a list of factors influencing process orientation as well as business process standardization. These lists could be used as checklists by practitioners aiming to shift their organization from function orientation towards process orientation as well as to standardize the respective processes.

The role of employees in BPM

The findings presented in Paper I highlight the importance of employees in general and of staff in particular for achieving process orientation in an organization. Paper I reveals that empowerment and expertise are not enough to ensure successful process implementation and operation. Commitment from top management, middle management and staff is crucial to make the journey from function orientation towards process orientation successfully. This goes beyond other scholars (e.g., Kohlbacher and Gruenwald 2011b), who have focused mainly on getting the support of top management and management to successfully implement process management and increase process orientation. This paper also outlines three roles employees can take on: supporter, owner, and/or performer. Knowing the different roles and their special training and other requirements could help practitioners apply role-specific change management to sustainably implement BPM and thus successfully increase process orientation.

Participants and management

The governance model presented in Paper II represents a proven concept to successfully standardize processes, including dedicated roles with clearly defined tasks and thus clearly separated accountabilities and responsibilities, as well as boards to guide communication and coordination among stakeholders. This governance model can be adopted by any organization aiming to standardize their processes or manage their processes in a structured manner. The concept has proven applicable for various kinds and sizes of organizations during several ADR cycles.

Process characteristics

Paper III and Paper IV give insights into what job characteristics have to be considered when aiming to achieve process orientation (Paper III) and process standardization (Paper IV).

Paper III highlights the fact that employee training and empowerment are not enough to increase employee process orientation but also certain job characteristics have to be taken into account. Feedback, autonomy, and task significance are the important job characteristics managers should focus on when aiming to increase employee process orientation. As all these three characteristics have a positive impact on process orientation, managers should ensure that they are perceived as high by the employees.

Feedback about the job can come from different sources, including colleagues, supervisor, or customers (Hackman and Oldham 1975), which could be supported by the organization by providing feedback tools. Autonomy can be increased by involving employees in process design or by assigning process management roles to them. It is crucial that employees feel that they can autonomously make decisions about tools, methods, and techniques (Hackman and Oldham 1976) that affect process execution. Task significance refers to the impact of an individual's job on her colleagues' jobs (Hackman and Oldham 1975). In the context of process orientation, employees are more likely to perceive task significance if they understand the overall process and are aware and consider the interfaces between their own tasks and their colleagues' tasks. This required awareness and knowledge can be ensured by using a BPM system which displays the overall process, the single contained tasks and all interfaces (see the next section below). The visualization of the connections among process tasks allow employees to see their part in the whole process chain and more strongly perceive the significance of their tasks. Another opportunity to increase this job characteristic is by using adequate training interventions such as role-plays.

This thesis not also examined the job characteristics that influence employee process orientation but also their process change/standardization acceptance. Comparing these two contexts, there are some differences regarding some job characteristics. In terms of process standardization acceptance, skill variety has a strong positive effect and autonomy has a negative effect. The differing results might reflect the nature of BPS. As its aim is to homogenize process execution and to reduce process variants, it is very rigid and controlled in most cases. Thus, employees perceive the induced changes as very threatening and unpleasant. Being aware of key job characteristics for BPS acceptance (i.e., skill variety and autonomy) as well as the impact of higher-order goals such as communion striving, status striving, autonomy striving, and achievement striving on BPS acceptance helps practitioners to derive the right management actions to successfully standardize processes. For instance, the results show that the standardization of a process which contains a lot of highly autonomous tasks is less likely to be accepted. To increase acceptance, employees can be involved in its design, preserving autonomy at least to a certain degree and facilitating the pursuit of higher-order goals despite standardized processes.

Paper III and Paper IV help managers understand what job characteristics they should consider when pursuing for process orientation or process standardization. Paper III identifies autonomy, feedback, and task significance as key job characteristics managers should consider when pursuing process orientation and autonomy and skill variety as the job characteristics most relevant to process standardization acceptance.

Paper V provides a comprehensive picture of the interplay between meaningfulness of work and job construals, showing that employees who perceive a high degree of meaning in their daily work and high embeddedness in an overall process are more willing to accept and embrace process changes. Managers should focus on these aspects when introducing process change projects. To increase perceived meaningfulness of work, it is important to give employees opportunities to use a wide range of skills and to help them recognize the importance of their daily work for the whole organization, for the end product, and for their colleagues. This may be achieved through job rotation or role-plays, which give employees the opportunity to get acquainted with the overall process and the significance of their tasks in it, perform other tasks in the process and develop and use possibly less frequently needed skills.

Regarding job construals, it is crucial to know and consider the impact of co-worker relations and work-role fit to derive the right actions to increase employee acceptance. For instance, before assigning a process role to a certain employee, the fit between the individual's self-concept and the tasks being executed within the role should be considered.

Tools and context

Paper VII, Paper VIII, and Paper IX have significant implications for organizations that already have implemented or plan to implement a BPM system.

Paper VII highlights the fact that BPM systems are much more than just documentation. In most cases, such a system has been implemented to fulfill legislative or normative requirements or to receive certificates such as ISO certificates. But beyond that, BPM systems provide many more benefits. Paper VII reveals that a BPM system is a central factor in enhancing employee process orientation and can reduce training time and costs by combining several learning modes.

To achieve these benefits, a BPM system has to be well designed. The organization should carefully identify and clearly communicate the goals of the BPM system implementation, make it easy for employees to understand how to apply the process models in their daily work, define process management roles and the precise target group and, critically, design the BPM system to fit the requirements of that target group.

Paper VII reveals that BPM systems not only increase process knowledge but also enhance employees' perceptions of the embeddedness of their tasks in an overall process. Job construals has shown to be a central aspect to change employee mindsets toward process orientation, especially for non-management employees.

Paper VIII identifies BPM system usage as an important lever not only for improving individual process orientation, but also for changing individual process innovation behavior. To support innovation activities, the design of the BPM system should ensure that employees recognize the impact of their process activities in the overall process.

Paper IX provides practical contributions how to enhance business analytics tool usage. The study reveals that the key for usage is reducing psychological barriers. The first step is creating a friendly and supportive atmosphere so that employees get the feeling of being expected to use BA tools. This atmosphere can either be created by co-workers or supervisors. The second step is to provide target-group-specific training. This training is most beneficial when performed by co-workers in similar positions with more advanced skills in using the respective tool. Peer training reduces psychological barriers because employees feel they can ask any question, even if they are critical or 'stupid' without exposing themselves to ridicule. In addition, knowledge sharing among co-workers increases tool acceptance. Knowledge sharing can be supported by exchange platforms like wikis or online forums.

The following Table 22 summarizes all managerial implications.

Dimension	Managerial implication
Process orientation and business process standardization	<ul style="list-style-type: none"> • Structured overview of all dimensions of process orientation and success factors for business process standardization • Ready-to-use checklist when aiming to shift an organization from function towards process orientation as well as to standardize processes
Role of employees in BPM	<ul style="list-style-type: none"> • Overview of different roles employees can take on while working in and with processes as well as their training and other requirements • Structured overview helps to apply role-specific training and change management to sustainably implement BPM
Participants and management	<ul style="list-style-type: none"> • Proven concept • Dedicated roles with clear role description which ensures clearly separated accountabilities and responsibilities • Dedicated boards to guide communication among stakeholders

	<ul style="list-style-type: none"> • Ready to be implemented instantly • Applicable for any kind and size of organization
Process characteristics	<ul style="list-style-type: none"> • Training and empowerment are not enough to increase employee process orientation: <ul style="list-style-type: none"> ○ Three job characteristics (autonomy, feedback, and task significance) have to be considered to better target activities. • Some processes are more likely to be standardized successfully due to employees acceptance: <ul style="list-style-type: none"> ○ Standardization of a process consisting of highly autonomous tasks is less likely to be accepted ○ Being aware of and considering the impact of job characteristics and higher-order goals can help increase employee acceptance • Employees need to perceive how their tasks are embedded in an overall process to work in a process-oriented manner and accept process changes. • Employees who perceive a high degree of meaning in their daily work and high embeddedness in an overall process are more willing to accept process changes. <ul style="list-style-type: none"> ○ Meaningfulness of work can be increased by focusing on skill variety and task significance, such as through job rotation or role plays. ○ Job construals is influenced by co-worker relations and work-role fit.
Tools and context	<ul style="list-style-type: none"> • BPM systems are more than just documentation: <ul style="list-style-type: none"> ○ They help to increase employee process orientation, ○ and can thus reduce training time and cost. ○ Moreover, they are an important lever for individual process orientation. • BPM systems as well as their usage are not beneficial per se: <ul style="list-style-type: none"> ○ BPM systems must be designed to fit the needs of the system users: system quality is more important for employees working in production whereas information quality is more important for administration employees. ○ BPM system use should be connected to the personal context of the user. ○ In order to increase individual process innovation, BPM systems should visualize the impact of employees' tasks on the overall process. • Job construals are especially important for non-management employees:

	<ul style="list-style-type: none"> ○ To change the mindset of non-process management employees toward process orientation, first the perceived embeddedness of their tasks should be increased. ● Reducing psychological barriers increases business analytics tool usage <ul style="list-style-type: none"> ○ A friendly and supportive atmosphere gives employees the feeling of being expected to use business analytics tools. ○ Target-group-specific peer training enables learning in a 'safe' environment and facilitates knowledge sharing. ○ Exchange platforms such as wikis and online forums support knowledge sharing.
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Table 22. Summary of managerial implications

6. Limitations

As with all research, the results of this dissertation are constrained by several limitations. First, the reviews of literature relevant to process orientation in this introductory paper (section 2.2) and to the role of people in BPM (Paper I) only cover a limited period. Furthermore, both reviews focus on a selection of journals and conferences, excluding potentially relevant papers published in other outlets.

The generalizability and transferability of the findings are also limited. Most of the data were collected in one organization only. To partly compensate for this limitation, the company chosen is a well-suited object of analysis because it is highly process-oriented and highly motivated to pursue process standardization in response to strict regulations demanded by national and international aviation authorities. As a result, the organization is constantly changing their processes. The wide range of services provided by the company made it possible to test the models and hypotheses by surveying both white collar administrative and blue collar production employees. To increase the generalizability and transferability of the results, data in other industries, such as a non-profit organization of the social care industry (Paper III) were collected as well.

Some papers (e.g., Paper III, Paper IV, Paper V, Paper VII) use self-evaluation data to study the influencing factors of process orientation and process acceptance. These data are prone to subjectivity and CMB. This limitation was reduced by conducting several tests to ensure that the data are not affected by CMB (see 3.4.2.3). It was not possible to use alternative objective data, such as log files or protocols, because the target organizations do not collect data using a standardized digital system which would allow worker's task reports to be collected anonymously. In addition, the workers' council of the organizations did not permit any documents to be analyzed which could implicate any specific employees or their performance.

This thesis aims to provide an overview of influencing factors for process orientation and thus process change acceptance, but examines only certain factors in detail. In addition to the factors analyzed in this thesis, there might be also other influencing factors (especially for process orientation). For instance, training has been proven to be a necessary prerequisite for process orientation (e.g., Leyer et al. 2015; Škrinjar and Trkman 2013) and organizational and BPM culture is discussed as important precursor (e.g., Schmiedel et al. 2013; Tumbas and Schmiedel 2013; vom Brocke and Sinnl 2011).

Another limitation is that the newly developed construct of job construals must be tested in future studies. Its use in only one organizational context limits the generalizability of its effect on process change acceptance as well as the interdependencies to other constructs such as meaningfulness of work.

As this section indicates that the findings of this thesis are limited in terms of their generalizability, future research is necessary to confirm these results and provide evidence for their generalizability.

7. Future research

The results and contributions of this dissertation cast light on possible avenues for future research, the discussion of which is structured mirroring Section 1.

Participants and management

The process governance concept developed in this dissertation thesis has already been tested successfully in reality. Nonetheless, a longitudinal evaluation and observation of the concept over a longer period of time is needed to test the sustainable effects on standardization success. Specifically, future research should investigate how the governance concept affects the degree of standardization and the factors influencing the role of process owner. Longitudinal studies are needed to observe the process of governance structures facilitating standardizing processes giving way to deviations over the time as employees identify local optimization potentials and apply workarounds (Kettenbohrer et al. 2013b) and the central role of process owner in ensuring sustainable process standardization within BPM governance structures (Kohlbacher and Gruenwald 2011b). My recent research (Kettenbohrer et al. 2016c) into the effectiveness of the process ownership assignment on BPS success attempts to take a step in this direction.

In order to increase the success rate, structured and proven guidelines on how to standardize processes are needed. In addition to describing each step in detail, the guideline should also take employees into account, supported by further process acceptance research (see Kettenbohrer et al. 2013b).

Process characteristics

This dissertation thesis illuminates the relationship between job characteristics and employee process change acceptance. These results can be used as a starting point for further research on the interdependence of job characteristics and different training modes, possibly including individualized training reflecting the characteristics of current or future roles. Further research into the effect of different training types (e.g., role-plays, face-to-face learning or web-based training) on employee process change acceptance and on the work-role fit and/or co-worker relations is needed. Furthermore, future research could also examine the influence of personality characteristics, such as individual inertia, on employee process orientation and thus process change acceptance.

This thesis develops and empirically evaluates the new construct of job construals. The robustness of this construct should be tested, extended and refined in further studies in the process management field, in other industries and in other cultures.

Tools and context

This thesis examines the effect of BPM system usage on employee process orientation. The results show that using such systems supports employees working and thinking in a process-oriented way. Further research is needed with regards to process change acceptance, for example into the factors determining the degree to which a BPM system influences employee process change acceptance, what system design features play a role, which modelling notation is best used to document processes, and the potential benefits of leveraging the full range of employees' expertise, including using social media or web 2.0 elements (see Kettenbohrer et al. 2015d).

In the context of tools and context, a promising technology is blockchain, which can potentially solve trust and transparency issues in business networks because (Mendling et al. 2018):

- Participants in a business network use a shared database to perform transactions.
- These transactions are validated by the participants using a consensus protocol.
- Smart contracts control the transactions between the involved participants which involves ensuring that contractual conditions are met and obligations are enforced.

In the context of process management, blockchain technology is promising because business processes often handle data stemming from information systems outside their control, such as from other business units or other companies. Traditional data transfer is complex and expensive and often leads to inconsistent and stale data, resulting in low levels of transparency and trust (Mendling et al. 2018).

Blockchain technology is a reliable means of enhancing transparency and trust in business processes due to the shared database on which transactions are directly performed and which provides the interface for the respective processes, completely eliminating inconsistent or unconfirmed data (Mendling et al. 2018). Given these benefits, future research should investigate how to successfully and sustainably combine blockchain technology and BPM.

Considering this and further current trends in business process management, such as process mining and further process automation, the question arises whether humans or computers and algorithms will perform process activities in the future. In the case of full process automation, there might be no need to take the individuals into account to successfully manage processes.

8. Conclusion

The main objective of this dissertation is to provide theoretical explanations and empirical evidence for the circumstances under which employees are willing to accept and embrace business process change. It identifies meaningfulness of work and job construals as crucial factors to enhancing employee process change acceptance. In other words, employees who perceive meaning in their work and understand how they and their tasks fit into larger processes and are interdependent with colleagues are more willing to change their process-related habits and routines.

These insights can help organizations actively and reduce the perceived threat of business process change and shift successfully and sustainably from function orientation towards process orientation.

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Paper I

A literature-based analysis of people's roles in business process management

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Paper II

Developing a governance model for successful business process standardization

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In Proceedings of the 19th Americas Conference on Information Systems
(AMCIS), Chica-go (IL), 2013

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Paper III

Examining the influence of perceived job characteristics on em- ployees' process orientation

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tems (ECIS), Istanbul, Turkey, 2016

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Paper IV

Analyzing the impact of job characteristics on employees' acceptance of process standardization

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In Proceedings of the 23rd European Conference on Information Systems (ECIS), Münster, 2015

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Paper V

Good cop or bad cop? How meaningfulness of work and job construals affect process change acceptance

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Good cop or bad cop? How meaningfulness of work and job construals affect process change acceptance

Abstract

Changing processes is a complex and difficult management endeavor. A lack of acceptance by the affected employees is one of the biggest inhibitors of successful process change. Two elements that influence acceptance are the perceived meaningfulness of the work itself and the perceived embeddedness of employees' tasks in an overall process (i.e., job construals). Although these two concepts are closely related, there are some differences, which cause a certain rivalry between the two. Our study examines which of the two concepts has the stronger effect on acceptance. We use data from a survey among 191 employees of a global aviation service company to show that, despite both concepts having a significantly positive effect on process change acceptance, job construals has the stronger effect.

1. Introduction

In the course of the ongoing digitalization of organizations, the way in which individuals collaborate and communicate has changed and will face further changes. One prerequisite for a successful transition is that individuals transform into experts not only for their task, but also for the overall process in which their task is embedded. Due to the challenges imposed by digitalization, globalization, and thus new ways of working (e.g., working in virtual teams), process orientation will become a critical factor. Process orientation means focusing on organizational processes ranging from end (e.g., customer order) to end (e.g., order fulfillment and collection)—in contrast to putting emphasis on hierarchical structures (Reijers 2006).

Due to digitalization and new working styles (e.g., virtual teams), employees are increasingly located in different organizational units, locations, countries, or time zones, but nevertheless have to work together along one process to create a product or a service (Barsness et al. 2005; Bassett 2016; Staples 2001). For example, consider the hypothetical case of Ben, an accounting clerk, who works in the accounts payable process and is responsible for checking supplier invoices. Ben works in Munich, Germany. His task is followed by the step of booking invoices into the firm's finance system, performed by Ewa, who works in the firm's captive nearshore center in Krakow, Poland. Due to digitalization, the environment is becoming increasingly dynamic and causing an increasingly rapid bombardment of new demands and requirements imposed on the organization, which in turn leads to frequent or even continuous change of business processes and work procedures (Markovitch and Willmott 2014). Consequently, employees are constantly facing changes, which can be related to tasks, procedures and workflows, information technology, or governance structures (Borgen et al. 2010).

Organizations struggle significantly with such process-related changes (Al-Mashari and Zairi 2000; Guha et al. 1997; Trkman 2010). Studies show that a lack of acceptance by a single employee whose work is affected by the change is one of the strongest inhibitors of successful and sustainable change (Oreg 2011; Tenner and DeToro 2000). However, there is still a gap in research about the determinants of change acceptance. For instance, while organizational psychology has a long tradition of analyzing the impact of work design on employee reactions, it has not primarily focused on change acceptance, but rather on aspects of work continuation, such as workers' motivation, work performance, or (low) intention to leave the firm. One well-established theory in this context is the job characteristics theory, which proposes that certain job characteristics, such as autonomy or task significance, drive these work continuation outcomes by increasing the meaningfulness that workers perceive in the work they do (Hackman and Lawler 1971; Hackman and Oldham 1975, 1976). However, the question remains of

whether and how these job characteristics and the resulting meaningfulness also affect workers' willingness to accept changes to their processes and procedures.

Now, when firms turn their organizational structures and the respective working styles toward process orientation—thinking and acting in such a manner that the whole process benefits, and the individual takes care of more than their own task—this meaningfulness might be affected by a worker's perception of being embedded in a larger process. This perceived processual embeddedness, which will be conceptualized as "job construals" here, can have a positive or negative effect on meaningfulness, depending on whether the person values this embeddedness as positive or negative (being a cog in the machine can be evaluated as positive or negative). On the one hand, perceiving themselves as a cog in the machine in a positive sense increases employees' awareness of the impact of their tasks on the overall process, as well their relatedness to their colleagues (Deci & Ryan, 2000; Ryan & Deci, 2000), which consequently has a positive effect on the perceived meaningfulness of work. On the other hand, being a cog in the machine in a negative sense could increase the feeling of irrelevance and replaceability, because their own work is only a small step in a longer process.

In addition to its effect on meaningfulness, job construals can also have a direct positive or negative effect on the worker's willingness to accept a change in this process: they might be supportive because they know and support the larger picture of an effective and efficient process (Škrinjar and Trkman 2013), with higher expertise in optimizing or contributing to the optimal, overall process. Although the two constructs of meaningfulness of work and job construals are causally related, there are substantial differences. Both concepts refer to the perception of value of an employee's work, but the perspective by which the values are judged differs. The perspective relevant for meaningfulness of work refers to the connection between employees and their higher-order goals. In contrast, job construals reflects the mental connection between an employee's activities and the corresponding activities along the overall process.

This paper aims to shed light on these unclear relationships among employees' perceived process embeddedness ('job construals'), the perceived meaningfulness of their work, and their willingness to accept changes to their processes and work procedures. Clarifying these relationships helps to identify the relevant adjustments to increase employees' acceptance of process change. Our research focuses particularly on two important variables, meaningfulness of work and job construals, to determine their differential and possibly contradictory impacts on workers' acceptance of change. Our research questions are as follows:

What influences an employee's willingness to accept process change?

And what has the greater impact: meaningfulness of work or job construals?

In the next section, we draw on organizational and behavioral psychology to develop our research model. To evaluate our hypotheses, we collected data during a process change project in a globally operating aviation service company. After explaining our methodology and the operationalization of the constructs, we present the results and then discuss the contributions as well as limitations of our work.

2. Theory and hypotheses

In this section, we develop our hypotheses by explaining the impact of meaningfulness of work and job construals on process acceptance²⁴.

²⁴ In the following, we use the terms task, job, and work as synonyms, because we understand process tasks executed by employees as their jobs within a certain process.

2.1 Process change acceptance

Change is always present in organizations (Burnes, 2004). According to the work system theory, nine different elements of a work system can be affected. A work system is defined as “a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific products/services for specific internal and/or external customers” (Alter 2013, p. 75). The nine elements of a work system are processes and activities, participants, information, technologies, customers, products/services, environment, infrastructure, and strategies (Alter 2013). We focus on changes in processes and activities (i.e., business process change, BPC; (Jurisch et al. 2014).

Due to the huge impact on employees' daily work (i.e., by changing the organization's processes but also the organizational structure; (Al-Mashari and Zairi 2000; Cao et al. 2001a), organizations put a great deal of effort into process-related projects, and yet they still struggle. Besides fading management commitment (Beer 2003), one of the major reasons why organizations fail to change processes successfully is their insensitivity regarding empowerment and motivation (Paper et al. 2001), as well as the attitudes and behaviors of the employees (Cao et al. 2001a; Grau and Moormann 2014) affected by the changes induced.

Due to its different forms and extents, change is particularly incomprehensible, unclear, and even threatening to the affected employees (vom Brocke et al. 2014). For instance, changing existing processes might include adding new tasks to the process or altering the workflow. In addition, the organizational structure might be affected so that employees have to report to a new manager or work within another team. All these BPC-induced changes can cause fear and be perceived as a threat, which consequently reduces employees' willingness to accept the changes.

An explanation of why BPC can have a negative effect is linked to job characteristics. Their impact is discussed in the context of enterprise system (ERP) implementation, which is one of the most pervasive organizational change initiatives (Morris and Venkatesh 2010) because such systems fundamentally alter the nature of workflows, tasks, and jobs (Liang et al. 2007). In previous studies (Morris and Venkatesh 2010), it was shown that job characteristics can change during process changes induced by an information system implementation. Due to the altered job characteristics, employees' job satisfaction and job performance are also affected (Bala and Venkatesh 2013, 2017; Venkatesh et al. 2010). We base our work on these findings and thus understand process change acceptance as employees' acceptance of all changes which are induced by BPC. We extend existing research by analyzing the impact of job construals on employees' process change acceptance.

In the following, we introduce two major determinants of this change acceptance: meaningfulness of work and job construals. We assume that due to an ever-changing work environment, employees' change acceptance is not solely dependent on how happy they are with their job (e.g., due to perceiving high meaningfulness in their work), but rather that employees need to be aware and also to perceive that they and their tasks are part of the overall process. If they perceive themselves and their tasks as embedded in the process as a whole, they are more likely to accept the process changes. The underlying assumption for the following research model is that the upcoming process change is favorable for the organization.

2.2 Meaningfulness of work

Meaningfulness of work is “the value of a work goal or purpose, judged in relation to an individual's own ideas or standards” (May et al. 2004, p. 14). According to Barrick and Mount (2013), every human being strives subconsciously for higher-order goals to perceive meaningfulness in life, which “refers to

individuals' perception that their actions are valuable, useful and worthwhile" (Barrick and Mount 2013, p. 137 f.). In this context, not only the accomplishment of the goal matters, but also the alignment of the goal with the individual's personality. This implies a focus on volitional behavior, which means that "the employee has to have both perceived and actual control over his or her goals and behavior" (Barrick and Mount 2013, p. 139). In other words, if individuals are not able to control the alignment between their goals and their behavior (e.g., they have to follow multiple instructions), they do not feel comfortable (Barrick and Mount 2013). These situations are called "discordant work situations" (Barrick and Mount 2013, p. 138) and refer to the misfit of individuals' higher-order goals, their personality, and the characteristics of the job being performed. Due to the missing opportunity to fulfill their implicit goals, employees perceive less importance and significance and consequently less meaningfulness in their work (Barrick and Mount 2013; Halbesleben 2006; Hobfoll 1989). Process change can create such a discordant work situation because it alters many components (e.g., tasks, workflows, or governance structures). These changes can have a negative effect on employees' acceptance, because employees perceive decreasing meaningfulness in their current work (Barrick & Mount, 2013; Hackman & Oldham, 1976). Thus, we hypothesize:

Hypothesis 1: *Employees who perceive their current work as meaningful are less likely to accept process change.*

2.3 Job construals

Employees' acceptance of process change is largely determined by their perception of the embeddedness of their work within the overall process. This perception is described by the concept of "job construals," which we develop from the concepts of self-construals and task interdependence.

Self-construals describes the perceptions individuals have of themselves, of others, and of the interdependence between them and other people (Markus and Kitayama 1991). These perceptions can range from being interdependent with or independent of others. An independent self-construal is based on individualism, personal rights, and the autonomy of the individual (Markus and Kitayama 1991), which highlights an individual's separation from others (Cross et al. 2000). In contrast, an interdependent self-construal is shaped by the assumption that the person is connected to others (Cross et al. 2000). The different forms of self-construals influence various self-related processes, such as cognitive processes, motivational processes, or even relationships. So the ability to act in accordance with the self and to pursue subconscious goals is one of the key drivers of employees' motivation (Barrick and Mount 2013). Individuals with an independent self-construal perceive self-esteem and derive positive views of themselves by standing out, competing with others, or defining themselves (Blaine and Crocker 1993; Cross et al. 2000). Persons with an interdependent self-construal perceive positive feelings in relationships with others (Cross et al. 2000).

Task interdependence, as our second conceptual foundation of job construals, is defined as "the degree to which the interaction and coordination of team members are required to complete tasks" (Langfred 2005, p. 514). Kiggundu (1981) identifies two types of task interdependence: initiated and received. Initiated task interdependence is defined as "the degree to which work flows from a particular job to one or more jobs. A person in a job characterized by high initiated task interdependence directly affects the jobs of others" (Kiggundu 1981, p. 501), while received task interdependence refers to "the extent to which a person in a particular job is affected by the workflow from one or more other jobs" (Kiggundu 1981, p. 501). Initiated task interdependence fosters the responsibility for work that a person experiences (Thomas 1957; Turner and Lawrence 1965), while, in contrast, received task interdependence is supposed to have a negative effect on experienced responsibility (Kiggundu 1981).

Combining the reasoning behind self-construals and task interdependence, we propose that employees' process change acceptance is largely determined by how they perceive *their work* (instead of themselves) being embedded within the process (i.e., job construals instead of self-construal). Accordingly, job construals refers to the interdependence or independence which employees perceive to exist between their work and the work of their colleagues.

We assume that this new way of thinking and the acceptance of BPC-induced changes are influenced by employees' self-perception regarding their task in the overall process. We argue that employees who see their tasks as highly interdependent with other tasks within the process and regard their tasks as embedded in the overall process (exhibiting an interdependent job construals) perceive their job as a cog in the wheel. Consequently, they are more likely to have the overall process in mind and to put the process and its objectives over their single tasks.

In a process-oriented company, hierarchies lose more and more importance (McCormack 2007), while products are created by various employees working in different, separate teams or even business units (Bitici et al. 2011; Browning 2010). However, the employees have one thing in common: they work within or along the same process to produce the required output. The process-oriented thinking of the individual worker, which is needed to successfully achieve process orientation in an organization, stems from the awareness of being part of an overall process and thus of the process's successful output. This implies putting overarching process goals over single task goals. Thus, a highly interdependent job construals increases employees' process orientation (Kettenbohrer et al. 2016b); their acceptance of process changes is highly influenced by their self-perception regarding their task in the overall process. Job construals does not only focus on knowing the overall process and the interlinkages of the different activities, it emphasizes the perceived interdependence or independence between employees' tasks and their colleagues' tasks within this process. Employees exhibiting an interdependent job construals, —that is, those who see their tasks as highly interdependent with their colleagues' tasks—perceive their own tasks as highly embedded in the overall process. Consequently, we hypothesize:

Hypothesis 2: Employees exhibiting an interdependent job construals are more likely to accept process change.

At first sight, job construals seems similar to meaningfulness of work. Despite some similarities, these two constructs are still different. In the following section, the interplay between the two constructs is explained in detail.

2.4 Interplay between meaningfulness of work and job construals

Meaningfulness of work refers to the value that individuals perceive in their job, judged in relation to their own ideas or standards (May et al. 2004) or the possibility of pursuing their own higher-order goals (Barrick and Mount 2013). Job construals also reflects a certain perception of the value of the work. Nevertheless, this perception refers more to the fact that an individual's tasks are embedded in the surrounding process. In other words, job construals highlights the fact that an individual perceives that the production of a product or service consists of several tasks which are highly interdependent; and that the individual's tasks are an important part of the process. So job construals also refers to the perceived value of work, but the perception is not judged in relation to the individual's goals or ideas, rather in relation to the overall process goals.

Summarizing, both constructs—meaningfulness of work and job construals – —reflect the perception of value of an individual's work. However, they differ in the perspective by which the value perception is judged. The perspective relevant for meaningfulness of work is the workers themselves and their higher-order goals. Thus, it reflects the connection between the workers and their higher-order goals. In

contrast, the perspective for job construals is the organization with its processes and the corresponding activities. As such, job construals reflects the mental connection between an individual's activities and the other activities in the process.

To illustrate the differences as well as the interplay between meaningfulness of work and job construals, imagine the following example. A sales representative, named Josh, closes an important and high-priced deal with a customer. Josh's task exhibits strong task significance, which supports his perceived meaningfulness of work. For instance, striving for achievement can be fulfilled because personal competence and a sense of accomplishment can be demonstrated. So the sales representative is able to pursue his higher-order goals. In contrast, job construals is perceived if Josh is aware of and recognizes that his achievement is valuable only if the accounting clerk Ben (remember him from the introduction), in a later step of the sales process, creates an invoice and thus claims money from the customer. In essence, Josh can close as many deals as he wants, but they are of no value for the firm if no billing takes place afterward. However, if Josh recognizes that sales activities do not create value without being embedded in an effectively running sales process (including billing), he will also perceive more meaningfulness in his own work. Consequently, if all process participants recognize and perceive that they have to work together along a larger business process—or to play their role/part in a larger value-creation process to achieve more—the overall process goal can be achieved, and thus also the perceived meaningfulness of their individual work will be higher.

This example shows that job construals and meaningfulness are separate constructs, but are also causally related. As introduced earlier, job construals is built on the two concepts of self-construals and task interdependence. Psychology research confirms the influence of task interdependence on employees' work motivation and work performance (Kahn et al., 1964; Kiggundu, 1981; Lawler et al., 1968). Besides the impact on responsibility experienced for one's own work, task interdependence has a positive impact on responsibility experienced for colleagues' work outcomes (Kiggundu, 1983). It can be shown that workers whose work has an impact on others perceive responsibility for their own actions (Horsfall & Aresberg, 1966; Thomas, 1957; Turner & Lawrence, 1965). Due to the perceived embeddedness and connectivity to their colleagues' work, we assume that employees become more aware of the impact of their tasks on the overall process, but also of the end product of the process. In addition, the interdependence with colleagues' tasks increases the feeling of relatedness (Deci and Ryan 2000; Ryan and Deci 2000), which consequently has a positive effect on the perceived meaningfulness of work. Thus, we can hypothesize that employees who exhibit an interdependent job construals perceive their work as more meaningful:

Hypothesis 3a: Employees exhibiting an interdependent job construals perceive their job as more meaningful.

However, there are also arguments for an opposite (negative) effect. Employees might perceive that the end product of a business process is not only dependent on their own work and their own performance, which consequently makes them feel like a "small cog in the wheel" (in a negative sense). For them, single tasks and their impact do not seem important for the success of the overall process, because the latter might be not too dependent on individual performance (while it surely often is). This negative perception of their own relevance within the process will negatively influence their perception of the meaningfulness of their work. To illustrate, remember Ben, our accounting clerk. He is working in the accounts payable process and is responsible for checking supplier invoices (Task A). This task is followed by the step of booking the invoices into the organization's finance system (Task B), which is performed by his colleague Ewa. Due to the separation of tasks, Ben is not responsible for the whole process, but only for Task A. The focus on only one step limits his perceived impact on the end product of the whole process and creates a feeling of irrelevance; in a sense, there are many other employees

involved in this process, and he might think that he is not important for its overall success because he is just a small cog in the wheel, being moved by the others and the process in which he is working.

In addition to the feeling of irrelevance, there might also be the perception of easy replaceability. Due to the separation of tasks and also their interdependence within the process workflow, each single step is double-checked during the performance of the process. If a mistake occurs and it gets uncovered, it could be fixed by another employee to ensure process success regardless. So Ben is responsible for Task A and his performance is somehow “covered” by Ewa, who is responsible for Task B. She can double-check the performance of the previous task. If she uncovers a mistake, she can ask Ben, responsible for Task A, to solve the problem, or she can solve the problem herself directly. Due to the possibility of rectifying mistakes or repeating tasks within another step of the process, the perception of replaceability can arise; in a sense, it is irrelevant whether one person is doing the task or anyone else. Thus, we hypothesize:

Hypothesis 3b: Employees exhibiting an interdependent job construals perceive their job as less meaningful.

Since meaningfulness of work and job construals are determined by specific job-related factors, these factors have to be analyzed in more detail. Thus, in the following section, job-related factors are discussed as antecedents of meaningfulness of work and job construals.

2.5 Job-related factors as antecedents for meaningfulness of work and job construals

Process change is embedded in specific job-related factors, and these factors are antecedents of meaningfulness of work and job construals. The first group of job-related factors is related to the factors determining the job itself. They are conceptualized as job characteristics. In this paper, we focus on the core job characteristics described by Hackman and Oldham (1975). The second group of factors reflects the job environment of the process worker. Job environment includes interpersonal relationships between workers and their colleagues who are working in the same process, as well as the work-role fit, determining the alignment of the work role and the process worker’s self-concept. The detailed influence of these job-related factors is explained in the following sections.

2.5.1 Job characteristics

The most important influencing factors for meaningfulness of work are the five job characteristics (autonomy, feedback, skill variety, task identity, and task significance; (e.g., Hackman and Oldham 1975, 1976; Humphrey et al. 2007). According to Hackman and Oldham’s job characteristics theory (Hackman and Oldham 1975), these job characteristics have a positive impact on positive work outcomes (e.g., motivation or job satisfaction) and a negative impact on negative ones (e.g., turnover or absenteeism). This effect is mediated by three psychological states (i.e., experienced meaningfulness of work, experienced responsibility for outcomes of the work, and knowledge of the actual results of the work activities; (Hackman and Oldham 1976). The original job characteristics model has been modified and extended by various researchers (e.g., Humphrey et al. 2007) and it has been shown that meaningfulness of work is the strongest mediator (Humphrey et al. 2007). Since in the original theory by Hackman and Oldham (1975) only three job characteristics (skill variety, task identity, and task significance) influence meaningfulness of work, we also test only these three job characteristics. In line with these findings, we hypothesize a positive impact of job characteristics on meaningfulness of work:

Hypotheses 4: The characteristics of the current job increase the employees’ experienced meaningfulness of work.

2.5.2 Co-worker relations

The degree of job construals (i.e., employees' self-perception of the embeddedness of their tasks in the overall work) is highly influenced by the perception of interdependence with their colleagues' work. There is an innate drive to affiliate with others to achieve human survival and well-being (Baumeister and Leary 1995). Social connections provide many benefits: for instance, social support, access to important resources, and potential mates (Buss 1990). Given these benefits, it is not surprising that belonging to social groups is one of the most important basic human needs (Bernstein et al. 2010). To satisfy the drive for good interpersonal relationships, these relationships have to fulfill two criteria: the interactions have to be frequent and affectively pleasant, with a few other persons; and they have to take place in a stable and enduring context of affective concern for each other's welfare (Baumeister and Leary 1995). In the working context, social belonging refers to good relations with co-workers. Good co-worker relations have been shown to be supportive of perceived psychological safety (Hackman and Oldham 1975; Kahn 1990). This safety is derived from trust, which can be either cognitive or affective (McAllister 1995). Individuals who trust each other are interested in one another's welfare and are willing to deepen the relationship emotionally (Pennings and Woiceshyn 1987). Central aspects are the dignity, respect, and value which they receive from their co-workers in relation to their own work (Locke and Taylor 1990). Moreover, salient group membership in terms of a sense of belonging, sense of social identity, and meaning (Florian and Snowden 1989; May et al. 2004) can lead to perceived embeddedness.

Individuals exhibiting an interdependent self-construal strive for good relationships with group members or colleagues (Cross et al. 2000). To strengthen this connectedness to others and consequently the interdependent view, employees "tend to think and behave in ways that emphasize their connectedness to others and that strengthen existing relationships" (Cross et al. 2000, p. 791). As a consequence, a positive relation to others (i.e., in an organizational context to co-workers) will positively influence their view of the self and increase self-esteem (Cross et al. 2000). Consequently, their perceived embeddedness in the overall process is positively affected. In contrast, individuals exhibiting an independent self-construal strive to stand out or be better than their peer group (Blaine and Crocker 1993; Harter 1993; Tesser 1964) and thus often put less effort into maintaining good relations with their co-workers. Therefore, we hypothesize:

Hypothesis 5: *Employees having good co-worker relations exhibit an interdependent job construals.*

2.5.3 Work-role fit

Besides the relation to co-workers, the relation of employees to the role they perform in a company influences their perception of embeddedness.

In the organizational science literature, person–situation interactions resulting in fit and congruence have been discussed extensively (e.g., Chatman 1989; Judge and Ferris 1992; Pervin 1989; Schneider 1987) and are bundled under the umbrella of "person–environment fit" (Guan et al. 2011). Person–environment fit consists of various lower-level fit constructs (e.g., person–organization fit, person–job fit, or work-role fit) which have been shown to be distinct from each other (Chatman 1989). In this paper, we use the construct of work-role fit and follow Edwards (1991) and Kristof (1996), who define work-role fit (or person–job fit) as the "fit between the abilities of a person and the demands of a job (i.e., demands-abilities) or the desires of a person and the attributes of a job (needs-supplies)" (Kristof 1996, p. 8). In a job exhibiting a high work-role fit, the work roles are aligned with individuals' self-concept. Consequently, individuals are able to act according to their values and beliefs (Brief and Nord 1990; Edwards 1991; Shamir 1991) and to pursue their higher-order goals (Barrick and Mount 2013). So, the employees perceive that they have control over their goal fulfillment. Consequently, they feel responsible for their

tasks and outcomes (Hackman and Oldham 1975, 1976). Due to the responsibility experienced for their work, individuals feel highly connected to their tasks and perceive these as highly embedded in the overall process. Therefore, we assume that employees do not only feel responsible for their own tasks, but also perceive the connectivity to their colleagues' tasks and even become aware of their tasks' impact on the overall process. Consequently, individuals are not limited to their dedicated tasks to express their values and beliefs in performing their work role (Brief and Nord 1990; Edwards 1991; Shamir 1991), but have the opportunity to express and identify themselves within the overall process. Thus, we hypothesize:

Hypothesis 6: *Employees performing a job with a high work-role fit exhibit an interdependent job construals.*

The overall resulting research model is visualized in Figure 19.

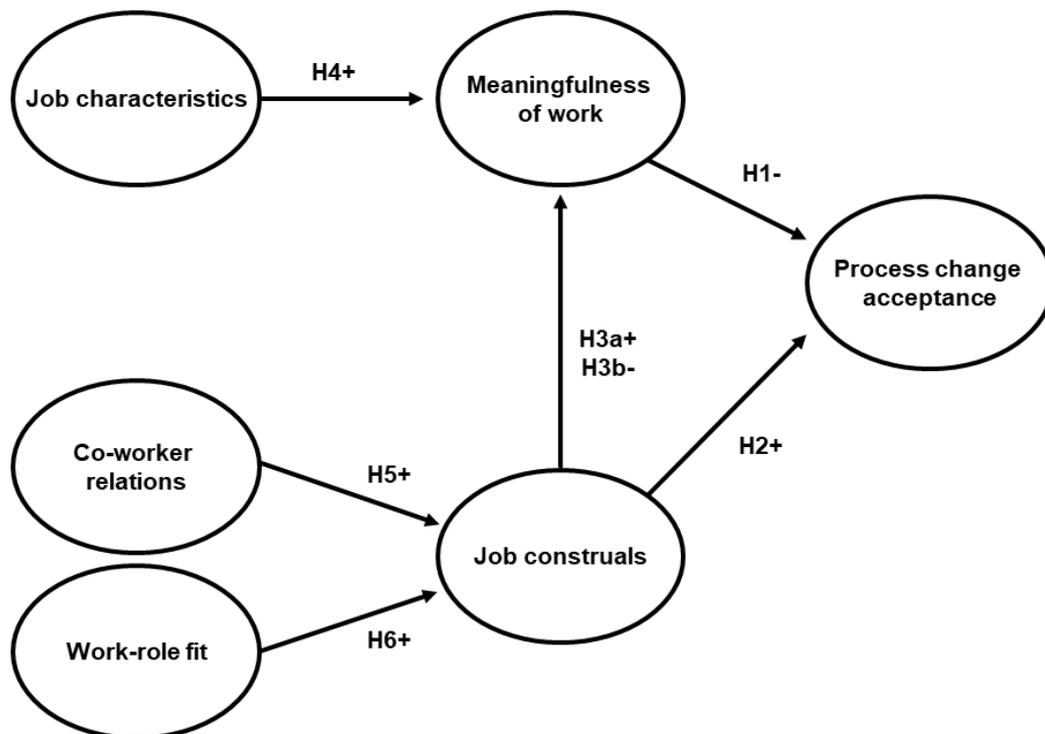


Figure 19. Research model

3. Method

In this section, we describe the data collection, research methodology, and survey instrument as well as the results of the model validation.

3.1 Data collection

To evaluate the proposed hypotheses, we collected data in a global service company in the aviation industry. Within that firm, we accompanied a process change project over one year and were able and allowed to collect data during that time. The initiative basically comprised changing the organization's process management governance structure. Here, newly designed processes give guidelines for managing processes and communicating with decision makers. Overall, 650 employees were affected by these new processes and the underlying governance structure in Germany alone. We invited all of them to participate in two rounds of online surveys, which took place from July to August 2015. Survey links were distributed via interoffice mail sent by the project management team. Participation in the survey was voluntary and anonymous, but we were able to match Time 1 and Time 2 surveys by having

employees use a unique code number. In the first survey round, we received 191 completed surveys, accounting for a response rate of 29.4%. The demographics are shown in Table 23.

Academic degree					
<i>No degree</i>		<i>Non-academic degree</i>		<i>Academic degree</i>	
0%		20.4%		79.6%	
Age					
<i>Younger than 25 years</i>		<i>25-40 years</i>		<i>41-55 years</i>	
0%		24.6%		61.8%	
				<i>Older than 55 years</i>	
				13.6%	
Sex					
<i>Male</i>			<i>Female</i>		
80.6%			19.4%		
Work area					
<i>Administration</i>			<i>Production</i>		
89.5%			10.5%		
Work experience in current company					
<i>< 1 year</i>	<i>2-5 years</i>	<i>6-10 years</i>	<i>11-20 years</i>	<i>21-30 years</i>	<i>> 30 years</i>
0%	6.3%	14.1%	30.4%	30.9%	18.3%

Table 23. Demographics

3.2 Measures

All the constructs in our research model (except for job construal) were surveyed by reflective multi-item measures adopted from the literature and measured on a five-point Likert scale with anchors from 1 (totally disagree) to 5 (totally agree). To capture co-worker relations, we used the measurement items from May et al. (2004) and Sims et al. (1976). Work-role fit and meaningfulness of work were measured by adapting items from May et al. (2004). For job characteristics, we applied items from Morgeson and Humphrey (2006). The measures for job construals were self-developed based on the constructs of self-construals and task interdependence. For the measurement development, we adapted multi-item measures from existing psychology and management research on self-construals and task interdependence (see Appendix) as well as phrasing new items. The newly developed items were also measured on a five-point Likert scale with anchors from 1 (totally disagree) to 5 (totally agree).²⁵ To measure process change acceptance, we used an adapted version of the items from Bovey and Hede (2001). All constructs and their scales are outlined in Table 27 in the Appendix. Finally, we used the demographic variables as controls.

3.3 Measurement validation

We used partial least squares (PLS) and applied the SmartPLS 3 software package (Ringle et al. 2015) to evaluate our research model. PLS was used since we apply a rather exploratory approach to understanding the influencing factors of employees' process change acceptance (Hair et al. 2017; Rigdon 2016).

For our measures, content validity, indicator reliability, construct reliability, and discriminant validity have to be checked (Bagozzi 1979). All of the measures employed have been shown to be robust in prior research, except for job construals as it is a newly developed construct. Nevertheless, to ensure content

²⁵ The instrument was pretested and pilot-tested in a nonprofit organization. In the pilot survey, we managed to question 39 employees, which provided proof of the robustness of the measures for job construals.

validity and suitability in our specific research domain, we discussed items of all constructs among the project team for the firm's process change initiative, and pretested them with four employees of the organization to avoid misunderstandings.

Indicator reliability was observed by checking that the loadings were above .7. Almost all loadings fulfill these conditions. Only IDE_1, IDE_2, and CWR-2 have slightly lower loadings (still significant at $p < .05$), but we chose to keep them in to have a broader measurement model.

Further, the average variance extracted (AVE) was higher than .5 for all constructs, and composite reliability was always higher than .7, as required by Fornell and Larcker (1981). To ensure discriminant validity, we used the Fornell–Larcker criterion, which compares the square root of the AVE values with the latent variable correlations (Fornell and Larcker 1981; Hulland 1999). Our measurement fulfills this requirement, as the square root of each construct's AVE is greater than its highest correlation with any other construct. In addition, the stricter heterotrait–monotrait (HTMT) ratio shows discriminant validity, as all HTMT values of our model are equal to or smaller than .9 (Gold et al. 2001; Henseler et al. 2015). The results are provided in Table 24 and Table 25.

		Cronbach's alpha	rho_A	Composite reliability	AVE
Antecedents	Skill variety	.890	.897	.932	.820
	Task identity	.775	1.930	.798	.579
	Task significance	.767	.799	.863	.678
	Co-worker relations	.480	.584	.781	.645
	Work-role fit	.858	.882	.912	.776
Media-tors	Job construals	.717	.728	.842	.641
	Meaningfulness of work	.877	.881	.915	.730
Dependent variable	Process change acceptance	.896	.897	.929	.765

Table 24. Measurement model validation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Skill variety	.905							
(2) Task identity	.255 (.330)	.761						
(3) Task significance	.334 (.392)	.179 (.177)	.824					
(4) Co-worker relations	.353 (.594)	.169 (.233)	.530 (.906)	.803				
(5) Work-role fit	.471 (.533)	.221 (.223)	.511 (.619)	.386 (.648)	.881			
(6) Job construals	.173 (.217)	-.022 (.154)	.225 (.329)	.266 (.430)	.218 (.269)	.801		
(7) Meaningfulness of work	.406 (.453)	.162 (.147)	.574 (.675)	.447 (.708)	.616 (.713)	.153 (.198)	.854	
(8) Process change acceptance	.060 (.068)	-.032 (.108)	.078 (.138)	.151 (.231)	.146 (.163)	.288 (.352)	.201 (.226)	.875

Table 25. Cross-correlations and square root of AVE and HTMT values (in parantheses)

3.4 Common method bias

As we used a survey-based single-informant approach to evaluate our research model, the results could be affected by common method bias (CMB). To address this issue we used several measures, including distributing two different versions of the questionnaire with altered item sequences. Although this measure does not reduce CMB, it provides insights into whether context or ordering of questions influences the answers. A group comparison between the different versions of the survey showed no significant differences.²⁶ We also tested the validity of our results for potential CMB by using the Harman single-factor test. This showed that no single component explains the majority of the overall variance (the largest component explained 28.08%). Additionally, a theoretically unrelated marker variable was used to operationalize a common method factor (Lindell and Whitney 2001; Podsakoff et al. 2003).²⁷ To test for the significance of CMB and to partial out its effect on the model paths, we added links from the common method factor to our dependent variable process orientation. Then, we observed whether changes appeared in the significance levels of the path weights and in the R^2 of the dependent variable. The comparison of the models with and without marker variables (see Table 28 in the Appendix) shows no indication for CMB that would affect our results.

Since our attempt to collect matched pairs for process change acceptance at two different points in time led to only 55 matched pairs,²⁸ we were not able to use the combined data set directly for model evaluation. However, the correlation between the latent scores for process change acceptance from the two surveys was very strong and statistically significant (Pearson $r=.72$, $p<.01$); that is, the scores from the first survey can be used as a proxy for the data from the second survey.²⁹ Collectively, all these tests suggest that CMB is not a serious problem in our model. Therefore, we used the data from the first survey ($n=191$) for our subsequent analyses.

4. Results

The results of testing the research model are provided in Figure 20. Our findings show that meaningfulness of work and job construals have a positive significant effect on process change acceptance (contradicting H1 and supporting H2), with the path of job construals to process change acceptance being significantly stronger than the path of meaningfulness to process change acceptance.³⁰ Job construals has no significant effect on meaningfulness of work (but it does show a slight negative effect, supporting H3b). Furthermore, two of the three job characteristics (skill variety and task significance) have a positive effect on meaningfulness of work (supporting H4), while task identity shows no significant effect. In addition, co-worker relations and work-role fit have a positive impact on job construals (supporting H5 and H6).³¹ Looking at the control variables and their impact on the

²⁶ We also ran the FIMIX-PLS procedure to check for unobserved heterogeneity (Becker et al. (2013); Hair et al. (2016a)). The results of this procedure showed no issues with unobserved heterogeneity.

²⁷ The marker variable was measured by the item "I am in a very good mood right now" using a five-point Likert scale with anchors from 1 (totally disagree) to 5 (totally agree).

²⁸ In the second survey round, again all 650 employees were invited, and 137 (21.1%) responded. In total, we gained 55 matched pairs.

²⁹ The same approach and argument were used in other PLS/SEM (structural equation modeling) studies at the individual level in top management journals (e.g., Tiwana and Konsynski (2010))

³⁰ Difference of path coefficients tested by t-test on a bootstrapping sample of 2000 bootstrap runs.

³¹ To check the robustness of our model, we also tested job characteristics as a second-order construct, as well as a model with all five core job characteristics from Job Characteristics Theory (i.e., adding autonomy and feedback). None of these models showed structurally different results. The SRMR, as a recently proposed (pseudo) goodness-of-fit index (Hair et al., 2017), also showed no substantial difference between the models. Consequently, we consider our model and the corresponding results as robust.

dependent variables, only age and gender have a weak significant effect on job construals and work experience has a weak significant effect on process change acceptance.

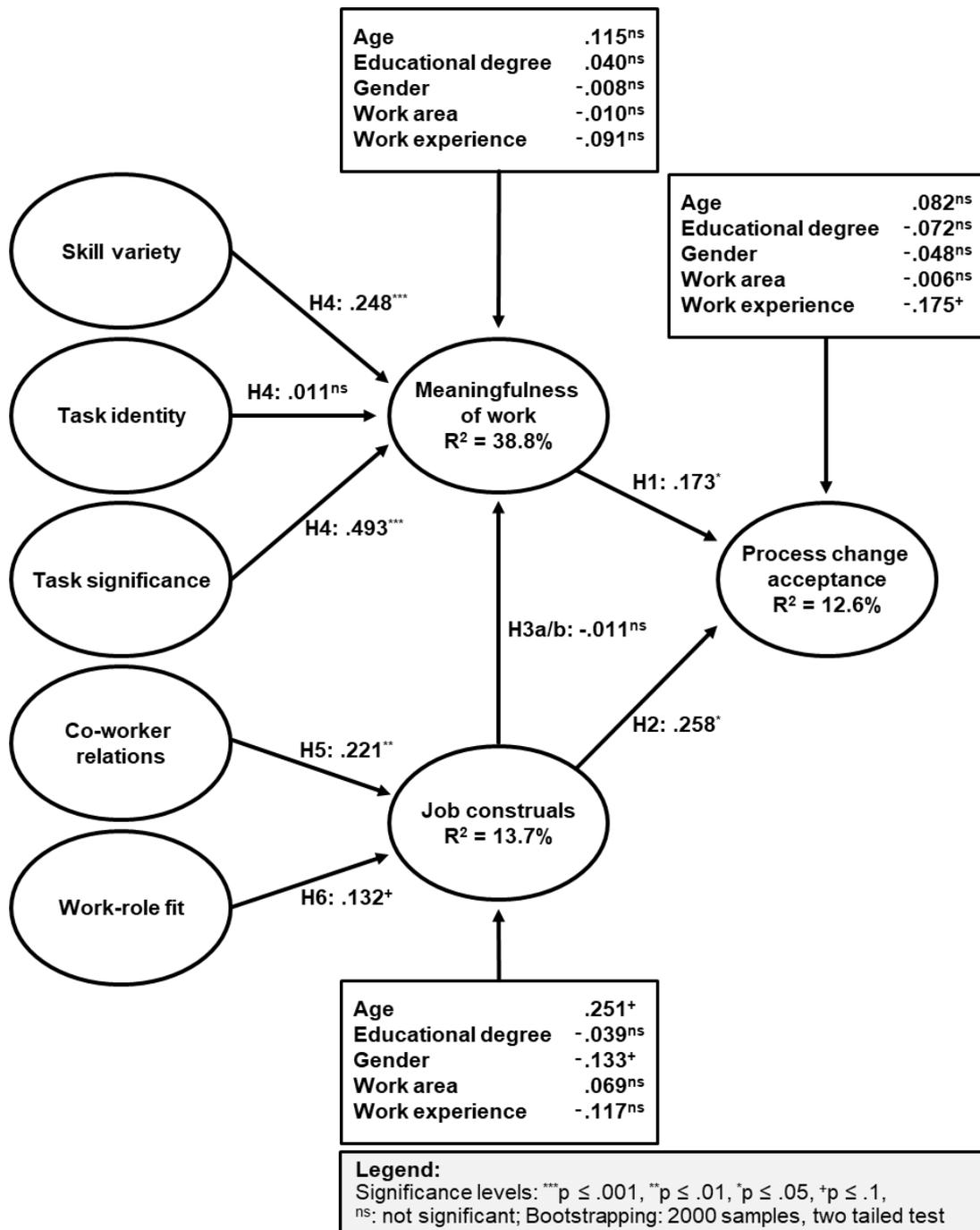


Figure 20. Results

4.1 Supplemental analyses

To obtain additional insights, we conducted several post-hoc analyses. First, we tested the model as a direct and a mediated model. In the direct model, the direct effect of all independent variables on the dependent variable was tested. In the mediated model, the direct effect of all independent variables plus their indirect effect (mediated by meaningfulness and job construals) was examined. None of these models led to structurally different results (see Table 26). The SRMR, a recently developed measure of fit for PLS-based model tests (Hair et al. 2017), also showed no substantial difference between the models (SRMR (original model): .063; SRMR (direct model): .067; SRMR (mediated model): .062).

		Job construals	Meaningfulness of work	Process change acceptance	
<i>Path coefficients</i>					
<i>Antecedents</i>	Skill variety	-	.253 (m) (p=.001)	.016 (d) (p=.861)	-.044 (m) (p=.563)
	Task identity	-	-.005 (m) (p=.954)	-.138 (d) (p=.235)	-.063 (m) (p=.507)
	Task significance	-	.493 (m) (p=.000)	.068 (d) (p=.596)	-.105 (m) (p=.315)
	Co-worker relations	.220 (m) (p=.003)	-	.090 (d) (p=.262)	.067 (m) (p=.457)
	Work-role fit	.129 (m) (p=.068)	-	.121 (d) (p=.155)	.055 (m) (p=.534)
<i>Mediators</i>	Job construals	-	-.013 (m) (p=.852)		.252 (m) (p=.025)
	Meaningfulness of work	-	-		.194 (m) (p=.060)
<i>Controls</i>	Age	.253 (m) (p=.009)	.115 (m) (p=.146)	.159 (d) (p=.103)	.080 (m) (p=.389)
	Educational degree	.038 (m) (p=.665)	-.040 (m) (p=.605)	-.096 (d) (p=.305)	-.073 (m) (p=.440)
	Sex	-.133 (m) (p=.048)	-.009 (m) (p=.889)	-.085 (d) (p=.176)	-.057 (m) (p=.372)
	Work area	.071 (m) (p=.331)	-.012 (m) (p=.858)	.005 (d) (p=.937)	-.006 (m) (p=.916)
	Work experience	-.118 (m) (p=.307)	-.091 (m) (p=.304)	-.212 (d) (p=.070)	-.148 (m) (p=.157)
<i>R²</i>					
<i>Job construals</i>		.136 (m)			
<i>Meaningfulness of work</i>			.386 (m)		
<i>Process change acceptance</i>				.084 (d)	.139 (m)

Table 26. Path coefficients post-hoc analyses (direct (d) and mediated (m) model); two-tailed test

We also conducted a moderation test to check whether there is a moderation effect of meaningfulness of work and job construals. The test showed only a very slight nonsignificant effect (path coefficient: .164; T statistics: .765; p value: .444; f^2 of the interaction term: .031).

5. Discussion

The aim of this paper has been to examine the impact of meaningfulness of work and job construals on business process change acceptance. Unexpectedly, we found that meaningfulness of work has a positive effect on process change, which is contrary to our hypothesis. We hypothesized that process change is perceived as a discordant work situation and, as such, would be in conflict with high meaningfulness. Instead, our results show a positive effect. We assume that this stems from two factors: the nature of the changed processes and communication of the change. The observed process change comprised changing the process management governance structure. Consequently, only employees who perform a governance role (i.e., a process management role) and who are highly skilled were affected. Due to their various skills, they were able to execute several tasks (even new or altered tasks), which made them more confident regarding process change. Consequently, the process change was

not perceived as threatening, because the employees could trust themselves and in their skills to handle the new requirements. Due to their various skills, they were still able to pursue the higher-order goal of, for instance, striving for achievement, and thus meaningfulness of work could still be perceived. In addition, the communication of the change took place in a very comprehensive manner (i.e., it was carried out in a visible and controlled way). Employees were informed via email, by their superiors, and in individual information sessions. So employees knew what to expect and their fears could be addressed at an early stage. For instance, worries about loss of power could be diminished—earlier studies have found such measures to be effective when managing change (Jurisch et al. 2014).

Regarding job construals, the results of our study show a positive significant effect on employees' process change acceptance. Due to the perceived interlocking of their own with colleagues' tasks, individuals are more likely to put the larger process optimum (i.e., process change) over their own task goals. In other words, individuals who perceive themselves and their jobs as highly embedded are more willing to break their existing routines and accept process changes. Looking at the single effects, job construals has a greater impact on process change acceptance than meaningfulness of work. This result can be explained by drawing on earlier research on learning in the context of process orientation (e.g., Kettenbohrer et al. 2016b). As noted earlier, job construals refers to individuals perceiving that their tasks are embedded in the surrounding process. In other words, individuals see and perceive that an overall process consisting of highly interdependent tasks is needed to produce a product or service. Furthermore, they perceive that their individual tasks are an important part of the overall process, and judge those tasks in relation to the corresponding overarching process. To ensure a process-oriented judgment, different training and learning modes could be applied. For instance, the best way to learn process orientation is by combining learning-by-doing and personal exchange (as in role plays, for instance). This combination is superior to using solely documented knowledge (Leyer et al. 2015; Leyer and Wollersheim 2013; Wollersheim et al. 2016). Picking up these arguments, Kettenbohrer et al. (2016b) show that using such a system, which combines learning-by-doing and personal exchange, has a positive effect on employees' process orientation. This effect is mediated by job construals.

The interplay between meaningfulness of work and job construals has been shown to be nonexistent;³² that is, the perception of being embedded with their own tasks in an overall process has no impact on the meaningfulness of work. Job construals has a positive impact on process change acceptance, because employees see and perceive the impact of their own actions on the overall process and end product, but this does not affect the perceived meaningfulness of their work. We assume that this nonexistent effect is based on the industry of the company being examined. Most of the employees have an engineering background, which requires more analytical than social skills. Thus, we assume that these employees focus more on the characteristics of their job, experiencing meaningfulness when these characteristics can be fully realized and simultaneously their higher-order goals can be fulfilled, while social aspects (i.e., job construals) play a minor role in the experience of meaningfulness.

As expected, the three job characteristics of skill variety, task identity, and task significance have a positive effect on meaningfulness of work. We assume that the nonsignificant effect of task identity is related to the industry in which the study was conducted. As the company examined is in the aviation industry, employees seem to experience meaningfulness of work from the opportunity to use different skills and see the influence on colleagues' work as well as on the end product, rather than from the possibility of finishing a complete product on their own.

³² We also checked the null correlation between the two constructs meaningfulness of work and job construal regarding nonlinear relationships, but we did not find any relationship at all.

In addition, co-worker relations and work-role fit have a positive significant effect on job construals. This shows that employees who have good interpersonal relationships perceive their tasks as more embedded in an overall process. A high fit between individual workers' self-concept and their work role also increases this perception, because they have the opportunity to pursue their higher-order goals.

Looking at the control variables, work experience in the current company has a negative impact on business process change acceptance. The findings of our study indicate that employees working in the same company for a long time are less likely to accept process changes. We assume that employees who have been with their company for a long time often have worked in the same, stable setting and/or process over that period, so they have established strong working routines and habits that they are unwilling to break. Consequently, the resulting inertia leads to resistance to process changes (Polites and Karahanna 2012, 2013).

5.1 Limitations

The survey for our study was conducted during a firm-wide process change initiative by the organization being investigated. At the time of the data collection, there were various implementation states of the new, standardized process at different sites in the company. As a limitation, we need to mention that the data collection took place in one organization only (with the measurement of the dependent variable being validated by a second survey round with a subset of the original respondents). That the data set came from one company reduces the generalizability and transferability of the results. However, we believe that the company examined is an object well suited to analysis, because since it is already highly process oriented and, due to strong regulatory requirements (from national and international aviation authorities), it is constantly facing process changes. In addition, in this firm we had the opportunity to survey employees working in administration units, but also in production units, and we could thus test our results for differences regarding work area (i.e., white-collar work vs. blue-collar work), which increases the generalizability of our findings.

For our study we used self-evaluation data, which is prone to subjectivity and CMB. To check whether our results are potentially affected by Type I errors due to CMB, we conducted several measures (i.e., distributing two different versions of the questionnaire, applying the Harman single-factor test, and using a marker variable). Alternative objective data (e.g., via protocols) could not be used, because the organization under observation does not utilize a standardized system that would allow for sufficient anonymization of workers' task reports. In addition, the organization's workers' council did not allow us to use any documents that could potentially permit the identification of single employees and their performance.

As the aim of this research is to examine the impact of meaningfulness of work and job construals on process change acceptance, other factors (e.g., work culture) are not considered, which explains the rather low R^2 s. To examine the effect of various other factors, a follow-up study could give more insights.

5.2 Implications for research

Our findings provide important implications for research by highlighting that successful business process change does not only depend on good process management practices (e.g., training), but also requires focusing on employees' psyches (i.e., taking employees' attitudes, concerns, and motivational factors into account). First, our results highlight the impact of meaningfulness of employees' work as well as the impact of job construals on process change acceptance. Although much has been written about critical success factors for process change (e.g., Kettinger et al. 1997; Kettinger and Grover 1995; Trkman 2010) and about required capabilities (e.g., Jurisch et al. 2014), the literature is surprisingly silent regarding the individuals performing single tasks in a process (Kettenbohrer 2016). Our work puts the

focus on the employees and explains which factors (besides change management or process management techniques) are highly relevant to successfully conducting BPC projects.

In addition, we found that employees' process change acceptance is not mainly influenced by meaningfulness of work, but by job construals. In this paper, we developed and introduced this construct, which highlights the importance of employees' perception of their task's embeddedness in an overall process. During the model development and the empirical study, the theoretical foundation and a measurement scale for job construals were developed—since our study has shown job construals to be an important driver of process change acceptance, the conceptualization and operationalization of this construct form a major scientific contribution.

Our newly developed construct of job construals is promising for further research, because it combines and enhances several research fields, such as psychology, organizational management, and business process management (BPM). We transferred the two constructs of self-construals (Markus & Kitayama, 1991; Shweder & Bourne, 1984; Triandis, 1989) and task interdependence (Kiggundu, 1981; Kiggundu, 1983) into the context of process change; thus, we were able to develop a new construct, which stresses the importance of employees' perception of their task embeddedness for process change acceptance.

5.3 Implications for practice

Our findings also provide insights for practitioners. If employees perceive a high degree of meaning in their daily work as well as high embeddedness in an overall process will they be willing to accept process changes. Managers need to consider these facts when introducing process change projects. To increase the meaningfulness of work, it is important to focus especially on skill variety and task significance. In other words, employees should have the opportunity to use their different skills, and the importance of their daily work (for the whole organization, in the end product, and for colleagues) should be highlighted. To do so, organizations could offer, for instance, job rotation or role-plays, so that employees have the chance to perform other tasks in the process and thereby use some of their (maybe less-used) skills. Job rotation or role-plays offer many benefits for the employees involved: first, they have the chance to get to know the overall process and its corresponding tasks better; second, they could develop and use other skills than their own; and third, they get an impression of their tasks' significance for the overall process.

Regarding job construals, knowing the impact of co-worker relations and work-role fit can help managers to derive the right actions to increase acceptance. For instance, before assigning a role to a certain employee, the fit between the individual's self-concept and the tasks being executed within the role should be considered.

In addition, our results highlight the importance of the nature of the changed processes, but also the communication of the change, for achieving process change acceptance by employees. In the organization analyzed, only employees with varied skills were affected by the change. Due to their diverse skills and also the comprehensive communication, they were confident in being able to manage the change and thus showed high self-efficacy. To increase process change acceptance by employees, organizations should first focus on extensive and adequate training by using and combining different learning modes to achieve the best effect. Secondly, a high degree of attention should be paid to the communication about the change. Every affected employee has to get all the relevant information at an early stage so that fears and worries can be diminished.

6. Conclusion

In this paper, we examined the impact of meaningfulness of work and job construals on process change acceptance. Our research shows that job construals and—contradictory to our theoretical argument—also meaningfulness of work have a significantly positive effect on process change acceptance. Our findings contribute to research on BPC and change management, because they shift the focus from technological aspects or aspects regarding the nature of the change toward the human aspects of process change. The results could be used for further research regarding drivers of employees' willingness to change a process. For instance, it could be promising to examine the impact of different types of training on the relationship between work-role fit and process change acceptance. Due to dedicated training and consequently a higher work-role fit, perceived embeddedness in the overall process as well as perceived meaningfulness of work could be increased. Similarly, it would be worth analyzing the effect of different social activities (e.g., team events or role-plays) on the relationship between co-worker relations and process change acceptance. For instance, dedicated events could increase the perceived embeddedness of employees' tasks because individuals will get to know each other but also their different tasks better. By knowing the relevant drivers for employees' process change acceptance, organizations can derive adequate adjustment mechanisms and successfully perform BPC.

Appendix

	Construct	Item ID	Loadings	Mean	SD	Item	Source
Antecedents	<i>Skill variety</i> (5-point-Likert scale)	SKI_1	.904	4.41	.726	The job requires me to utilize a variety of different skills in order to complete the work.	Morgeson and Humphrey (2006)
		SKI_2	.919	4.36	.689	The job requires a variety of skills.	
		SKI_3	.892	4.34	.720	The job requires me to utilize a variety of different skills in order to complete the work.	
	<i>Task identity</i> (5-point-Likert scale)	IDE_1	.632	3.58	1.053	The job provides me the chance to completely finish the pieces of work I begin.	Morgeson and Humphrey (2006)
		IDE_2	.636	3.80	.860	The job allows me to complete work I start.	
		IDE_3	.966	3.75	.972	The results of my work are clearly visible.	Sims et al. (1976)
	<i>Task significance</i> (5-point-Likert scale)	SIG_1	.832	4.55	.612	The results of my work are likely to significantly affect the work of other people.	Morgeson and Humphrey (2006)
		SIG_2	.866	4.10	.758	The job itself is very significant and important in the broader scheme of things.	
		SIG_3	.770	4.31	.706	The work performed on the job has a significant impact on people inside the organization.	
	<i>Co-worker relations</i> (5p Likert)	CWR-1	.912	4.57	.628	My interactions with my co-workers are rewarding.	May et al. (2004)
		CWR-2	.678	4.20	.651	My co-workers value my input.	
	<i>Work-role fit</i> (5-point-Likert scale)	WRF-1	.863	4.25	.731	My job 'fits' how I see myself.	May et al. (2004)
		WRF-2	.898	3.85	.942	The work I do on this job helps me satisfy who I am.	

		WRF-3	.882	3.90	.927	My job 'fits' how I see myself.	
Mediators	Job construals (5-point-Likert scale)	JOC-1	.822	3.84	1.060	It is also part of my job to know the tasks of my colleagues.	Cross et al. (2000)
		JOC-2	.853	3.92	1.005	I need to communicate with my colleagues to carry out my work.	Billings et al. (1977)
		JOC-3	.720	3.75	1.030	My task is a step in a longer process chain, a small step to fulfill a bigger task (to work on the assembly line).	Kettenbohrer et al. (2015b)
	Meaningfulness of work (5-point-Likert scale)	MEA-1	.887	4.01	.918	My job activities are personally meaningful to me.	May et al. (2004)
		MEA-2	.848	3.99	.918	The work I do on this job is worthwhile.	
		MEA-3	.848	3.86	.927	My job activities are significant to me.	
		MEA-4	.833	4.16	.758	The work I do on this job is meaningful to me.	
Dependent variable	Process change acceptance (semantic scale)	PCA-1	.790	3.96	1.088	I would/wouldn't welcome a standardized process.	Bovey and Hede (2001)
		PCA-2	.928	4.41	.822	I would/wouldn't support a standardized process.	
		PCA-3	.914	4.45	.831	I would/wouldn't accept a standardized process.	
		PCA-4	.861	4.45	.844	I would/wouldn't give in to a standardized process.	

Table 27. Measurement model

	Path	β without marker variable	β with marker variable	Changes in level of significance
<i>Path coefficients</i>				
Antecedents	Skill variety → meaningfulness of work	.248 (p=.001)	.250 (p=.001)	No change
	Task identity → meaningfulness of work	.011 (p=.885)	-.006 (p=.936)	No change
	Task significance → meaningfulness of work	.493 (p=.000)	.497 (p=.000)	No change
	Co-worker relations → job construals	.211 (p=.002)	.222 (p=.003)	No change
	Work-role fit → job construals	.132 (p=.059)	.126 (p=.094)	No change
Mediators	Job construals → meaningfulness of work	-.011 (p=.872)	-.014 (p=.828)	No change
	Job construals → process change acceptance	.258 (p=.015)	.258 (p=.015)	No change
	Meaningfulness of work → process change acceptance	.173 (p=.038)	.173 (p=.038)	No change
Controls	Age → job construals	.251 (p=.007)	.253 (p=.010)	Change from p<.1 to p<.01
	Age → meaningfulness of work	.115	.122	No change

		(p=.150)	(p=.123)	
	Age → process change acceptance	.082 (p=.384)	.081 (.387)	No change
	Educational degree → job construals	-.039 (p=.641)	.038 (p=.684)	No change
	Educational degree → meaningfulness of work	.040 (p=.621)	-.043 (p=.586)	No change
	Educational degree → process change acceptance	-.072 (p=.453)	-.072 (p=.466)	No change
	Sex → job construals	-.133 (p=.050)	-.132 (p=.050)	No change
	Sex → meaningfulness of work	-.008 (p=.901)	-.010 (p=.881)	No change
	Sex → process change acceptance	-.048 (p=.438)	-.048 (p=.450)	No change
	Work area → job construals	.089 (p=.341)	.070 (p=.328)	No change
	Work area → meaningfulness of work	-.010 (p=.875)	-.012 (p=.857)	No change
	Work area → process change acceptance	-.006 (p=.909)	-.006 (p=.908)	No change
	Work experience → job construals	-.117 (p=.274)	-.117 (p=.302)	No change
	Work experience → meaningfulness of work	-.091 (p=.298)	-.094 (p=.286)	No change
	Work experience → process change acceptance	-.175 (p=.091)	-.175 (p=.091)	No change
<i>R</i> ²				
	Job construals	13.7%	13.6 %	-
	Meaningfulness of work	38.8%	39.0 %	-
	Process change acceptance	12.6%	12.6 %	-
Two-Tailed Test				

Table 28. Path coefficients and changes in levels of significances by adding a marker variable

Operationalization of the job construals construct

In the following, we describe the development of the measure for job construals. Following Moore and Benbasat (1991), items were designed by adapting established measures for self-construals and task interdependence. In addition, we added self-developed items. The literature-based items were rephrased depending on their origin: items originally measuring self-construals were changed from self-perception to job perception; items originally measuring task interdependence were changed from an objective view to an individual perceptual view.

Item	Original construct	Original item	Reference	Rephrased item
JC1	Self-construal	When I think of myself, I often think of my close friends or family also.	Cross et al. (2000)	It is also part of my job to know the tasks of my colleagues.
JC2		To what extent does the individual depend on his/her colleagues for doing his/her job?	Jenkins et al. (1975)	My task within the process highly depends on tasks of other colleagues.

JC3	<i>Task interdependence</i>	I have to talk to other workers to get my job done.	Billings et al. (1977)	I need to communicate with my colleagues to carry out my work.
JC4		I must wait for someone to finish their job before I can do my job.		I need to wait until others have finished their task so that I can start with my work.
JC5	<i>Self-developed items</i>			My job is of great importance for my company/organization.
JC6				My task is a step in a longer process chain, a small step to fulfill a bigger task (to work on the assembly line).
JC7				Tasks of others directly depend on mine.
JC8				Work activities highly depend on the work of other people.
JC9				The completion of my work depends on the work of many other people.
JC10				The successful fulfillment of my task highly depends on intensive consultation with my colleagues.
JC11				If others do not finish their job, I cannot get my job done.

Table 29. Adaptation and assignment of items

The appropriateness of the measurement scales was then discussed and evaluated with 17 BPM experts from the industry. To evaluate the content validity of the derived items, we applied a card-sorting procedure. Here, experts needed to assign the items to the new construct of job construals. In the first round, we discussed each item (out of 58 items) with six BPM experts.

Furthermore, we discussed the construct definition with the experts so that they got the opportunity to report on poor wording or potential misunderstandings. To guarantee the construct validity of the potential items and to identify poorly worded or ambiguous terms, we asked the experts to sort the items to three different construct categories (job construal, autonomy, and “others”). To check for “discriminant” content validity, in the card-sorting procedure the 58 items included 4 items for measuring “autonomy” (Morgeson and Humphrey 2006), a construct that is strongly related to task independence.³³ All six experts sorted these four items to the category “autonomy,” which indicates high content-wise discrimination between the two constructs. We also added the category “others” to provide a kind of container category for all items that the experts deemed to be suitable neither for job construals nor for autonomy. As a result of the first round, 11 out of the 58 items showed high substantive validity. Moreover, we checked whether there were unclear or poorly formulated items. In such cases, we reworded the items according to the participants’ answers and started Round 2.

In the second round, we repeated the sorting task: we asked 11 other BPM experts to sort the 58 items into the three constructs (job construal, autonomy, and others). To ensure comprehensibility, the experts categorized the items and also reported on problems with wording of the single items. Here, 7 out of 58 items were chosen. To predict the measure’s performance, we used a pretest assessment of its substantive validities, proposed by Anderson and Gerbing (1991). A measure’s substantive validity is a major prerequisite for construct validity. In addition, the small-sample nature of substantive validity assessments is appropriate for pretests. To assess substantive validity, card sorting is necessary. As

³³ In the job characteristics model by Hackman and Oldham (1976), autonomy is defined as “the degree to which the [design of the] job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out” Hackman and Oldham (1976).

described earlier, the experts sorted the single items to the constructs they thought the item fitted the best. To analyze the experts' assignments, Anderson and Gerbing (1991) propose two indices: proportion of substantive agreement (P_{SA}) and substantive validity coefficient (C_{SV}). The proportion of substantive agreement is defined as "the extent to which an item reflects its intended construct. [But it] does not indicate the extent to which an item might also be tapping other, unintended constructs" (Anderson and Gerbing 1991, p. 734). Therefore, the substantive validity coefficient is applied. The C_{SV} index "reflects the extent to which respondents assign an item to its posited construct more than to any other construct" (Anderson and Gerbing 1991, p. 734). The values for P_{SA} range from .0 to 1.0 and for C_{SV} from -1.0 to 1.0. A higher value indicates a greater substantive validity for both indices, with .5 being the recommended threshold for sufficient substantive validity (Anderson and Gerbing 1991).

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Paper VI

Leading 20,000+ employees with a process-oriented management system

Insights into process management at
Lufthansa Technik Group

Mirko Kloppenburg
Janina Kettenbohrer
Daniel Beimborn
Michael Bögle

In: vom Brocke J., Mendling J. (eds) Business Process Management
Cases. Management for Professionals. Springer, Cham, 2018
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Best Industry Paper

<https://www.springerprofessional.de/leading-20-000-employees-with-a-process-oriented-management-syst/14210046>

Paper VII

Examining the impact of business process management system use on employees' process orientation

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(ICIS), Dublin, Ireland, 2016

<https://aisel.aisnet.org/icis2016/ISDesign/Presentations/6/>

Paper VIII

How to provoke individuals' contributions to process innovation

The role of process management
systems

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How to provoke individuals' contributions to process innovation – The role of process management systems

1. Introduction

Process innovation – defined as the creation of new processes or the substantial transformation of existing processes (Peng et al. 2008) – has become essential for the competitive and financial performance of a firm (Piening and Salge 2015). Delivering products and services efficiently to customers in terms of time, cost and quality requires a constant adaption to new technologies and customer requirements (Tang et al. 2013). However, many companies struggle with establishing a holistic process innovation approach, involving all their employees, who are (intended to be) the main resource for generating, championing and implementing process innovation ideas (Anderson et al. 2014). Such individual innovation behavior with regard to processes is routed in the concept of innovative work behavior, which is an employees' behavior aiming to achieve the development and planned introduction of new ideas concerning products, services and processes to realize benefit for the organization (Farr and Ford 1990). As such it is distinct to concepts like Business Process Reengineering, which is a top-down approach with a project-based focus beyond a single process (Hammer and Champy 1993). Since process innovation is more of an ongoing nature it is closer to the continuous improvement of processes (including concepts like Lean Management) but also distinct from it, as process improvement is associated with capturing the enhancement of existing processes to eliminate sources of imperfection, i.e., incremental changes (Yang et al. 2015). Compared to such improvements, process innovation is associated with the design and implementation of new processes, changing a process radically or introducing a completely new technology/system in a process for the first time within an organization.

Academic research has, in the past, predominantly researched product innovation and left success factors for process innovation being too little understood (Keupp et al. 2012). In our study, we analyze how software applications can help getting people engaged in process innovation. In many organizations, so-called BPM systems (BPMS) are in place to support activities of business process management (BPM) such as process modeling & documentation, process simulation, or workflow management. The question is whether employees who are using these systems on a regular basis will be stimulated to develop individual process innovation behavior? And, if yes, what are the mechanisms of this effect?

While, over the last two decades, the IS literature has provided substantial evidence for the important role of IT systems for organizations' innovation capabilities (e.g., Ahuja and Chan 2014; Alavi and Leidner 2001; Sabherwal and Sabherwal 2005; Tanriverdi 2005), research in IS and in innovation management remains relatively silent on drivers of process innovation at the individual level and on the value contribution of user-oriented information systems. The individual level is however important to be analyzed since it is the users who, by their usage, create value out of those systems and thus contribute to an organization's success (Bala et al. 2017).

Hence, we want to provide empirical evidence for this assumption and aim at answering the following research question:

Does and – if yes – how does a BPM system contribute to employees' process innovation behavior?

Applying the four-factor theory (FFT) of team climate for innovation (West 1990; West and Anderson 1996) and using data from a survey among German banks, we show that employees who make regular use of a BPM system exhibit a stronger process-oriented attitude and thus contribute more to process innovation.

Thus, we contribute to the IS literature in understanding both drivers for individual process innovation behavior and the value contribution of knowledge-based IT systems for process innovation.

The remainder of the paper is organized as follows: First, we provide an overview of related literature in IS covering how IT contributes to value creation in general and to process innovation in particular. Second, we develop our research model including the hypotheses of interest based on FFT. Third, we describe our research method containing the measures deduced from the hypotheses. Fourth, we present our results. Finally, we conclude our paper with a discussion containing theoretical as well as practical implications, limitations and an outlook to future work.

2. Related research

Research on how IT contributes to the performance of a firm, i.e. IT business value (ITBV) research, is one of the oldest, broadest, and most fundamental streams in the IS research field; showing that IT and IS provide value is instrumental for both IS researchers and CIOs/IT managers in order to justify their 'existence'. While early ITBV research had looked at the relationship among IT investments and economic firm performance (Melville et al. 2004), later studies introduced a richer variety of variables on both the IT and the value side of the hypothesis (and many mediators in-between). However, since the tradition of those studies had been strongly in the IS economics discipline, studies still applied usually 'hard', often monetary, measures as dependent variable. In early years, this contributed to the IT productivity paradox (since not all IT investments are dedicated to increasing (short-term) operational productivity, efficiency, and profitability measures) (Brynjolfsson 1993) and was later criticized by Kohli and Grover (2008), who called for a complementary inclusion of more "indirect and intangible" (p. 33) performance dimensions.

Recently, some of the studies responding to this call have introduced innovation performance as ITBV dimension; Joshi et al. (2010) found a relationship between introductions of certain software applications and new product announcements; Kleis et al. (2012) found IT investments to be related to innovation output; Chatterjee et al. (2015) and Wang et al. (2012) showed that IT capabilities and IT affordances lead to higher innovation performance; and Moos et al. (2013) showed that the firm-wide usage of knowledge management systems (KMS) contributes to the firm's absorptive capacity and thus increases innovation performance. However, those studies looked at the relationship between IT and 'traditional', i.e., product and service, innovations. Although research on the general role of IT for process innovation has some tradition and can be rooted back to Davenport's (1993) seminal framework, distinguishing the role of IT as enabler vs. implementer of process orientation, an analysis of the literature based on this framework, showed that only very few works have addressed questions regarding the role of BPMS for process innovation (only 5 out of 126 journal articles analyzed; (Müller et al. 2012)). Moreover, while one of those five papers was just a research commentary (Basu and Kumar 2002), the other works were mainly design oriented (Krishnamurthy and Rosenblum 1995; Kwakh and Kim 1999) and always focused on tools explicitly designed for and used during process change projects (Im et al. 1999; Kwakh and Kim 1999; Sarker and Lee 2006) (often called "BPR tools"; Im et al. 1999) rather than on BPMS systems permanently in use³⁴.

Moreover, while most ITBV studies were done at the firm level, a closer look at the individual level is worthwhile to get deeper insights into the mechanics that create the ultimate (economic) IT business value (Schryen 2013). Particularly, the use of specific IT systems, such as KMS or BPMS, by individuals

³⁴ Both replicating Müller et al.'s search strategy for the years 2012 to 2017 and doing a forward search starting from the 5 mentioned articles did not lead us to other studies on the role of BPMS for process innovation.

may contribute to the creation and advancement of organizational capabilities, e.g., better decision making or innovation capabilities, that will have an intermediate, often long-term, effect on the organization's performance (Kohli and Grover 2008; Schryen 2013). However, only a few researchers have empirically included internal capabilities in their empirical studies (Schryen 2013). One example is the study of Bala et al. (2017), which highlights the role of exploitation and exploration ability of employees on IT-enabled collaboration capacity. While we are not aware of any study that analyzed the impact of individual usage of BPMS, there are various studies available at the interrelated, or overarching, domain of KMS, which usually analyze the effect of system usage on job performance. For example, Zhang and Venkatesh (2017) analyzed how the usage of different features of a KMS (such as post, search, or make comments) contributes to users' job performance. Similarly, studies observed the impact of KMS usage on sales agents' performance (Ko and Dennis 2011), customer service performance (Kankanhalli et al. 2011), or on decision-making performance (McCall et al. 2008).

Overall, we can conclude that our study taps into a very under-researched field, being among the first analyzing the impact of the usage of an IT system on process innovation³⁵ and analyzing the impact of a system other than KMS on individual performance.

3. Model development

Our research model proposes that employees' usage of BPM systems (i.e., the independent variable) drives their individual process orientation (i.e., the mediator) and thus facilitates the creation and implementation of innovative ideas on how to redesign or improve 'their' business processes (i.e., the dependent variable). Accordingly, our research investigates individual-level phenomena within an organizational context. We thereby restrict the scope, or unit, of our analysis to individual process orientation and individual process innovation contributions, i.e., we do not take process orientation at the organizational level or organizational process innovation outcomes into account. The model will be derived based on the Four-Factor Theory, which will be introduced first before we start with the actual development of our model.

3.1 Theoretical foundation: Four-factor theory

As theoretical foundation for our research, we use the Four-Factor Theory (FFT) (West 1990; West and Anderson 1996). This theory states that four major climate factors – vision, participative safety, task orientation, and support for innovation – are predictors of the innovativeness of individual employees.

Vision refers to “an idea of a valued outcome which represents a higher order goal and a motivating force at work” (West 1990, p. 310). Employees, e.g. members in teams or colleagues working in the same business process, need to share a clear and common vision on how to innovate a process; this does also require the definition of reachable goals to motivate and incentivize them (Anderson and West 1998).

Participative safety reflects an environment in the workplace that employees perceive as non-threatening, i.e. employees feel safe to bring in their ideas and actions without negative consequences (West 1990). Such a non-threatening environment can be created by assuring that employees make suggestions without having the fear of negative personal consequences from colleagues disliking the idea or when problems occur due to implementing an innovation as well as being afraid of losing their job when having an idea to automate their process. If people feel safe in such regards, they are more likely to

³⁵ With process innovation being one possible answer to Kohli and Grover's (2008) call for “better models to enhance our understanding of the various positive manifestations of IT because lacking that understanding so often results in underreported economic benefits” (p. 33).

offer ideas for new and improved ways of working and support their implementation (Anderson and West 1998).

Task orientation refers to the emphasis of employees on achieving a high task execution efficiency in terms of time, cost, and quality, which is aligned with the overall vision (West 1990). Employees with high task orientation permanently observe the performance of tasks and search for root causes to increase performance. In doing so, they critically reflect possibilities for modifications including the tasks and applied work methods (Tjosvold 1982).

Support for innovation refers to “the expectation, approval and practical support of attempts to introduce new and improved ways of doing things in the work environment” (West 1990, p. 38). Its extent can vary across teams, but it has to be articulated, enacted, and active. Articulated support could be provided by documents containing instructions for innovation methods, policy statements, or word of mouth. Enacted support, i.e., the provision of resources such as additional personnel, is supposed to be a necessary precondition for group innovation. But then, real innovation behavior is stated to be best supported by active support, i.e., personal and innovation-related actions from the top management (Anderson and West 1998).

In the following, we will use the FFT for deriving our research model.

3.2 The dependent variable: Individual process innovation behavior

The contributions of individuals are important for innovating processes as knowledge regarding process changes has to be created, distributed and executed by individual employees working in these processes (Pavlou and El Sawy 2011).

Such contributions to process innovation exhibited by individual employees – individual process innovation behavior – serve as the ultimate outcome variable of our model. Performing a business process in a way that it is effective, efficient, and leading to customers (as recipients of the process outcome) being satisfied, represents a competitive advantage for companies (Jones and Linderman 2014). However, due to changing customer expectations and new technological options, there is an increasing pressure to not only engage in incremental process improvements (e.g., continuous improvement programs, CIP), but to innovate and transform processes in order to ensure continuously satisfying results (Naveh 2005).

Introducing such process innovation requires the generation, adoption, and implementation of new ideas (Pierce and Delbeq 1977; Scott and Bruce 1994). Idea generation describes the recognition of problems in a process and the articulation of ideas that change the process radically (Calantone et al. 2002). As such, it refers to creativity which is the first step for innovation implementation activities as innovations are dependent on new ideas in the first place (Anderson et al. 2014). Next, idea championing mainly refers to championing activities, as adoption is triggered by promoting innovation ideas among colleagues and supervisors to achieve a sufficient number of ‘believers’ who will drive or support a later implementation of the innovation (de Jong and den Hartog 2010). Idea implementation covers then the subsequent activities that are related to introducing the idea successfully in the organization (e.g., implementation of a new information system or processes within an existing information system, training employees) so that the process innovation becomes part of the organizational routine (Calantone et al. 2002).

3.3 The mediator: Individual process orientation

We assume that employees who have a process-oriented mindset are more likely and willing to engage in process innovation behavior. In general, process orientation refers to individuals having a process

perspective, i.e., they have an 'open-minded' perspective on overall processes running across organizational functions instead of having a perspective limited to the specific functions or process steps (or: 'silos') that they are entrusted with (Ding 2015). Employees exhibiting a process-oriented perspective take the larger process, of which their work is part of, into account when performing their daily activities (Leyer and Wollersheim 2013). For instance, employees are more customer-focused as they consider the impact of their work activities on the preceding and subsequent process activities and thus also on the overall process outcome (McCormack 2001)³⁶. And, they consider and care about potential side-effects of their own work (and changes of it) on the work of those colleagues that work later 'in line' of the process.

Leyer et al. (2015) have conceptualized individual process orientation as a three-dimensional construct, consisting of process knowledge, process awareness, and process coordination. Accordingly, process orientation first requires knowledge regarding the design of the overall process in order to have an overview of other functions included (Tang et al. 2013). Process orientation in this regard means that employees think positively about the need to know the different process activities and tasks in detail, but also about the process benefits and weaknesses (process knowledge) (Babic-Hodovic et al. 2012; Forsberg et al. 1999). Such knowledge supports the vision factor according to FFT as it enables employees to better understand the impact of their own work, and it leads to employees being experts who are capable of identifying and generating innovation opportunities.

Second, employees have to be aware of how their work influences the overall process (Chen et al. 2009). This is related to the task-orientation factor of FFT as employees have to be aware of the connection of their work activities to customers as well as to overall process goals. Employees being process-oriented, consider it as being important to support the overall vision of the process in a best possible way (Hellström and Eriksson 2013; Rohner 2012). This positive orientation might also be in line with the expectance of receiving personal benefits as well as taking credit for contributing to strategic competitive advantages. As such, employees will have a natural interest to contribute to process innovation in order to increase customer value even if their activities are not benefitting.

Third, the last part of process orientation refers to a positive view on the coordination with colleagues in a process (process coordination) (Zarei et al. 2014). Coordination refers to team work and connectedness across departments with colleagues involved in a process. Thus, it is in line with the participative safety factor of FFT in the sense that a community at the process level is usually seen as positive. Such an orientation makes it easier to champion ideas among the colleagues involved in the same process and to successfully implement a newly generated process innovation. As a consequence, new and innovative process ideas could be implemented more easily and sustainably.

Summing up, an individual's process orientation is expected to lead to an increase in her process innovation behavior. Thus, we hypothesize:

³⁶ It needs to be noted that the term of „process orientation” does also have a meaning at the organizational level and basically refers to the organizational restructuring of a firm along business processes (McCormack 2001) There is a rich stream of literature on various aspects of process-oriented organizational design, covering the organizational structure (Bronzo et al. 2013; Kohlbacher and Reijers 2013; Škrinjar and Trkman 2013), goal setting (Babić-Hodović et al. 2012; Hellström and Eriksson 2013), customer focus (Reijers 2006; Zarei et al. 2014) or about the degree of autonomy granted to employees (Hammer 2007; Kohlbacher 2013; Zarei et al. 2014) Some of this research has even investigated the impact of these organizational design components on process innovation (e.g. Jansen et al. 2006; Tang et al. 2013). However, since our interest of analysis is at the individual level, this is out of scope of our argumentation and investigation; we only tap into this literature where it allows drawing references to the interplay of process orientation and process innovation behavior at the individual level.

H1: *The higher the process orientation of employees involved in a process, the higher is their individual process innovation behavior.*

3.4 The independent variable: BPM system usage

IT has frequently been raised as a crucial component of organizations' capability to explicate, document, and utilize organizational knowledge (Gold et al. 2001). To become more specific, scholars have developed categorizations of IT systems that allow differentiating among different classes of systems and their contribution towards firms' knowledge capabilities. For example, Pavlou and El Sawy (2011) differentiated between project and resource management systems, cooperative work systems, and organizational memory systems.

As pointed out, process orientation is a normative idea that describes how process-related actions should be conducted by employees (Daft et al. 2007). However, independent of a function- or process-oriented attitude, an organization consists of processes that must be managed (Armistead and Machin 1998). This management of processes (business process management, BPM) is typically described by a process lifecycle containing activities such as identifying, modeling, analyzing, improving, implementing, executing, monitoring, as well as changing processes (e.g., van der Aalst et al. 2007). BPM is usually supported by dedicated tools and software applications (Grozniak and Maslaric 2010), often referred to as 'BPM systems' (BPMS) (Jeston and Nelis 2008). As such, a BPMS is "a piece of software that supports activities such as the modeling, analysis, and enactment of business processes" (Reijers 2006, p. 390).

Accordingly, referring back to the system categorization introduced above, BPM systems can be categorized as organizational memory system, i.e., "systems that provide knowledge coding, directories, and retrieval IT functionalities, supporting the acquisition, assimilation, transformation, and exploitation of knowledge practices" (Ahuja and Chan 2014, p. 6). As such, they belong to the larger class of knowledge management systems (KMS) (Ahuja and Chan 2014; Alavi and Leidner 2001) and support the individual employee in learning and gathering knowledge about the business processes they are involved in³⁷.

BPMS contain information that is relevant to the daily execution of employees' tasks. This information is for instance provided by process models (i.e., a visual representation) which reflect documented knowledge about working procedures (e.g., how a certain task has to be performed or which tools have to be used to perform this task). Every time, employees want to receive information about their own tasks within a business process and therefore access the BPMS, they get a process-oriented view of their work environment (Kettenbohrer et al. 2016b). Consequently, knowledge regarding the design of the process is explicitly or implicitly acquired (process knowledge). These aspects are consistent with the 'vision and support' factor of FFT. The reason is that vision highlights the importance of a higher-order goal (West 1990), in this context, process orientation. According to FFT, 'support' refers to practical support to implement new and improved ways of working (West 1990). Vision and support are promoted by the BPM system by visualizing processes and/or providing relevant documents.

³⁷ We need to note here that there exist various definitions for BPMS in the literature, which range from process modeling & design – which maps to the concept of organizational memory systems – to process execution & tracking – which refers to operational or transactional systems, and thus feature run-time and build-time functionalities (Ravesteyn and Batenburg 2010; Reijers 2006). However, we restrict our definition of BPMS to modeling & design and thus can stick with the organizational memory system categorization.

Furthermore, BPMS provide process models, which are visual representations of working procedures. As Berner et al. (2016) propose, process visibility (which includes process visualization) increases situation awareness in process operation and helps to identify bottlenecks in the course of substantial process improvement. This proposition can be extended by the perspective that BPMS also highlight interdependencies between the different tasks within a process. Thus, these interdependencies become transparent and explicit (Kettenbohrer et al. 2016b). The employees become aware of interdependencies between their own and their colleagues' tasks as well as of their tasks' impact on the overall process (process awareness) (Škrinjar and Trkman 2013). Due to the interdependencies between the different tasks within a process, employees have to coordinate their work with their colleagues. BPMS support this coordination task and enable personal exchange because these interdependencies and the corresponding colleagues are made transparent (process coordination) (Kettenbohrer et al. 2016b). These aspects are consistent with the 'participative safety' factor of FFT (West 1990) as BPMS make the impact of an employees' process activities on their colleagues' tasks and on the over-all process transparent, show design possibilities, and highlight the collaboration among them on the process level.

Thus, we hypothesize:

H2: The usage of a BPM system by employees leads to a higher individual process orientation.

Turning the argumentation around, individuals' process orientation serves as an important mediator, i.e., explanatory factor, of the impact of BPMS usage on process innovation behavior. The BPMS provides a process-oriented view and information about employees' tasks within a process. Due to the visual and transparent representations of the working procedures, interdependencies between the different tasks within a process become transparent and explicit (Kettenbohrer et al. 2016b). The transparent visualization facilitates the identification of process innovation opportunities. Employees who are more process-oriented will regard this information as relevant for improving their process activities (Babic-Hodovic et al. 2012; Hellström and Eriksson 2013), which thus contributes to their individual process innovation behavior. This does also map to the knowledge management literature, which – at the organizational level – suggests that firms that deploy digital knowledge repositories tend to retain and reuse collective organizational knowledge, thereby developing better innovative capabilities (Alavi and Leidner 2001; Sabherwal and Sabherwal 2005; Tanriverdi 2005).

H3: An individual's process orientation positively mediates the relationship between BPM system usage and individual process innovation behavior.

The following Figure 1 shows the research model at a glance.

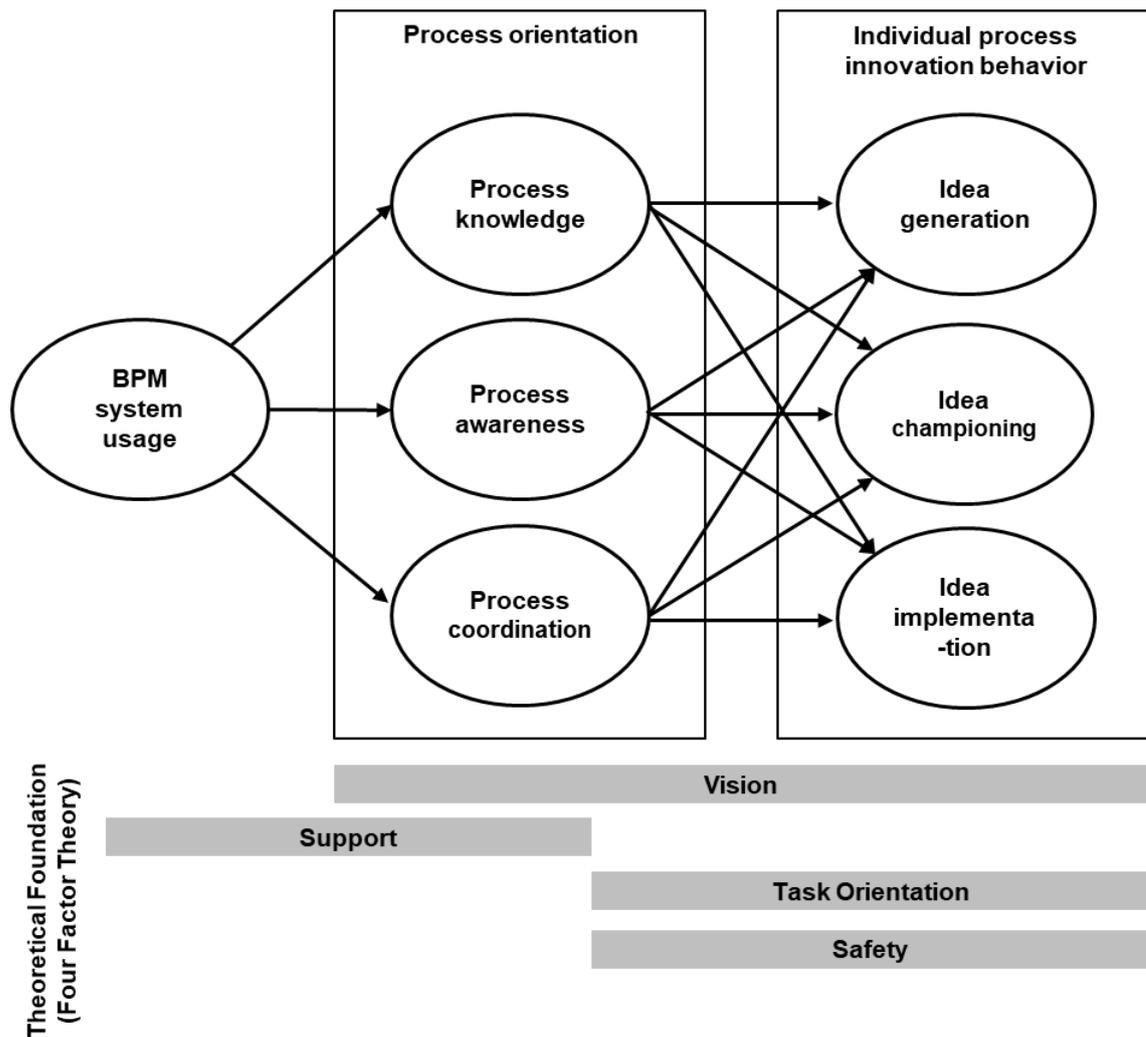


Figure 21. Research model

4. Research method

To test our research model, we developed a questionnaire, containing the operationalization of the model constructs, and collected data from employees in the financial industry. The approach and the measures are outlined below.

4.1 Participants and procedure

We used a non-public university mailing list to email an invitation and link to our online survey to 61,572 valid email addresses. The recipients work in various parts of the German financial industry and at various hierarchical positions. At the beginning of the online survey, we used a filter question to sort out participants in managerial positions in order to ensure that only process workers were contained in our sample. Moreover, we accepted only the participation of individuals who work in organizations that have a type of BPM system in place which displays business processes and provides process-oriented documentation to the users (i.e., no workflow automation tools etc., cf. footnote 4). This was assured by stating the focus of the survey clearly at the beginning and using a clear definition of BPMS and visual examples. As a result, we received 1,054 responses, which is a common rate for using such mailing lists (Leyer et al. 2017). Among these participants, 296 agreed to answer a second questionnaire and were asked to choose an anonymous but unique identification code. They were contacted two months later with a shorter questionnaire, containing measures for the dependent variable; in this second stage

we received 171 responses. Participation was again anonymous; individuals' answers from both survey rounds were matched through the identification code.

Our final sample of 171 participants consists of 75.4% male and 24.6% female participants; the average age is 43.9 years.

To assess a potential non-response bias given the low response rate, we followed Kobarg et al. (2017) by indirectly testing whether the answers of the participants differed from those who did not participate. In line with Sheikh and Mattingly (1981), we considered the response times by assuming that employees who participated late share similarities with employees who did not participate at all (Miller and Smith 1983). However, our results did not change by adding 'date of participation' and 'survey answering time' as controls to our model. Thus, we could not detect any influence from a potential non-response bias.

We test our research model using partial least squares (PLS), applying SmartPLS 3.2.7 and using the bootstrapping procedure with 5,000 resamples (Hair et al. 2011). For estimating the mediating effect, the total indirect effects procedure of SmartPLS is used. We have chosen PLS because our intent is not to fit a coherent theoretical model but to contribute to the explanation of our dependent variable, individual innovation behavior (Petter 1999). Therefore, construct-based 'performance' criteria, such as R2, are more useful than overall model fit criteria (such as RMSEA or RMR).

4.2 Measures

All variables of our research model were measured in a reflective manner using a 7-point Likert scale for innovation and 5-point Likert scales for BPMS usage and process orientation³⁸. To measure our independent variable, BPMS usage, we adapted the scale from Doll and Torkzadeh (1997). Process orientation was measured in terms of process knowledge, process awareness, and process coordination adapting the scales from Leyer et al. (2015). Finally, the dependent variable of our model, individual process innovation behavior, was operationalized as a three-dimensional second-order construct, according to the three dimensions of idea generation, idea championing, and idea implementation. All measures were adopted from prior literature: idea generation from Calantone et al. (2002) and de Jong and den Hartog (2010); idea championing from de Jong and den Hartog (2010) and Lewis and Seibold (1993); and idea implementation from Calantone et al. (2002), de Jong and den Hartog (2010), and Robertson (1967). In addition to the operationalized model constructs, we captured gender, age, participation in trainings on the BPMS, and recent changes in the participant's organization as control variables. All items and their sources are listed in detail in the Appendix.

We followed the typical procedures to check the applicability and content validity of survey measures (MacKenzie et al. 2011; Roberts et al. 2016). Several academic experts as well as practitioners examined the survey to assure understandability and flow of the survey. After-wards, the survey was successfully pilot-tested with 30 participants in a service firm that had an established process modeling software.

5. Results

5.1 Validity and reliability

We follow the standard procedures of checking validity and reliability of scales for reflective measurement models according to Hair et al. (2011) and Hulland (1999). The results of composite reliability

³⁸ In order to avoid common method bias, we designed the questionnaire with two different scales and, as outlined above, measured the dependent variable at a second point in time connecting the questionnaires with specific but anonymous codes.

values regarding the internal consistency reliability show values above the threshold of .7 for each variable. Indicator reliability is confirmed for each variable by ensuring the indicators' loadings to be larger than .7 (see Appendix). The AVE values of the variables are all well above the .5 threshold, which confirms convergent validity. Table 30 provides an overview on composite reliability and AVE. Another table in the Appendix presents the means of and correlations among all construct scores.

	Composite Reliability	AVE
<i>BPM system usage</i>	.918	.692
<i>Process knowledge</i>	.825	.702
<i>Process awareness</i>	.800	.667
<i>Process coordination</i>	.822	.698
<i>Idea generation</i>	.935	.827
<i>Idea championing</i>	.933	.822
<i>Idea implementation</i>	.919	.791

Table 30. Measurement model validation (first-level constructs)

Discriminant validity is checked using the heterotrait-monotrait ratio of correlation (HTMT).90 (Henseler et al. 2015), which is providing a higher accuracy in terms of detecting discriminant validity than using the Fornell-Larcker-criterion. Table 31 provides the values for the second-order constructs while Table 32 contains the values regarding the first-order constructs which are all below the threshold for HTMT of .90.

	(1)	(2)	(3)
<i>(1) Individual process innovation behavior</i>			
<i>(2) Process orientation</i>	.348		
<i>(3) BPM system usage</i>	.234	.432	

Table 31. HTMT values (second-level constructs)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>(1) Idea generation</i>						
<i>(2) Idea championing</i>	.848					
<i>(3) Idea implementation</i>	.803	.898				
<i>(4) Process knowledge</i>	.161	.140	.229			
<i>(5) Process awareness</i>	.141	.201	.386	.581		
<i>(6) Process coordination</i>	.317	.400	.386	.456	.614	
<i>(7) BPM system usage</i>	.168	.220	.276	.255	.419	.367

Table 32. HTMT values (first-level constructs)

We also conducted a Finite Mixture (FIMIX) segmentation analysis. The results show that there is no issue with heterogeneity of the data.

Regarding the quality of our structural model, we calculate standardized Stone-Geisser Q^2 values (Kortmann 2015). A strong overall prediction power is confirmed by having positive Stone-Geisser Q^2 values for each variable which we derive from performing a blindfolding procedure (omission distance of 6; (Henseler et al. 2009)).

5.2 Test of the structural model

In the following, the results from testing the hypotheses are presented. Figure 22 shows the results of our model test.

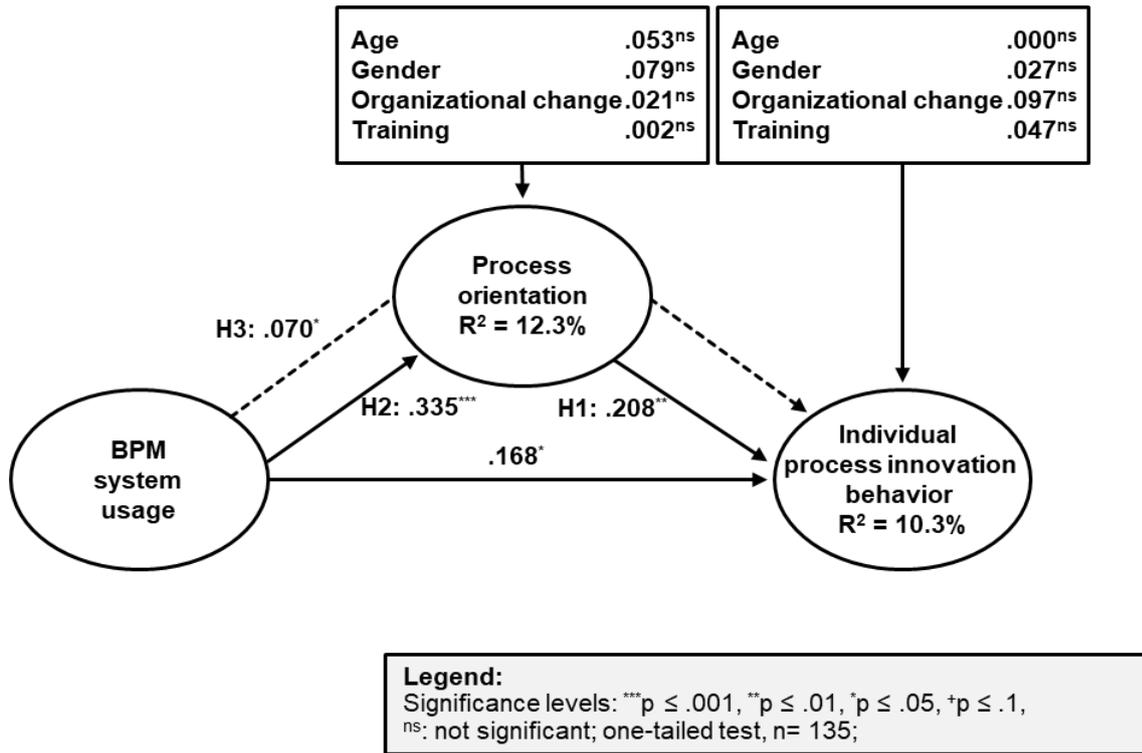


Figure 22. Results

Hypothesis 1, stating that process orientation is positively related with innovation behavior, is supported ($\beta = .208, p < .01, f2 = .042^*$).

Hypothesis 2, stating that the more usage of a BPM system leads to a higher process orientation, is supported ($\beta = .335, p < .001, f2 = .120^*$).

Hypothesis 3, stating that process orientation mediates the influence of BPMS usage on innovation behavior, is supported as well (product of betas = .07, $p < .05$).

Overall, the total effect of the direct effect and the indirect effect of BPMS usage on individual process innovation sums up to .238 ($p < .01$), with the direct path of BPMS usage on individual process innovation behavior being also positive and significant ($\beta = .168, p < .05, f2 = .026^{ns}$); accordingly, process orientation serves only as a partial mediator (VAF (variance accounted for) = 29.3%), leaving room for further factors explaining the relationship between individual BPMS usage and innovation behavior.

In a post-hoc analysis, we repeated the model test with the first-order constructs only, linking each dimension of process orientation to each dimension of process innovation. This allows for testing the effect of the determinants on the different dimensions of innovation behavior and thus allows for a better understanding of how BPMS usage contributes to process innovation behavior. First, we examined how BPMS usage drove the single dimensions of innovation behavior by testing three models that contained each of the dimensions separately as single dependent variable. The following table presents the results.

		Process orientation	Idea generation	Idea championing	Idea implementation
Direct effect		.335 ^{***}	.145 ⁺	.157 [*]	.186 ^{**}
		.342 ^{***} ³⁹			

³⁹ Varying values because three different models (one for each of the innovation behavior dimensions) were tested.

<i>BPM system usage</i>	Mediating effect	-	.040 ⁺	.065 [*]	.089 ^{**}
	Total effect	-	.185 ^{**}	.223 ^{**}	.275 ^{***}
	f ²	.119 ⁺ .127 ⁺	.019	.023	.034 ⁺
<i>Process orientation</i>	Direct effect	-	.119 ⁺	.191 ^{**}	.261 ^{**}
	f ²	-	.013	.035 ⁺	.069 ⁺

Table 33. Post-hoc analyses results showing the path coefficients using the first-order constructs of individual innovation behavior; + p < .1; * p < .05; ** p < .01; * p < .001; one-tailed tests)**

The results show that the results from the original model test remain true for all three of the single innovation behavior dimensions, though with differing effect sizes: interestingly, they are the lowest for idea generation and strongest for idea implementation. In the following, we will discuss our findings.

6. Discussion and conclusion

Our results show that using a BPM system indeed has a positive effect on a person's process innovation behavior with individual process orientation being an important mediator and, thus, explanatory variable. The results can be explained by FFT which is reflected in our research model.

The relevant mechanisms become more evident when having a closer look at the post-hoc tests that we conducted. While BPM system usage has a significant positive effect on all dimensions of individual process innovation behavior, the single dimensions of individual innovation behavior reveal the underlying explanations. The effect on idea generation can be explained by the BPM system visualizing the processes to the user. The visualization allows employees to see processes 'end to end' in one place, hence, to be able to understand relationships and to trace potential influencing factors for problems in certain processes and activities. As a consequence, understanding and thus process orientation increases. Hence, creative processes among employees are triggered by having process information more present in one's mind or by having ideas from daily work activities in the first place which they then link to the overall process. Such effects support the process of linking problems to ideas for solution and thus contribute to a process vision.

The comparably stronger effect regarding idea championing can be explained by the continuous usage of a BPM system from initially convincing colleagues to executing projects for implementing ideas. A BPM system can be used in manifold ways such as (1) retrieving information about which colleagues are involved in a certain business process – which allows them to be identified and contacted easier when having an idea; (2) convincing colleagues about the potential benefits of an idea by using the BPM system for joint visualization of the process, (3) discussing interdependencies between activities and processes affected by an idea in order to reduce concerns among colleagues regarding potential negative consequences. These mechanisms explain how process innovation activities evolve from individual process orientation, which is triggered by using a BPM system. Hence, spreading an idea among colleagues and across the organization is a lot easier when using a BPM system.

The comparably strongest effect of BPMS usage and process orientation is on idea implementation. This can be explained by the BPM system supporting such activities in many aspects. A BPM system allows providing an overview of how an idea can be implemented within the processes not only in the planning stage but also during an implementation project when unexpected changes might occur. As such, project members are always aware in their way of thinking of the dependencies of activities and processes, given the influence and consequences of a change of processes. This makes it easier to

follow a joint vision in the sense of process orientation without losing the overview during the implementation when there are old and new process designs including half-done idea implementations simultaneously present in a business process. All employees being involved have a transparent overview, which makes it easier to inform and integrate affected employees with potentially less resistance.

The relative differences of the strengths of the paths on the three dimensions of process innovation behavior can be explained by BPMS usage and being process oriented helping less for generating exciting ideas as there are other factors involved regarding the generation of ideas. A BPMS provides the environment to understand the process and to have a starting point for thinking about ideas, but is more supportive when it comes to the more structured tasks of championing and implementation. Here, the software provides an environment for joint work activities with colleagues and helps to manifest an idea in the existing process landscape.

Summing up, it becomes evident from the results that process orientation is an important mediating factor of the impact of BPM systems on individual process innovation behavior. As the explanations highlight, it is important that a BPM system fosters understanding and inter-action in processes, i.e. how employees are integrated in processes, which then leads to more innovation behavior. Hence, the degree of how much employees are already embedded in processes independent from using a BPM system might be an important additional explanatory factor for individual process innovation behavior. Kettenbohrer et al. (2015b) look at the degree of embeddedness which employee themselves perceive to have in executing their tasks as part of a certain process – which ranges from highly independent to highly interdependent. Accordingly, employees who perceive their tasks to be highly interdependent with their colleagues' tasks and highly embedded within the overall process, perceive their work as an important 'cog in the wheel' and thus are more likely to put the overall process goals over their individual tasks and goals.

In order to take this argument of perceived embeddedness into account, we did another post-hoc analysis: we add this variable to our research model using a conceptualization and measure proposed by Kettenbohrer et al. (2015b)⁴⁰.

Embeddedness is included as a moderating factor for individual innovation activities as well as a direct factor on innovation. The results are depicted in Figure 23.

The results reveal interesting aspects in addition to our main results. Perceived embeddedness is based on the concept of task interdependence, which itself consists of two dimensions: initiated and received task interdependence. Initiated task interdependence is relevant for the impact of embeddedness on process innovation behavior: employees exhibiting a job with high initiated task interdependence are conscious about potentially affecting the job of their colleagues and thus perceive high responsibility for their work (Kiggundu 1981). We assume that due to the high perceived interdependencies with their colleagues' jobs and the need to consider all the interfaces, embeddedness of employees leads them to perceive their work environment to be more complex. This does – despite of them being process oriented – reduce their engagement in innovation activities as initiating changes can be expected to be very exhausting in a more complex environment. The result indicates that employees see the importance of processes triggered by a BPM system, but avoid innovation activities in more embedded and complex settings. This is particularly evident in the financial services industry, which is highly regulated and once

⁴⁰ Kettenbohrer et al. called their construct of perceived embeddedness "job construals" and derived it by combining the concept of self construals (Cross et al. 2000; Markus and Kitayama 1991) and task interdependence (Kiggundu 1981).

employees have to take more dependencies into account, it is more difficult to execute innovation activities.

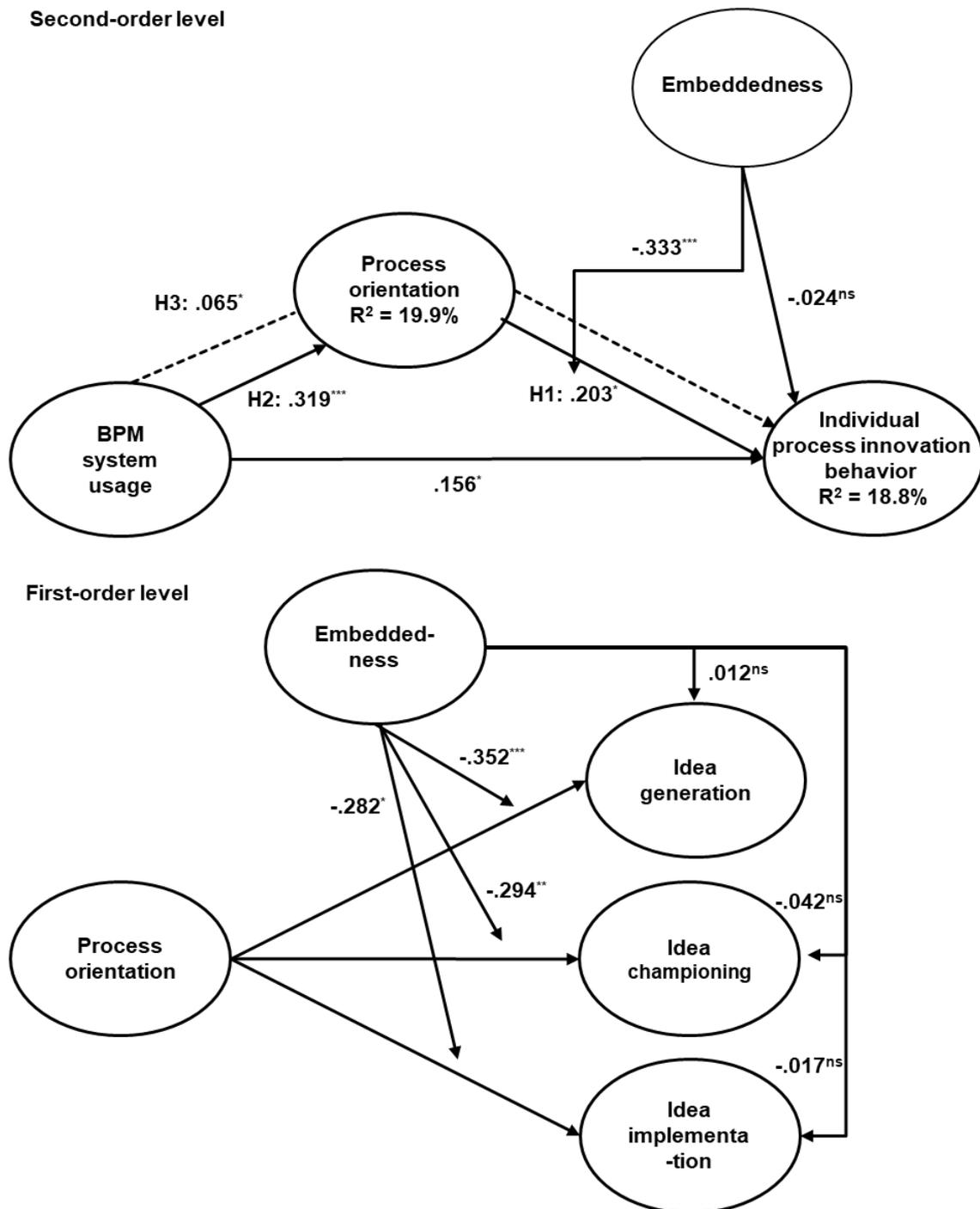


Figure 23. Results including the embeddedness; + $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$; one-tailed tests, $n = 135$)

6.1 Theoretical implications

Our results lead to a couple of theoretical implications. First, we provide evidence on the impact of system usage on process innovation. As outlined earlier, prior research in analyzing the benefits of using IT in organizations leaves this performance dimension out. As such, we contribute to the discussion on

the business value of IT by providing a model to extend our understanding of the various positive manifestations of IT. Process innovation should be considered as an important dimension in the IT business value discussion when determining benefits of IT in organizations.

Second, we contribute to the literature on IT business value in providing an understanding of the mechanisms of system usage on an individual level. Interacting with the software application increases users' process orientation, which contributes to their process innovation behavior; thus, there is a causal sequence of these elements across different levels of analysis: we focus on an individual level but can deduct implications regarding innovation on an organizational level (since a BPMS is not implemented for a single person but for a whole organization). Hence, our individual-level analysis provides valuable insights regarding employee behavior that can be aggregated to understand effects at the firm level.

Third, our results highlight the importance of considering the organizational structure with regard to determining the effects of IT business value. Embeddedness refers to complexity of the work environment, which is reflected in a more complex organizational structure. Hence, our results are in line with and extend results of Leyer et al. (2017), who have found a positive impact of organizational structure on process innovation. Our extension lies mainly in highlighting the role of embeddedness and showing that despite the positive effects of a BPMS visualizing processes, it is not fostering those employees who are hampered by a complex work environment and would invest comparably more time and cognitive effort for process innovation activities. Hence, despite the positive effects of a BPMS, the organizational design in which employees are embedded in should be designed in a way that is not perceived as difficult by employees.

Fourth, our results highlight the importance of innovation occurring in daily work activities next to innovation activities happening in projects. Here, a BPMS is not only supporting efficiency in these daily work activities but contributes to a positive impact on innovation activities by fostering the importance of cross-functional connection among employees. As such we extend results from Lee and Walsh (2016) promoting the role of "invent while you work" (and hence picking up their call for further research) with regard to the positive impact of providing IT for individual employees.

Fifth, our results extend the general view that thinking styles are important with regard to innovation activities (Anderson et al. 2014), in our case process-oriented thinking being triggered by using a BPMS. We, however, argue that it is not only the thinking style itself, but that having process-oriented mindset and being able to use the support from an underlying system leads to process innovation behavior. Hence, in line with Davenport (1993) and subsequent works on the role of IT for process innovation (Müller et al. 2012), we can confirm the important role of BPMS for implementing, but less enabling, process innovation.

6.2 Managerial implications

The most fundamental managerial implication of our study is that the introduction of a BPMS is an important lever for process innovation. It does not only contribute positively to process orientation among the workforce, which is relevant for an efficient process execution, but also supports individual process innovation behavior by triggering this mindset. Hence, process innovation in an organization can be fostered by supporting individual employees with a BPMS and making them use it on a regular basis.

It should, however, be considered that the relative impact of IT with regard to supporting idea generation is weak. To improve this situation, BPMS should be extended to show employees the impact of what they are doing on the overall process. This could be for example to visualize outcome-oriented information from the actual process execution (e.g. heat maps of processes that show the performance of activities) not only for supervisors or data analysts but for employees working in the processes.

Additionally, organizations should be more aware of the possibilities to trigger and support innovation activities within the workforce, next to daily operational work. Since setting up projects requires additional effort in terms of management and additional organizational structures as well as budgets, it will be beneficial to foster innovation behavior 'on the shop floor'.

A further implication is that processes should not be designed in a too complex way although a software might compensate by providing a good overview of a complex process environment. What might be beneficial in terms of gaining benefits from specialization seems to overstrain employees with regard to process innovation.

Additionally, organizations aiming to foster their employees' innovation behavior should support job rotation to decrease their perceived embeddedness. As our results show, perceived embeddedness has a negative effect on process innovation behavior. Employees, who feel highly embedded in the overall process they are working in, know the impact of their tasks on their co-workers' jobs and thus feel responsibility for it. The feeling of high embeddedness is increased not only by job-related aspects but also by social aspects (e.g., by knowing the co-workers better privately). While this can per se be beneficial, the downside of this is that these employees do not come up with innovative and radically new ideas since they try to avoid affecting their co-workers' tasks negatively. To enhance and facilitate innovation behavior, organizations should decrease perceived embeddedness by facilitating job rotation and offering the possibility to perform different and new tasks easily.

6.3 Limitations and future work

There are several limitations to be considered. Our empirical study focused on and is restricted to the individual level of analysis. Since other studies have shown and argued that collaboration among employees is needed to create innovation (e.g., Tarafdar and Gordon 2007), which is also an argument inherently being apparent in our model, this might limit our results. However, it is also obvious that the BPMS is only a complementary enabler for process innovation while collaboration among colleagues will be required and happen anyway. Future designs of BPMS should take this into consideration and allow for tool-based collaboration within the system to a larger degree.

Furthermore, it should be considered that our results stem from the financial services industry, which represents an information-processing intense environment. Information-processing services that take place mainly virtually with no object or subject being visible are a special challenge as the processes are not 'visible' (compared to e.g., an assembly line). Thus, software systems that show the business processes are important to foster process orientation and trigger innovation behavior, while the effect could be weaker in more tangible work environments. However, it could also be the case that such environments are characterized by spatially distributed workplaces so that a BPMS would create even more benefits. In order to determine such effects, it will be necessary to conduct further studies in environments with people-oriented services (services performed on individuals such as transport or medical services) vs. possession-based services (services performed on things such as repairing a car or delivering a parcel) and to compare the results. In addition, financial services are regulated to a high extent (which is not unlike some other environments like aviation or chemical industry). In such environments, the effect of our model on innovation behavior is probably lower than in less regulated environments. The negative moderating role of perceived embeddedness is giving a hint that having more dependencies and thus perceiving it more difficult to be able to execute innovation is indeed a reason to show less of such behavior. Hence, the analysis should be repeated in less regulated environments to identify the effect strength in different settings.

It is also important to note that although we avoid CMB by collecting data for independent and dependent variables at different points in time, system usage and innovation behavior could be measured more

objectively. If repeating the study within an organization, system usage data could be gathered from the system logs while innovation behavior could be determined by ideas handed in, meetings taking place in this regard or innovation projects occurring. Since we focus on the individual level, there would, however, be the challenge to match such data to individual employees which is often prevented by data security policies.

In addition, the scope of system usage could be extended beyond BPMS. There could be, for example, an emphasis on business analytics tools being used to analyze processes such as process mining or business process simulation. The use of such analytical tools by regular workers is however still very limited in organizations while the use of a BPMS is typically more wide-spread.

Finally, the cost-benefit effects of BPM system usage leading to process innovation and then fostering individual process innovation behavior would be interesting. Our results are limited to an expected impact based on self-reported scales which often in reality is higher. Hence, it would be necessary to determine the cost of introducing and running a BPMS and then determining its impact on the savings and/or additional value created due to innovations triggered by individuals and being implemented in processes.

Overall, we are living in times where innovation becomes more and more critical – researching and understanding the drivers and success factors for innovativeness at the organizational and individual level is therefore essential and conducive to firms' future success.

Appendix

	Construct	Item-ID	Item	Reference
<i>Innovation</i>	<i>Idea generation</i>	IGE_1	I have ideas for innovations of activities in my area of operations.	Derived from de Jong and den Hartog (2010)
		IGE_2	I participate in the development of new ideas for activities in my area of operations.	Derived from Calantone et al. (2002) and de Jong and den Hartog (2010)
		IGE_3	I participate in the identification of innovative solutions for problems	Derived from de Jong and den Hartog (2010)
	<i>Idea championing</i>	ICH_1	I participate in creating a vision of progression for my area of operations.	Derived from Robertson (1967)
		ICH_2	I try to persuade colleagues of innovative ideas	de Jong and den Hartog (2010)
		ICH_3	I make important organizational members in my area of operations enthusiastic for innovative ideas	
	<i>Idea implementation</i>	IIM_1	I am often the first in our team to try to implement new ideas in our area of operations.	Derived from Calantone et al. (2002)
		IIM_2	I participate in implementing new ideas.	Derived from Calantone et al. (2002) and de

				Jong and den Hartog (2010)		
		IIM_3	I systematically introduce innovative ideas into work practices.	Derived from de Jong and den Hartog (2010)		
<i>Process orientation</i>	<i>Process knowledge</i>	PKO_1	I know the broad activities that are necessary to complete these products for external customers.	Leyer et al. (2015)		
		PKO_2	I know the employees with whom I am working on the compilation of products for external customers.			
	<i>Process awareness</i>	PAW_1	The reduction of cycle time (not processing time) of customer orders together with the colleagues involved is an important goal of my daily work.			
		PAW_2	In my area or operations I put an emphasis on how satisfied external customers are with the products in which I am involved.			
	<i>Process coordination</i>	PCO_1	For the processing of my products I continuously coordinate myself with all relevant parties involved including those outside my area of operation.			
		PCO_2	I am continuously involved in the coordination with all relevant parties (also outside my area of operation) of the products on which I work to avoid backlogs.			
	<i>BPM system usage</i>	<i>BPM system usage</i>	BSU_1		I use the BPM system to help me think through problems related to the execution of my processes.	Doll and Torkzadeh (1998)
			BSU_2		I use the BPM system to analyze why problems regarding processes occur.	
BSU_3			I use the BPM system to explain my decisions related to the execution of my processes.			
BSU_4			I use the BPM system to structure my work.			
BSU_5			I use the BPM system to communicate with colleagues about processes.			
<i>Job construals</i>	<i>Job construals</i>	JOC_1	My task is a step in a longer process chain, a small step to fulfil a bigger task (to work on the assembly line).	Kettenbohrer et al. (2016b)		
		JOC_2	My work activities highly depend on the work of other people.			
<i>Controls</i>	<i>Organizational change</i>	ORC_1	The organizational structure related to my area of operations was affected by changes since the first questionnaire.	Bordia et al. (2004)		
		ORC_2	The processes in my area of operations were affected by changes since the first questionnaire.	Jurisch et al. (2014)		

	Training	TRA_1	Did you participate in a BPMS training since the first questionnaire?	
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Table 34. Measurement model

Model variables		Mean and st. dev. across all items of respective construct		Inter-construct correlations (main diagonal contains square roots of AVEs)								
				(1)	(1a)	(1b)	(1c)	(2)	(2a)	(2b)	(2c)	(3)
Items meas-	(1) Individual process innovation behavior	5.27	1.24	.82	.96***	.92***	.88***	.42***	.33***	.25**	.35***	.20**
	(1a) Idea generation	5.36	1.30		.91	.82***	.77***	.36***	.28***	.20**	.32***	.17*
	(1b) Idea championing	4.99	1.49			.91	.76***	.43***	.31***	.27***	.37***	.19*
	(1c) Idea implementation	5.36	1.25				.89	.38***	.35***	.24**	.28***	.22**
Items meas-	(2) Process orientation	3.67	0.70					.61	.72***	.69***	.84***	.14
	(2a) Process knowledge	4.21	0.84						.84	.36***	.35***	-.01
	(2b) Process awareness	3.13	1.01							.82	.37***	.12
	(2c) Process coordination	3.43	.92								.84	.17*
	(3) BPM system usage	2.88	1.23									.83

Table 35. Descriptive statistics and correlations among variables (Notes: M = Mean, SD = Standard Deviation; * p < .05; ** p < .01; *** p < .001; two-tailed tests)

	Idea generation	Idea championing	Idea implementation	Process knowledge	Process awareness	Process coordination	BPM system usage	Job construals	Organizational change
IGE_1	.897								
IGE_2	.913								
IGE_3	.919								
ICH_1		.907							
ICH_2		.931							
ICH_3		.882							
IIM_1			.910						
IIM_2			.913						
IIM_3			.842						
PKO_1				.806					
PKO_2				.868					
PAW_1					.872				
PAW_2					.758				
PCO_1						.880			
PCO_2						.789			
BSU_1							.788		
BSU_2							.809		

BSU_3							.856		
BSU_4							.808		
BSU_5							.895		
JOC_1								.872	
JOC_2								.882	
ORC_1									.951
ORC_2									.831

Table 36. Indicator loadings with constructs

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Paper IX

This analytics tool looks nice, but... I am still happy without it

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(under review)

This analytics tool looks nice, but... I am still happy without it

Abstract

Business analytic tools offer many benefits for organizations to support managerial decision making and drive actions. Hence companies are striving to adopt such tools to allow for a data-driven transformation towards evidence-based management. However, despite such benefits, organizations struggle with the adoption of business analytics tools because employees are showing hesitation regarding the usage of these tools in their daily work processes. Employing a behavioral perspective and using the theory of reasoned action, this paper examines how employees' behavioral antecedents influence the degree of using business analytic tools in organizations. A survey in the financial services industry with 332 responses including both users of analytic tools as well as non-users reveals that on an individual level it is skills being important for usage but not perceived value. On the organizational side, perceived norms from supervisors and peers as well as accessibility are important. Further analyses on the level of different business analytic tool categories show e.g. that the attitude of employees is important for forecasting but not for other tools. The results contribute to establishing a theoretically grounded behavioral perspective of the field of business analytics. Our results emphasize the importance of the organizational context in which employees are embedded in when it comes to convincing individual employees in using analytic tools. Practical implications are that supervisors should be convinced of the importance of analytic tools to foster usage among employees and self-service options for having access to software supporting business analytics should be offered.

1. Introduction

The amount of data being collected by organizations is increasing exponentially. Business analytics (BA) provides a toolset that allows these data to be used in a meaningful way to support managerial decision making and drive action (Davenport and Harris 2007). According to Davenport and Harris (2007), BA comprises the usage of statistical and quantitative analysis, explanatory and predictive modelling, as well as optimization. However, BA is about not just the tools or the data, but providing insights that result in action; therefore, it is about evidence-based management (Holsapple et al. 2014). In order to become an evidence-based organization, BA tools have to be used by organizational members and insights uncovered by these tools have to be accepted by decision makers and alter their actions. As a consequence, behavioral factors have a strong impact on the acceptance and usage of analytics tools within organizations. This represents the focus of the current study.

Beyond a large body of literature that is mostly practice oriented and normatively proposes BA concepts and tools (e.g., Davenport 2006; Davenport and Harris 2007; Davenport and Ronanki 2018), the empirical evidence that BA applications are indeed beneficial is increasing (e.g., Bayrak 2015). This is supported in a number of domains, ranging from positive effects on supply chain performance in different industries (Trkman et al. 2010), to positive impacts on decision-making effectiveness mediated by a data-driven environment (Cao et al. 2015), to the finding that BA effectiveness is strongly related to planning, but less to measurement. Similarly, big data analytics capability is positively related to firm performance (Gupta and George 2016; Wang and Hajli 2017), as well as BA capabilities (specifically, the effective use of data aggregation, analytics and data interpretation tools) influencing decision-making effectiveness (Wang and Byrd 2017).

However, despite the proposed and empirically corroborated benefits of BA, organizations struggle with the adoption thereof, and with embedding its tools within their decision-making processes (e.g., Ramathan et al. 2017; Rathore et al. 2014). Employing a behavioral perspective, we argue that whether analytics tools are used in employees' work processes depends on the employees themselves. Non-adoption of these tools can stem from a variety of reasons, such as unfamiliarity with the tool, a lack of access to software solutions by which to implement the method, a lack of knowledge on how to apply the method or how to use the software, or a self-conception among groups of employees that currently executed processes are still state-of-the-art. While organizations can provide required software and training and encourage tool usage, employees nevertheless play a crucial role in the degree of adoption, which ranges from non-usage to enthusiastic, heavy usage. However, prior research has put little emphasis on understanding the behavioral reasons why employees use analytics tools, and the intensity with which they do so. Studies in the field have focused on BA in general (e.g., Gupta and George 2016), analyzed the challenges for adoption/usage at the company level (e.g., Vidgen et al. 2017) or focused on specific tools (e.g. discrete-event simulation; (Hoad et al. 2015)), but have not taken employees' behavior into account. Hence, we aim to close this gap, and ask the following research question: Which behavioral antecedents influence the degree to which BA tools are used in organizations?

To answer this question, we adopt a psychological perspective following the argumentation of Walker et al. (2015), and use the theory of reasoned action (TRA), which covers attitudes, norms and control as explanatory antecedents for behavior. We argue that organizational transformation towards evidence-based organizations depends on the behavior of its members. By introducing TRA as relevant behavioral theory on the level of the individual, we aim to explain the intensity of usage of different types of analytics tools from a behavioral perspective. Our study focuses not on adoption at the level of the organization, but on the intensity of usage of BA on an individual level – which is not well understood so far, particularly for different types of analytics tools (Côte-Real et al. 2014).

We conducted a survey in the financial services industry. This industry was chosen as it places strong emphasis on providing information-centric services and a high availability of data, and thus represents (in principal) very good conditions for the deployment of analytical tools. We received responses from 332 participants, which included both users of at least one analytics tool, and non-users. We employ structural equation modelling to explain the (rather low) intensity of usage based on TRA with individual and organizational hurdles. While the individually perceived utility of BA tools does not play a significant role, the individual skill level is of high importance. On the organizational side, normative beliefs and accessibility are important – that is, the work environment in which employees are embedded is decisive. Not only knowing a tool, but also being allowed and encouraged to use it, affects the level of adoption. By differentiating categories of BA tools according to their level of sophistication, we unveil differences in the strength of the influential factors. This allows us to understand that antecedents for using analytics tools can vary substantially depending on the tool category, showing, for example, that being convinced of the tool value is very important for forecasting tools, but not relevant at all for statistical analysis and predictive modelling. Such differences lead to distinct implications when trying to foster a data-driven culture.

Practical implications of our study include the fact that organizations should focus on the relevant beliefs and antecedents with regard to the different categories of analytics tools when fostering a data-driven transformation. The results show that it is important to focus less on individual aspects and more on organizational hurdles, while acknowledging the important role of supervisors by increasing their understanding of analytics tools.

The structure of this paper is as follows. In the next section, we develop the theoretical foundation for the proposed research model and review literature on the

TRA, BA and decision support, as well as BA tool usage. Thereafter, the applied research method is outlined. We then present and discuss results of the data analysis. The paper closes with a general discussion of implications, limitations of the study and suggestions for further research.

2. Theoretical foundation

2.1 Theory of reasoned action

According to TRA (Ajzen and Fishbein 1973; Fishbein 1967; Fishbein and Ajzen 1975), an individual's behavior is driven by behavioral intentions, which are the sum of the individual's attitude towards the behavior, perceived norms surrounding performance of the behavior, and perceived behavioral control (as extended by the Reasoned Action Approach; (Fishbein and Ajzen 2010)) (Figure 24).

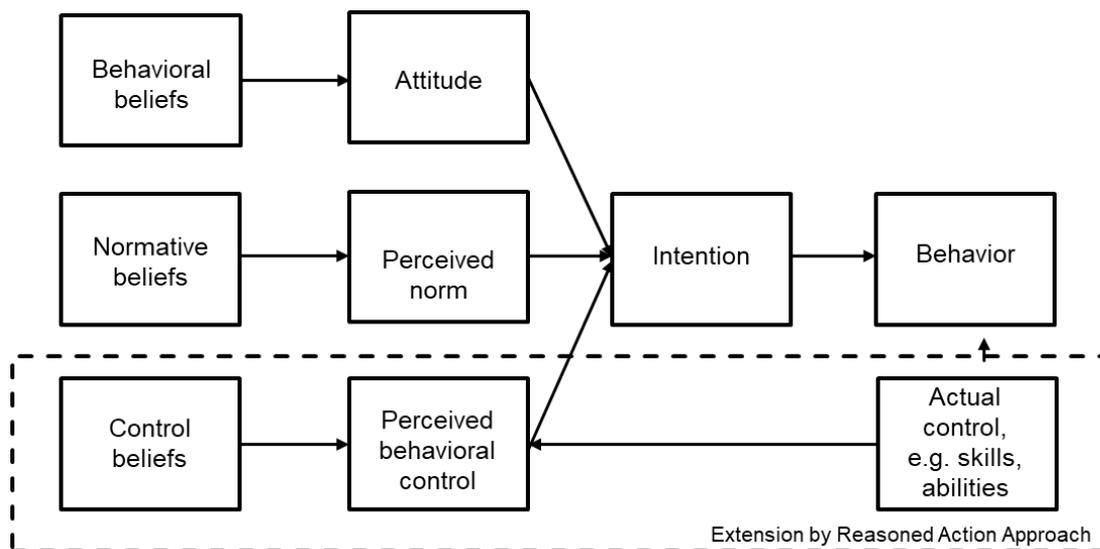


Figure 24. Overview on the TRA, including the control dimension (Fishbein and Ajzen 1975, 2010)

Attitude towards the behavior refers to the individual's positive or negative feelings about performing a certain target behavior. It is determined through an assessment of the individual's beliefs regarding the consequences arising from the behavior and an evaluation of the desirability of these consequences. The overall attitude is influenced by the individual consequences and the desirability assessments for all expected consequences of the behavior. Perceived norm refers to an individual's perception of whether other people (who are most important to him/her) think that he/she should or should not perform the behavior in question. Perceived norm can be expressed as the sum of the individual perception and motivation assessments for all relevant referents (Ajzen and Fishbein 1973; Fishbein 1967; Fishbein and Ajzen 1975). Perceived behavioral control refers to the individual's perception of whether he/she is capable of, or has control over, performing the behavior in question. The more positive the attitude towards a certain behavior, the perceived norm and the perceived behavioral control, the more likely it is that the individual will perform the behavior. Major antecedents for attitude, perceived norm and perceived behavioral control are beliefs, which can be behavioral, normative and control beliefs (Fishbein and Ajzen 2010). In summary, performing a certain behavior entails a process of comparing and selecting among the attitudes, perceived norms and perceived behavioral controls associated with each of the alternative behaviors in the choice set (Sheppard et al. 1988).

2.2 BA to support dynamic decision making

BA tools can be organized in different ways. Asllani (2015), for example, proposed structuring the toolset stringently, according to its primary function, into descriptive, predictive (forecasting, data mining) and

prescriptive methods. Davenport and Harris (2007) organized the tools more intuitively along the four questions shown in Table 37:

Guiding question	Analytic tool category
Why is this happening?	Statistical analysis
What if these trends continue?	Forecasting/extrapolation
What will happen next?	Predictive modelling
What's the best that can happen?	Optimization

Table 37. Categorization of analytics tools (adapted from Davenport and Harris (2007))

Statistical analysis methods, such as visualization of data or regression, help decision makers to precisely describe the decision environment. Tools from the “forecasting/extrapolation” category, such as time series forecasting or neuronal networks, support prognosing the future. The predictive modelling category comprises methods such as decision trees and simulation, which allow the decision maker to explore different future scenarios. Finally, optimization techniques, such as linear and non-linear optimization, aid in finding the best possible actions. The example of the system dynamics (SD) simulation analytics tool shows that it is not completely correct to assign a tool to one category exclusively: SD causal loop diagrams could very well be used to explain why a certain development can be observed, yet, at the same time, quantified SD models can be used both to forecast and to create future scenarios (predictive modelling). Finally, most SD software packages include optimizers that help in finding the optimal policy. Therefore, if simulation is assigned to the predictive modelling category it is its main contribution that is considered.

BA tools are promoted to implement evidence management by supporting managerial decision making through the conscientious, explicit, and judicious use of various sources of information (Briner et al. 2009; Holsapple et al. 2014). It is known that human performance in dynamic decision making (DDM) – defined as a sequence of multiple, interdependent and sometimes real-time decisions occurring in complex dynamic environments (Brehmer 1992; Edwards 1962), which characterizes most managerial systems – is generally poor (Dörner et al. 1994; Moxnes 1998; Qudrat-Ullah 2014; Sterman 1989; Strohecker and Größler 2012; Wittmann and Hatrup 2004). This increases the need to use adequate analytics tools that help to reach good decisions in dynamic settings. The complexity of these settings is recognized as an important moderating factor on performance, so this factor also has to be considered. Complexity is driven by the number of elements to be decided on, their connections and whether the setting is closed-loop (higher dynamic complexity) or open-loop (lower dynamic complexity). As shown by a recent experimental study, human performance decreases significantly when complexity in DDM tasks increases (Kampmann and Sterman 2014). Early studies by Paich and Sterman (1993) and Diel and Sterman (1995) also reported decreasing performance of participants when the dynamic complexity of the tasks they had to accomplish was raised. This finding further encourages the usage of analytics tools in decision-making environments of high dynamic complexity.

2.3 Usage of BA

In order to empower decision makers and allow them to come to better decisions, analytics tools have to be adopted and applied continuously by the organization's employees. These individual employees have to become embedded in the everyday work processes, and therefore play a crucial role. However, research on BA has targeted employees and their role in using BA tools only recently.

Some recent papers have highlighted that a main barrier to tool adoption is a shortage of qualified personnel. For instance, Ward et al. (2014) classified this issue as a severe challenge to the application of

BA in the healthcare sector, albeit relying largely on anecdotal evidence. Based on a Delphi study and interview data from a broader range of industries, Vidgen et al. (2017) classified the availability of strong “data scientist skills” as a “challenge focal area”. Regarding discrete-event simulation tools, Hoad et al. (2015, p. 1155) reported that “the use of methods is hampered by a lack of application knowledge”. In addition, Gupta and George (2016) highlighted that, regarding big data analytics in general, data, technology and human capabilities, as well as dynamic capabilities of the firm, are important drivers of BA usage, leading to the practical implication that employees need to “possess big data-specific managerial and technical skills” (Gupta and George 2016, p. 1061).

Other studies have focused on specific analytics methods and software tools. For instance, a study by Brailsford et al. (2013) evaluated the adoption of a particular simulation modelling tool in the National Health Service in the UK. Their study covered 28 interviewees from three groups of adopters: “not started”, “given up” and “actively using”. They found that the main reasons for employees giving up using the software were that perceptions of advantages, ease of individual adoption, advantages over current practices (e.g. Excel), training access and usage by colleagues were negative. Non-users mainly criticized the ease of adoption and ease of use, while users reported mainly positive perceptions, except for perceived existing skill base. Another example is provided by the analysis of Park et al. (2010), who focused on Web analytics services. They found that the continuous use intention of Web analytics services is mainly driven by information quality, as well as the value provided.

Another important issue highlighted is that employees do not see the full value of applying analytics tools. Vidgen et al. (2017) highlighted that value from using analytics for improved decision making should be created. Similarly, modellers questioned by Hoad et al. (2015) had the attitude that discrete event simulation is not necessary – i.e. according to the study they did not see much value in applying such tools.

A few studies, which are related more closely to our research, have started to adopt behavioral theories to explain usage behavior of analytics tools. In order to understand employees’ acceptance of BA tools, related research has used the technology acceptance model (TAM), which is based on TRA (Brailsford et al. 2013). Besides TAM, prior literature on business intelligence has also applied technology-organization-environment as an underlying theory to explain BA tool adoption in firms (Côte-Real et al. 2014). In addition, the information systems (IS) success model has been used to take a more technical perspective on the continuous use of Web analytics services (Park et al. 2010).

Summing up, it can be concluded that the behavior of employees plays an important role when it comes to the continuous usage of analytics tools. According to the theoretical foundations, such behavior seems to have several antecedents, which are related to employees themselves as well as to how the tools provided are perceived. The analyses to date have, however, been limited to specific analytics tools or to analytics tools in general, without putting special emphasis on the type of tool, or by covering the dimensions according to TRA. As such, these studies provide an initial understanding of analytics tool usage and serve as a starting point to better understand the importance of the behavioral aspect in this regard. Specifically, it is necessary to analyze how continuous use of analytics tools can be explained from the behavioral perspective of employees. Our research aims to close this gap, and thus focuses on the different types of analytics tools and analyses the different dimensions of TRA in detail.

2.4 Research model

By applying TRA to the context of BA tool usage, the theory provides a set of explanations as to why employees use analytics tools, and to what degree. The theory establishes a causal link between antecedents from the three dimensions of (1) individuals’ attitude toward the behavior, (2) perceived norms surrounding performance of the behavior and (3) perceived behavioral control. Prior work as discussed

in Section 2.3 is used to conceptualize application of the general model to the context of BA. Individuals can be convinced of the value of a specific tool via behavioral beliefs conceptualized by aspects such as information required by the tool, reliability of the tool, ease of application of the tool as well as support to achieve excellent work results. Such beliefs result in an attitude toward the specific analytics tool. Within normative beliefs relevant individuals are within the professional context, hence colleagues from the direct work environment, supervisors and colleagues in similar functions are relevant reference persons. The intensity of analytics tool usage can be explained depending on the importance and pressure of perceived norms. Regarding control beliefs, easy access, lack of alternatives, costs and benefits of the application, and perceived control options of applying the tool, as well as the respective importance of these, are relevant conceptual elements.

Our research model focuses on behavior in terms of using analytics tools, and is not limited to intentions to use such tools. This focus on actual behavior avoids bias regarding the intention–behavior gap (Fishbein and Ajzen 2010). In addition, the focus of the research model is on the usage of specific analytics tools by each respondent, but is not limited to a specific tool – i.e. any tool usage can be explained by the model, but the variables predict usage for one tool at a time. As the focus is on specific analytics tools, the research model has the underlying assumption that respondents are already familiar with the respective tool. Otherwise, it would not be possible to judge the benefits within behavioral beliefs. The analytics tool skills are reflected in the variable “analytics tool skills”, which is connected to usage of the tool and to perceived behavioral control. The variable is explained with reference to skills, as the ability to control use of the tool is dependent on the individual’s skills regarding its application.

Concluding, based on adopting TRA in the context of using analytics tools, we formulate the following research model (hypotheses are according to the model in line with the basic understanding of TRA) as depicted in Figure 25.

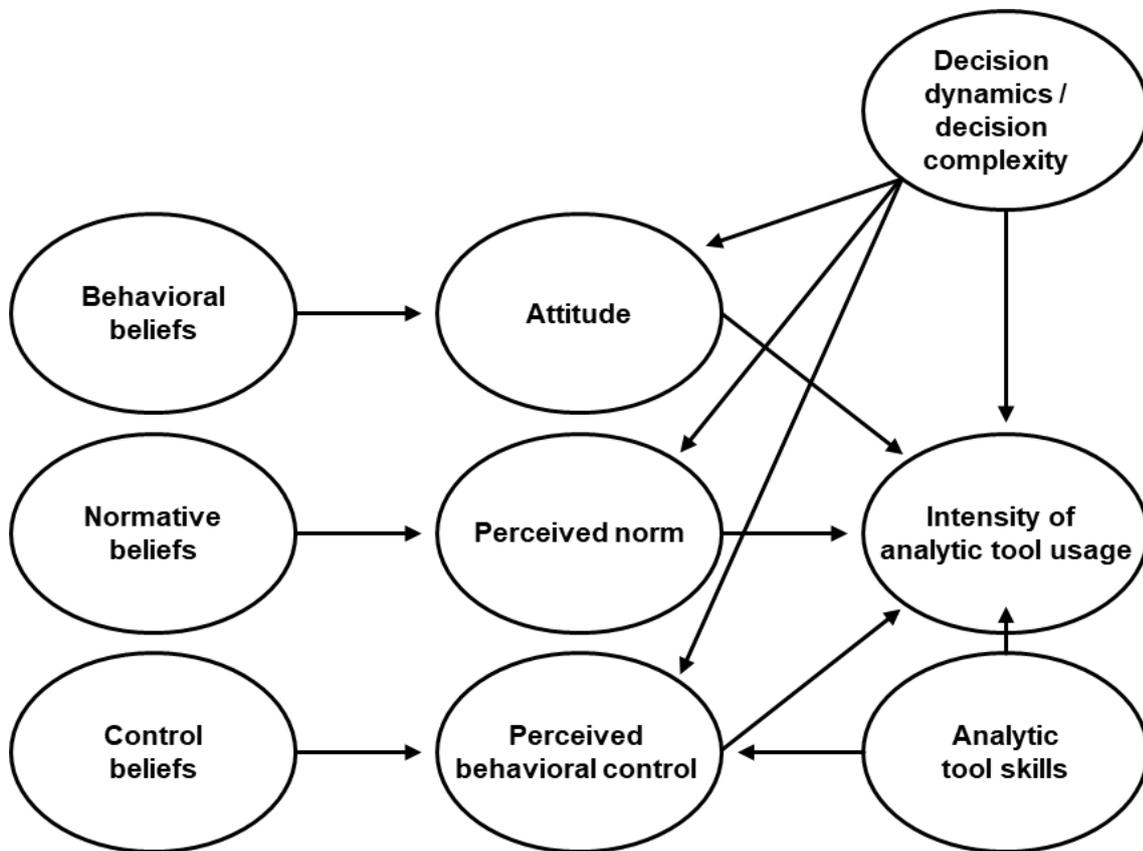


Figure 25. Research model

3. Research method

3.1 Participants

In order to test our research model, we gathered data by surveying employees within the financial services industry. We focus on this industry, as it offers – in principal – good preconditions for use of analytics tools. Financial service operations are characterized by processing information (Hatzakis et al. 2010); that is, gathering, analyzing and producing information in various formats and for different purposes is part of the employees' everyday business. Typical financial services products relate to granting loans, selling investment products such as bonds or certificates, and providing transaction management. This entails sales activities and administrative activities (e.g. settlement and clearing), but also involves call centers, as well as supporting activities ranging from human relations to IT management to treasury. In order to provide services and execute the related activities efficiently, good decisions on staffing and scheduling, forecasting related to credit (behavioral) scoring and loan portfolios, calculating customer value regarding long-term financial service relations, investment decisions on the capital markets and pricing decisions of services in relation to interest rates are required (Hatzakis et al. 2010). Such decisions are ongoing, which means they are of a dynamic nature. To tackle such (operational) decision problems, a wide range of analytics tools from all four categories could be employed (e.g., Baesens et al. 2003). Therefore, analytics tools can be assumed to be highly relevant decision support instruments for a broad range of employees in this industry.

We collected data from employees working in the German financial services industry by sending out an online questionnaire using a non-public mailing list. The online system recorded 933 entries, of which 268 did not contain any data at all; presumably these individuals simply clicked on the link and read the preface, without going further. Of the 665 remaining responses, 333 had to be deleted as the participants did not fully complete the items regarding the dependent and independent variables. The remaining sample included 332 employees, of whom 71.4% were male and 28.6% female. The average age of the participants was 41.0 years (SD: 10.6 years), and the average working experience amounted to 12.0 years (SD: 9.1 years). In addition, 69.1% of the participants had no managerial responsibility, while 30.9% were in managerial positions. Bank working areas were represented as follows: 32.2% front office, 18.3% back office and 49.5% supporting activities. The demographics of the participants in our survey were comparable to other analyses from the financial services sector (e.g., Leyer and Moormann 2014).

To assess potential non-response bias, we followed (Kobarg et al. 2017) by indirectly testing whether the answers of the participants differed from those who did not participate. In line with Sheikh and Mattingly (1981), we considered the response times by assuming that employees who participated late were similar to employees who did not participate at all (Miller and Smith 1983). The direction or significance of our results did not change by adding the control variables "date of participation" and "survey answering time" to our model. Thus, we did not detect any influence from a potential non-response bias.

3.2 Measures

We adopted our measures from the reasoned action approach using seven-point Likert scales for each item (Fishbein and Ajzen 2010) except for usage. As our focus is on actual behavior, we asked respondents to rate their usage intensity on a time-period scale of daily, several times a week, once a week, several times a month, once a month, several times a year, once a year, or never. The measures regarding the other variables were adapted to the context of analytics tools. Examples include, "The [analytics tool] provides exactly the information I need for my work" (behavioral beliefs), "I use the [analytics tool] as it is available to me" (control beliefs) and "Individuals who influence me recommend that I use

the [analytics tool]" (perceived norms). The variables "attitude", "perceived norm", "perceived behavioral control" and "skills regarding tool usage" consist of reflective items. The items of the variables regarding beliefs are calculated by multiplying the respective belief strength with the items of outcome evaluation ("behavioral beliefs"), motivation to comply ("normative beliefs") and power of control ("control beliefs"). All measures are displayed in Appendix A.

The analytics tools as reference objects in our questionnaire were operationalized within the four adopted categories. For each category, a number of analytics tools exist (Asllani 2015; Davenport and Harris 2007; Gupta and George 2016), as depicted in Table 38.

Statistical analysis	Forecasting/extrapolation	Predictive modelling	Optimization
Visualization of data	Time series	What-if analyses (sensitivity analyses)	Linear optimization
Exploratory data analysis	Causal prognosing	Monte-Carlo Technique (random numbers)	Non-linear optimization
Descriptive statistics	Neuronal networks	Simulation	Integer optimization
Correlation analysis	Support vector machine	Decision trees	Dynamic programming
Regression analysis	Bayesian statistics		Heuristic optimization
Analysis of variance			
Cluster analysis			
Factor analysis			

Table 38. Analytics tools within the categories

To capture the decision context in which analytics tools might be used, we measured decision complexity, as well as decision dynamics in the employees' work environment. The scales were adapted from conceptual descriptions of decision complexity by Smith and Hayne (1997), Swait and Adamowicz (2001) and Ordóñez and Benson (1997), as well as decision dynamics from Paich and Sterman (1993) and Diel and Sterman (1995).

In addition, we gathered control variables in terms of gender, age, work experience and analytic reasoning.

3.3 Procedure

Participants were questioned using a dynamic questionnaire, as follows: First, we asked respondents to indicate their knowledge of all the analytics tools presented in Table 1. If they did not select any analytics tool (which meant that they were not familiar with any), they were forwarded to the questions on decision dynamics and complexity in their workplace, and on their demographics. If they indicated knowledge of at least one analytics tool, they were asked about their ability to use the tools they knew about, as well as how often they used tools that were available in their workplace.

Second, we randomly selected one of the tools participants indicated having knowledge about and asked questions, using this tool as the reference object, regarding the reasoned action approach variables. This was necessary in order to ensure that participants had knowledge about the analytics tool in question.

Third, participants were questioned regarding decision complexity and dynamics in their job, as well as regarding their demographic information.

3.4 Data analysis

We tested our research model using partial least squares (PLS), and implemented it in SmartPLS 3.2.7 using the bootstrapping procedure with 5,000 resamples (Hair, Ringle, & Sarstedt, 2011).

In order to check validity and reliability, we used the standard procedure for reflective measurement models proposed by Hair et al. (2011) and Hulland (1999). Composite reliability was confirmed for each variable because the values were above the threshold of .7. Indicator reliability was also confirmed as the AVE values of all variables were above .5. Table 39 provides an overview of the composite reliability and AVE.

	Composite Reliability	AVE
Tool usage	1.000	1.000
Attitude	0.912	0.738
Behavioral beliefs	0.888	0.694
Perceived norm	0.910	0.788
Normative beliefs	0.872	0.796
Perceived behavioral control	0.863	0.708
Control beliefs	0.810	0.840
Knowledge regarding tool usage	1.000	1.000

Table 39. Measurement model validation

Discriminant validity was assessed using the heterotrait–monotrait (HTMT) ratio of correlation (Henseler et al. 2015), which provides greater accuracy in terms of detecting discriminant validity compared to using the Fornell–Larcker criteria. Table 40 provides the values for the constructs, which were all below the threshold of .90 for HTMT.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Tool usage							
(2) Attitude	.301						
(3) Behavioral beliefs	.397	.718					
(4) Perceived norm	.296	.440	.357				
(5) Normative beliefs	.414	.570	.605	.823			
(6) Perceived behavioral control	.369	.526	.529	.386	.439		
(7) Control beliefs	.362	.548	.647	.531	.630	.679	
(8) Knowledge regarding tool usage	.403	.171	.213	.213	.148	.257	.271

Table 40. HTMT values

We conducted several tests to examine the quality of our structural model. As per Henseler (Henseler et al. 2014), we examined standardized root mean square residual (SRMR) as a measure for the approximate fit of our composite factor, as well as common factor, models – a value of less than .10 or .08 should be reached for both (Hair, et al., 2011). Our model reached .06 for the SRMR composite factor model and .08 for the SRMR common factor model.

In addition, following Kortmann (2015) we performed a blindfolding procedure involving an omission distance of 6 to assess the predictive relevance of the model (Henseler et al. 2009). The test revealed positive Stone–Geisser Q^2 values; thus, strong overall predictive power can be assumed for the model (Henseler et al. 2009).

4. Results

4.1 Descriptive results

First, we report on the descriptives regarding the 332 participants, of whom 43.4% did not have knowledge of any analytics tool (hence, values for the variables included in the TRA model are not available; nevertheless, we obtained values for the demographic variables, as well as for the scales “analytic reasoning”, “decision dynamics”, and “decision complexity”), as shown in Table 41.

	M	SD	(1)	(2)	(3)	(4)	(5)
Age	41	10.57		-.03	-.10	.07	-.05
Gender	1.28	0.46			.01	.05	.05
Analytic reasoning	4.56	1.26				.16**	.08
Decision dynamics	5.23	1.10					.38***
Decision complexity	4.36	1.18					

Table 41. Descriptive statistics of the overall sample and correlations among variables (Notes: N = 332; M = Mean, SD = Standard Deviation; * p < .05; ** p < .01; * p < .001; two-tailed tests)**

Checking for major differences between participants who were not aware of any tool at all and those who had knowledge of at least one tool, we observed the following similarities and differences. Regarding decision dynamic ($U(12,087.5) = -2.981, p < .01$) and complexity ($U(7,841.5) = -1.812, p < .10$), we observed significant differences between participants with knowledge of at least one tool ($M = 5.29; M = 4.48$) and those who were not aware of any tool ($M = 5.11, M = 4.12$). There were no differences between either group regarding age ($T(283) = .703, ns$), work experience ($T(284) = .156, ns$) and being a supervisor ($\chi^2(2) = .389, ns$). However, we found a significant difference between groups with respect to the working area ($\chi^2(11) = 39.864, p < .001$): participants with knowledge of tools were more likely to work in finance and accounting, as well as strategic company development and steering departments in financial services companies, compared to those who were not aware of any tools.

The 188 participants with knowledge of at least one tool answered all questions, so that all research model variables could be obtained. Table 42 presents the descriptive results and correlations.

	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Tool usage	6.30	2.01	.38***	.29***	.39***	.28***	.38***	.33***	.40***
(2) Behavioral beliefs	25.22	9.95		.65***	.53***	.32***	.58***	.55***	.20**
(3) Attitude	4.75	1.31			.51***	.40***	.54***	.47***	.16*
(4) Normative beliefs	15.49	10.46				.73***	.52***	.53***	.14
(5) Perceived norm	2.97	1.65					.44***	.46***	.12
(6) Control beliefs	22.25	11.30						.57***	.25**
(7) Perceived behavioral control	4.56	1.56							.24**
(8) Knowledge regarding tool usage	1.39	0.58							

Table 42. Descriptive statistics and correlations among variables (Notes: N = 188; M = Mean, SD = Standard Deviation; * p < .05; ** p < .01; * p < .001; two-tailed tests)**

On average, the 188 participants had knowledge of 4.6 tools (SD: 5.3). The detailed distribution of their tool knowledge is depicted in Figure 26.



Figure 26. Distribution of knowledge regarding tools (multiple responses; N = 1517)

Participants reorted the following usage statistics within the four categories of analytics tools, as depicted in Figure 27.

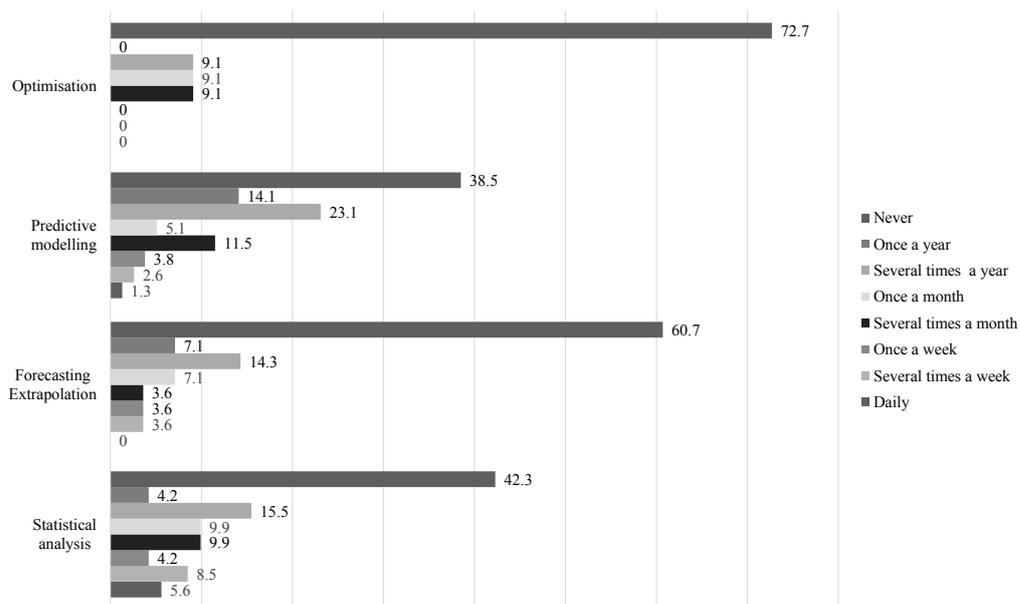


Figure 27. Distribution of tool usage in the dataset (N = 188)

4.2 Results regarding the research model

In order to understand the reasons for varying usage intensity, we calculated the underlying structured equation model. The results are presented in Figure 28.

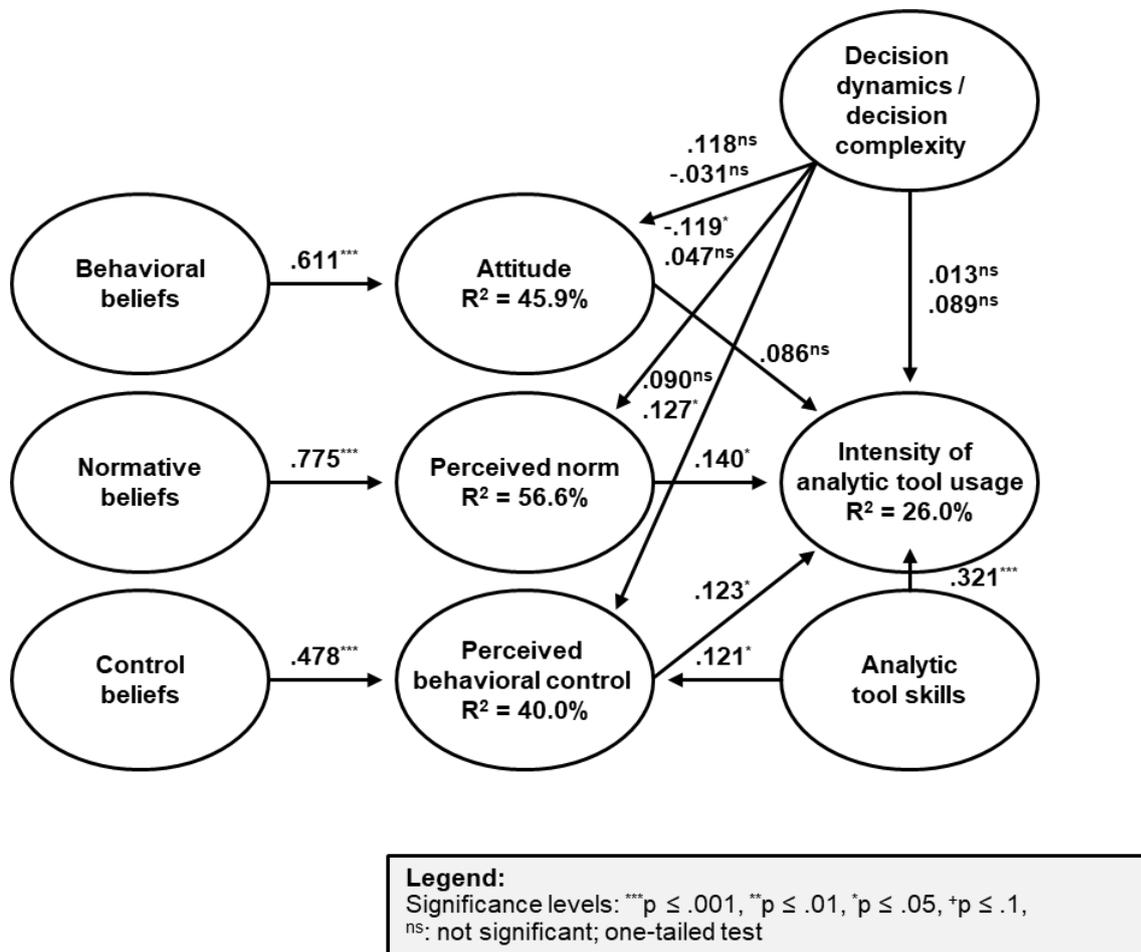


Figure 28. Results of the general research model

Adding the control variables age, decision complexity, decision dynamics, work experience and analytic reasoning style increased the explained variance to .283. Influences of the control variables could only be observed for age on attitude ($-.140$, $p < .01$), as well as decision dynamics on perceived norm ($-.119$, $p < .05$).

A *post hoc* analysis of splitting up normative and control beliefs (as perceived norm and perceived behavioral control have a significant effect) revealed that the effect of control beliefs was mainly driven by employees having access, i.e., being able to control usage personally ($.358$, $p < .001$) and less by tools being available in a cost-effective manner ($.164$, $p < .05$).

Regarding normative beliefs, there was no significant influence of colleagues – i.e., those who work together with employees in the respective area of the organization. The main driver of perceived norm was the influence of supervisors ($.438$, $p < .001$), as well as colleagues being in similar positions to that of the respondent ($.405$, $p < .01$).

We then tested the model according to the groups of analytics tools for which the 188 participants reported on the variables in our research model (see Figure 29). The fourth group, “optimization”, was excluded from the analysis as the number of observations was not high enough to warrant further investigation.

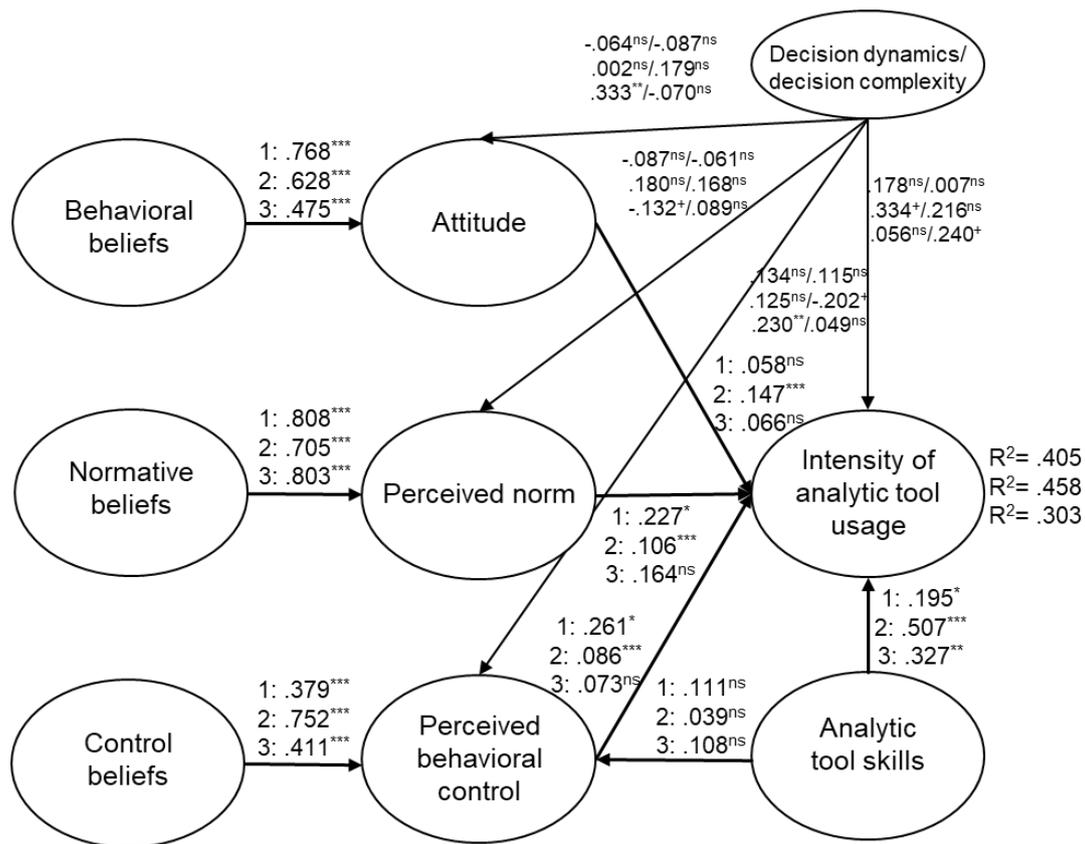


Figure 29. Results of the model for each of the three tool categories; + p < .1; * p < .05; ** p < .01; *** p < .001; one-tailed test)

5. Discussion and conclusion

5.1 Theoretical contributions

BA and big data are hyped to improve decision making and organizational performance. However, adoption of BA tools seems to be falling behind expectations. By finding significant support for antecedents of the intensity of tool usage in our research model, we contribute to defining the field of BA in multiple ways.

First, we emphasize the behavioral perspective of BA by adopting TRA as a useful psychological theory in this regard. TRA helps to conceptualize the object of interest and to uncover causal relationships. Our analysis shows that the component of behavioral science and underlying psychological mechanisms is an important part of the field of BA, thus emphasizing the importance of this dimension of the field of analytics as described by Mortenson et al. (2015). In order to deliver the full potential value of analytics tools in organizations, behavioral aspects related to psychological constructs have to be considered. As our results show, the relevant significant constructs are beyond the functionality of tools or their perceived applicability in order to create value. Hence, next to developing better analytics tools that enable more profound decisions to be made, more emphasis should be placed on understanding how organizational conditions can be set to ensure usage of such tools.

Second, in order to understand how organizations can be transformed to being data-driven, the focus regarding adoption should be extended beyond the individual to the group level in which the individual is embedded. Hence, we contribute to understanding of organizational issues in BA adoption by explaining the (rather low) usage intensity based on TRA with individual and organizational hurdles. While

individually perceived utility of BA tools does not play any role, the individual skill level is of high importance. Furthermore, on an individual level, self-efficacy regarding tool application should be strengthened. On the organizational side, normative beliefs and accessibility are important; in other words, the work environment in which employees are embedded in is decisive. As our results show, the influence comes not from employees with whom the individual works within processes, but rather supervisors and colleagues doing similar work. This means that a wider organizational setting than the direct work environment has to be considered. Furthermore, organizations have to put more emphasis on enabling their employees to have access to relevant analytics tools when they need them.

Third, building on prior work that has shown the value of BA (e.g., Cao et al. 2015; Trkman et al. 2010), we conceptualize and empirically underline the relevant antecedents that must be established in order to create such value. Our results show that understanding these antecedents is of high importance, as a surprisingly high percentage of employees are ignorant of BA tools. The results contribute to understanding of how analytics tools can be aligned with employee behavior in the workplace. As a multitude of analytics tools is available for different purposes, it might be difficult to get to know not only the tools themselves, but also how to apply them. This is reflected in the fact that such knowledge is an important antecedent. As expected, knowledge regarding tool usage significantly positively influences tool usage but, interestingly, does not have a significant effect on perceived behavioral control (contrary to our model). This means that the more knowledge an employee has regarding a certain BA tool, the more he or she uses that tool. However, at the same time, knowledge does not influence the individual's perception of being capable of using the tool. We assume that this finding is related to the fact that learned theoretical information must be implemented throughout practical training before employees have the feeling of really understanding the subject. As prior research has shown, training of a new subject (and thus the knowledge regarding this subject) is only beneficial if the subject has been trained in an adequate context, regularly gets feedback regarding the application and has the chance to practice the subject via adequate exercises and situations (Gonzalez et al. 2003). We assume that this is often not the case in training employees regarding BA tools, which diminishes employees' perception of being capable of using them.

Looking further at the results of the overall model, our findings show that the usage of BA tools is significantly influenced by perceived norm and perceived behavioral control. In other words, individuals are more likely to use BA tools if other important individuals (such as important co-workers) expect them to use the respective tool, and they perceive themselves as being capable of using the tool. These results strengthen the findings of a Delphi study by Vidgen et al. (2017), who found that people-oriented factors (such as a lack of data or analytical and technical skills) are, besides value-related factors (such as establishing a business case and using analytics for decision making), the most important challenges organizations have to face when implementing BA tools. In order to benefit from BA tools, organizations have to hire the right people with the right skills (Gupta and George 2016), and who are also curious, problem-solving oriented and capable of working independently (Vidgen et al. 2017). Contrary to our model, attitude has no significant effect on tool usage (in the overall model). This result contradicts findings from Web analytics services research (Park et al. 2010) which has shown that high satisfaction with the tool increases usage by employees. We assume that the non-significant effect of attitude on the intensity of tool usage is related to the fact that the tool either has to be used by employees (regardless of whether they are willing to use it) because it is a standard or is not available.

Fourth, we focus on a broad set of BA tools classified in four categories, instead of one specific OR technique only (e.g. simulation; (Hoed et al. 2015)), or very generally on BA as a whole (e.g., Gupta and George 2016). Looking at the different types of BA tools, perceived norm and perceived behavioral

control only significantly influence tool usage in the case of statistical analysis and forecasting/extrapolation, with the effect being stronger for forecasting/extrapolation tools. Predictive modelling seems to be very complex for use by employees, so that the only explanatory variable is having the necessary skills. This explanation is in line with Hoad et al. (2015); however, contrary to their results, it is only skills being a relevant antecedent, and not attitude. Attitude is only relevant for forecasting/extrapolation, as our results show. This is also supported by results from users within a healthcare study context (Brailsford et al. 2013), who saw advantages of new tools over current practices, which refers to behavioral beliefs and attitude. The finding can be explained by the fact that such tools predict the future analytically, via assumptions, whereas humans tend to believe in their intuitive feelings. Thus, one has to be convinced of or believe in the results of such analytics tools in order to continuously use them.

Furthermore, Kowalczyk and Buxmann (2015) proposed that decision support from a specific analytics tool and the decision-making process should be considered jointly, highlighting the role of ambidexterity in decision support. If data analysts collaborate closely with decision makers as well as with decision makers better, then decision making will be more rational – i.e. accompanied by a positive notion of analytics tools. Our results show that this normative component regarding the colleague's role, including collaboration, is indeed important in general, but is not relevant for predictive modelling in particular. While we did not check for the specific tactics proposed by Kowalczyk and Buxmann (2015), our results show that use of predictive modelling is mainly due to knowledge of such tools. As per Hoad et al. (2015) analysis, which falls within this class of analytics tools, we support the importance of knowledge but do not find evidence regarding attitude being an important antecedent. In addition, our results show that the influence of perceived value from analytics tools on their use is only relevant in the category of forecasting/extrapolation. Thus, while it has been emphasized in various studies (e.g., Brailsford et al. 2013; Vidgen et al. 2017) that benefits are important for analytics tools to be used in organizations, there are other important factors on the individual level as well.

Fifth, our model incorporates a link to DDM. As the results show, analytics tools can be and are used in environments with different degrees of DDM characteristics. There seems to be, however, a normative pressure as the work environment becomes more dynamic, so that there is an indirect influence from the fact that relevant colleagues are against the use of analytics tools. Independent of this influence, perceived complexity of decision making does not lead to a situation in which employees react by increasing the usage intensity of analytics tools. Either BA tools are not required to understand more complex situations, or, given the widely lacking knowledge of tools, employees do not realize that analytics tools could help them to tackle dynamic problems more effectively. Supporting the first of these arguments, we found support for forecasting tools wherein a higher decision complexity leads to a higher usage intensity, with skills being the only other antecedent.

5.2 Practical contributions

Our results have some important implications for practitioners. For the successful usage of BA tools, it is not important to convince employees or change their attitudes towards them. However, it is crucial to highlight that usage of a BA tool is favorable. By creating a friendly and supportive atmosphere, employees get the feeling of being expected to use BA tools. When the first employees start to use them, and are convinced of their usefulness by having access to them and perceiving a positive impact from their use, these employees will have a positive influence on their co-workers in similar positions with respect to using the tools. An important role can be seen in supervisors who are convinced of the usefulness of analytics tools; thus, emphasis has to be put on showing supervisors the possibilities so that they have a positive influence on adoption among their employees.

To get employees on board, the perceived behavioral control has to be increased by diminishing the psychological barrier to using BA tools. This can be achieved via target-group-specific training. In order to simultaneously increase the perceived norm, this training could be performed by co-workers who are in similar positions but are more advanced in using the respective tool. Peer training can reduce psychological barriers, because employees can ask critical or (in their view) “stupid” questions without exposing themselves to ridicule, while knowledge sharing (from their co-workers) increases their acceptance of the tool. Furthermore, a platform for exchange between such colleagues should be established, whether online or through personal meetings. This could also result in supporting a company-independent platform to foster the exchange of employees in similar positions – e.g. if a company is not big enough to have several people doing similar jobs.

In addition, self-service options that allow employees to have access to tools when needed could be established. Such self-services would enable easy access that would match personal opportunities to use the tool. Here, Web applications that easily allow transfer data and are only paid per use by the company could be a promising path.

5.3 Limitations and future research

The results of our study have some limitations. First, we collected data in the financial services industry only, which limits the generalizability of our findings. As described within the characteristics of financial services in Section 3.1, the industry processes significant amounts of information, and is thus a good example for administrative contexts that can be found in many companies in every industry. However, to overcome the generalizability issue, the study should be replicated in other industries. Second, the composition of our survey participants is not equally distributed – i.e. the number of participants without knowledge of at least one BA tool is quite high, whereas the group of participants who answered the questions regarding optimization tools is very small. In order to obtain equally distributed groups, the number of survey participants needs to be higher. While there might be a suspicion that analytics tools are not widely used by employees in the financial services industry, our results indicate no bias towards employees not answering when they did not have knowledge of any analytics tool. Third, our data stem from one point of time, which might make it subject to common method bias. While we adopted an underlying theory with a generally established research model that incorporates cause and effect, future research should focus on conducting a longitudinal study at least two points in time. Other options could be to conduct a case study that allows for gathering explicit information on work contexts in the form of job descriptions and recordings on how often software containing analytics tools has been used. Fourth, capturing explicit data on job descriptions could be enlarged by considering decision dynamics and complexity. Capturing such information would enable researchers to better distinguish whether decision making is indeed complex/dynamic, or is perceived as such due to employees lacking relevant capabilities. However, as our results show, the decision complexity of participants work environment is above average, which indicates that analytics tools are assumed to have a positive impact on decision making, and are relevant.

Following this line of argumentation, future research should select specific contexts and characterize them as to whether analytics tools in specific categories are indeed required to perform the job. The relatively low usage of analytics tools could be partly explained by BA being implemented within an automated system that does not require employees to make decisions, such as in the case of automated loan decisions for retail credit. Hence, future research should also analyze for which purpose – operational, tactical or strategic decisions – systems are installed, or to what extent human decision makers will benefit from using analytics tools.

Finally, future research should put more emphasis on the organizational environment in which analytics tools are to be used by employees. As our results indicate, the organizational conditions in which employees are embedded are quite important. Hence, the dynamics of organizational change towards a data-driven company culture should be analyzed in more depth with regard to the applicability and usage intensity of analytics tools. Such analyses would help to distinguish necessary decision support and the importance of different kinds of tools, and to better establish the field of behavioral BA, in addition to aiding in the development of tools.

Appendix

Behavioral beliefs
The analytic tool provides exactly the relevant information which I need for my work.
Having exactly the relevant information available which I need for my work is very important for me.
I am very satisfied with the reliability of the information generated by the analytic tool.
Having reliable information available is very important for my work.
The analytic tool is an effective means to support my work.
Working effectively is very important for me.
The analytic tool helps me to deliver excellent work results.
Delivering excellent work results is very important for me.
The analytic tool can be used very easily.
The easy use of the analytic tool is very important for me.

Table 43. Items for behavioral beliefs

Attitude
The work-related use of the analytic tool is ...
... beneficial.
... satisfactory.
... important.
... gratifying.
... pleasing.

Table 44. Items for attitude

Normative beliefs
My colleagues with whom I work together advise me to use the analytic tool.
I generally take advise from colleagues with whom I work together very seriously.
My colleagues in similar positions (also in other companies) advise me to use the analytic tool.
I generally take advise from colleagues in similar positions (also in other companies) very seriously.
My supervisor advises me to use the analytic tool.
I generally take advise from my supervisor very seriously.

Table 45. Items for normative beliefs

Perceived norm
Individuals which have an influence on me, advise me to use the analytic tool.
Individuals that are important to me, advise me to use the analytic tool.
Individuals whom's opinion I value, advise me to use the analytic tool.
Individuals in a similar situation like me, advise me to use the analytic tool.

Table 46. Items for perceived norm

Control beliefs
I use the analytic tool, because it is easily accessible for me.
The easy access to analytic tools is important for me.
I use the analytic tool, because it is cost-effective to use it.
The cost-effective use of analytic tools is important for me.

Table 47. Items for control beliefs

Perceived behavioral control
It is in my control to use the analytic tool for my work.
It is mainly up to me to use the analytic tool for my work.
I am convinced that I can use the analytic tool for my work.
If I really want to, I can use the analytic tool for my work.

Table 48. Items for perceived behavioral control

Decision dynamics
In my work environment...
... goals are achieved by a sequence of similar decisions.
... decisions are influenced by prior decisions.
... the environmental conditions are changing over time.
... it is important to make decisions on the correct point in time.

Table 49. Items for decision dynamics

Decision complexity
Decisions in my work environment are characterized by...
... many alternatives from which one has to choose from.
... many scenarios that have to be considered.
... consequences that are difficult to understand.
... long time periods until consequences are evident.

Table 50. Items for decision complexity

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Appendix

Publications

Journal articles (peer reviewed)

Leyer, M., Kettenbohrer, J., and Strohhecker, (2018): This analytics tool looks nice, but... I am still happy without it, Journal of the Operational Research Society (under review)

Conference articles (peer reviewed)

Leyer, M., Beimbom, D., Kettenbohrer, J., (2018): Will Users of Process Management Systems Be More Innovative? A Study on Process Innovation and Process Orientation in the Financial Industry, ACM SIGMIS CPR 2018, Buffalo - Niagara Falls, USA

Kettenbohrer, J., Beimbom, D., and Leyer, M. (2016): Examining the Impact of Business Process Management System Use on Employees' Process Orientation, Proceedings of the 37th International Conference on Information Systems (ICIS), Dublin, Ireland

Kettenbohrer, J., Kloppenburg, M., and Beimbom, D. (2016): The Effect of Process Ownership Assignment on Business Process Standardization Success, Proceedings of the 22nd Americas Conference on Information Systems (AMCIS), San Diego (CA), Research in Progress

Kettenbohrer, J. (2016): A Literature-Based Analysis of People's Roles in Business Process Management, Proceedings of the 22nd Americas Conference on Information Systems (AMCIS), San Diego (CA)

Kettenbohrer, J., Beimbom, D., and Eckhardt, A. (2016): Examining the Influence of Perceived Job Characteristics on Employees' Process Orientation, Proceedings of the 24th European Conference on Information Systems (ECIS), Istanbul, Turkey

Kettenbohrer, J. and Beimbom, D. (2015): Investigating the Role of Inertia in Business Process Standardization Initiatives, Proceedings of the 36th International Conference on Information Systems (ICIS), Fort Worth, USA, Research in Progress

Kloppenburg, M., Kettenbohrer, J., Beimbom, D., and Bögle, M. (2015): Leading 20,000+ employees by a process-oriented management system - insights to process management at Lufthansa Technik Group, Proceedings of the 13th Business Process Management Workshops (used to be: Proceedings of the International Conference on Business Process Management (BPM)), Innsbruck, Austria, Best Industry Paper

Kettenbohrer, J., Fischer, D., Beimbom, D., and Kloppenburg, M. (2015): How Social Software Can Support Business Process Management - Developing a Framework, Proceedings of the 21th Americas Conference on Information Systems (AMCIS), Puerto Rico

Kettenbohrer, J., Beimbom, D., and Eckhardt, A. (2015): Analyzing the impact of job characteristics on employees' acceptance of process standardization, Proceedings of the 23rd European Conference on Information Systems (ECIS), Münster

Kettenbohrer, J., Eckhardt, A., and Beimbom, D. (2015): A Theoretical Perspective on Meaningfulness of Work and the Success of Business Process Standardization Initiatives, Proceedings of the 12th International Conference on Wirtschaftsinformatik, Osnabrück

Kettenbohrer, J. and Beimbom, D. (2014): What You Can Do to Inhibit Business Process Standardization, Proceedings of the 20th Americas Conference on Information Systems (AMCIS), Savannah (GA), Research in Progress

Kettenbohrer, J., Beimbom, D., and Kloppenburg, M. (2013): Developing a Procedure Model for Business Process Standardization, Proceedings of the 34th International Conference on Information Systems (ICIS), Milan, Italy, Research in Progress

Kettenbohrer, J., Beimbom, D., and Kloppenburg, M. (2013): Developing a Governance Model for Successful Business Process Standardization, Proceedings of the 19th Americas Conference on Information Systems (AMCIS), Chicago (IL)

Book chapters

Kloppenburg M., Kettenbohrer J., Beimbom D., Bögle M. (2018): Leading 20,000+ Employees with a Process-Oriented Management System: Insights into Process Management at Lufthansa Technik Group. In: vom Brocke J., Mendling J. (eds) Business Process Management Cases. Management for Professionals. Springer, Cham: p.505-520

Kettenbohrer, J., Kloppenburg, M., and Beimbom, D. (2015): Driving Process Innovation: The Application of a Role-Based Governance Model at Lufthansa Technik, In: vom Brocke, J.; Schmiedel, S. (eds.) (2015): BPM - Driving Innovation in a Digital World, Management for Professionals; Springer International Publishing Switzerland: p.275-286

Other publications (peer reviewed)

Kettenbohrer, J. (2015): The Human Side of Business Process Standardization, Proceedings of the 2015 Doctoral Consortium WI, Würzburg

Unpublished

Kettenbohrer, J., Beimbom, D., Eckhardt, A., and Weitzel, T. (2018): Good cop or bad cop? How meaningfulness of work and job construals affect process change acceptance, unpublished

Leyer, M., Kettenbohrer, J., and Beimbom, D. (2018): How to provoke individuals' contributions to process innovation – The role of process management systems, unpublished