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Potentiale von Enterprise Social Networks und Business Process Management zur Gestaltung effizienter Unternehmen

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Abkürzungsverzeichnis

BPI	Business Process Improvement
BPM	Business Process Management
ESN	Enterprise Social Network
IT	Information Technology
KMU	Klein- und mittelständische Unternehmen

1 Einleitung

1.1 Motivation und Problemstellung

Seit Langem streben Unternehmen danach, sich effizient zu gestalten (organisatorische Effizienz[1]), um dem Wettbewerbsdruck standhalten zu können. Wesentliche Effizienzsteigerungen konnten besonders seit den 1980er Jahren durch die Einführung von Prozessmanagementkonzepten bzw. der Ausrichtung der Organisation an den Prozessen verzeichnet werden (Davenport, 1993, Hoser und Geyer-Schulz, 2007). Die Globalisierung und der rasche Informationsaustausch aufgrund neuer technologischer Möglichkeiten stellen aktuell zusätzliches Potential zur Effizienzsteigerung dar. In einigen Fällen befähigen die neuen Technologien Organisationen auch dazu, das bestehende Geschäftsmodell zu erweitern bzw. dieses neu zu definieren und in neue Märkte einzudringen, um zusätzliche Kunden- und Interessensgruppen zu erschließen (Levitt, 1999). Damit gehen jedoch ggf. andere oder zusätzliche Erwartungen an die Produkte und Dienstleistungen einher (Adesola und Baines, 2005), was zu immer kürzeren Produktlebenszyklen[2] (Saaksvuori und Immonen, 2008) und steigendem Kostendruck bei weiterhin hohen Qualitätsansprüchen der Kunden führt (Stark, 2015). Diese Herausforderungen erhöhen auf Unternehmen wiederum den Druck die Effizienz zu steigern. Da sich die effiziente Gestaltung der Organisation aber je nach den sich ändernden Rahmenbedingungen unterschiedlich erzielen lässt (Gabler,

[1] Definition organisatorische Effizienz: "*Die organisatorische Effizienz ist das Maß für den Zielbeitrag einer organisatorischen Regelung (Organisation). Die Bewertung der Effizienz möchte letztlich die Frage beantworten, welche Organisationsstrukturen unter bestimmten Situationsbedingungen in welchem Ausmaß die Zielerreichung fördern. Die Effizienz der einzelnen organisatorischen Gestaltungsmöglichkeiten lässt sich beim gegenwärtigen Forschungsstand aufgrund der Komplexität der Bewertungsproblematik jedoch nur sehr bedingt angeben*" (Gabler, 2018).

[2] Definition Produktlebenszyklusmanagement: „*Product Lifecycle Management (PLM) is the business activity of managing, in the most effective way, a company's products all the way across their lifecycles; from the very first idea for a product all the way through until it is retired and disposed of.*" (Stark 2015, S. 1).

2018), befinden sich Unternehmen in einem stetigen Transformationsprozess aufgrund diverser, oftmals technologischer Treiber[3].

Wesentliche Treiber für die effiziente Gestaltung sind in den letzten Jahren vor allem digitale Technologien, wie soziale Netzwerke, das Internet der Dinge, Cloud Lösungen etc. Diese Technologien und Konzepte sind sowohl aus dem Privatleben als auch dem beruflichen Umfeld nicht mehr wegzudenken (Gimpel und Röglinger, 2015). Auf der einen Seite verzeichnet zum Beispiel das soziale Netzwerk Facebook, das die private Kommunikation, Interaktion und Vernetzung durch den Austausch von Nachrichten, das Posten von Status-Updates, Bildern etc. revolutionierte (Ryan und Xenos, 2011), derzeit mehr als 2 Mrd. aktive private Nutzer pro Monat (Statista, 2018). Auf der anderen Seite haben im beruflichen Kontext digitale Technologien Möglichkeiten für neue Geschäftsmodelle geschaffen, welche für ganze Branchen einen massiven Umbruch bedeuten. Zum Beispiel entwickelte sich Uber zum weltgrößten Taxiunternehmen, obwohl es selbst keinen Fuhrpark besitzt und Airbnb wurde zum größten Anbieter für Unterkünfte, ohne selbst auch nur einen Quadratmeter Eigentum des Unternehmens aufzuwenden (Brousseau und Pénard, 2007, Gimpel und Röglinger, 2015). Dies erhöht ebenfalls den Druck auf die Organisationen in den entsprechenden Branchen, effizienter zu werden.

Neben der Schaffung neuer Geschäftsmodelle bieten digitale Technologien auch vielversprechendes Potential zur Verbesserung existierender Praktiken in Organisationen. Aus den sozialen Medien können beispielsweise Kunden-Posts extrahiert und anschließend mit Hilfe von Big Data-Verfahren analysiert werden. Diese ermöglichen es, die Erwartungshaltung der Kunden gegenüber Produkten und Dienstleistungen besser zu verstehen und einzuschätzen, sodass man diese durch die Erkenntnisse zielgerichtet auf die aktuellen Bedürfnisse der Kunden ausrichten kann (Schwaiger et al., 2017). Eine weitere Möglichkeit, um den Kundenwünschen besser zu entsprechen, sind sog. Open-Innovation-Plattformen. Starbucks sammelt beispielsweise auf deren Internetseite „MyStarbucksIdea“[4] Vorschläge von Kunden zu neuen Kaffeekreationen und zur Verbesserung des Service, welche dann von der Nutzergemeinschaft bewertet und – bei positiver Rückmeldung – in den Starbucks-Filialen eingeführt bzw. umgesetzt werden (Gallaugher und

[3] Johannsen (2017) nennt als derzeit relevante Treiber beispielsweise: *Entwicklung der Rechnerleistung, Datendigitalisierung, zunehmende Vernetzung, wachsende Datenmengen und mobile Datenübertragung*.

[4] https://ideas.starbucks.com/

Ransbotham, 2010). So kann durch diese Plattformen die Innovationskraft der Unternehmen durch den Miteinbezug der Kunden deutlich gesteigert werden (Downes und Nunes, 2013).

Während die letztgenannten Beispiele auf Potentiale von digitalen Technologien an der Kundenschnittstelle abzielen, bieten diese ebenfalls Möglichkeiten für die firmeninterne Nutzung. In den letzten Jahren etablierten sich in vielen Unternehmen interne soziale Netzwerke – oftmals Enterprise Social Networks (ESN) genannt (Stei et al., 2016, Viol und Hess, 2016). Leonardi et al. (2013) definiert diese als

> *„web-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing" (p.2).*

Die Vorteile von solchen Plattformen sind entsprechend vielfältig. Zum Beispiel können Mitarbeiter einfacher über Standorte und Länder hinweg interagieren, sodass geographische Hürden abgebaut werden (Chin et al., 2015a, Han et al., 2015, Suh und Bock, 2015, Wiesneth, 2016). Zusätzlich wird das Wissensmanagement im Unternehmen unterstützt, da Wissen einfacher geteilt werden (Han et al., 2015) und man schneller Spezialisten identifizieren kann (Riemer et al., 2015). Hinsichtlich sozialer Auswirkungen bilden die Mitarbeiter durch die ESN-Nutzung eine Gemeinschaft (Mäntymäki und Riemer, 2014), wodurch das Zugehörigkeitsgefühl zum Unternehmen erhöht (Han et al., 2015) und das Vertrauen der Mitarbeiter untereinander gesteigert wird (Richter und Riemer, 2009). Entsprechend groß ist das Interesse an ESN sowohl in der Praxis als auch in der Wissenschaft (Stei et al., 2016, Viol und Hess, 2016). Rossmann und Stei (2016) heben zusätzlich hervor, dass diese zur Verbesserung der Effizienz innerhalb der Organisation genutzt werden können.

Zusammenfassend zeigen diese Beispiele, dass durch die Anwendung von digitalen Technologien letztendlich Wettbewerbsvorteile gegenüber Konkurrenten erzielt werden (Matt et al., 2015). Dazu müssen diese jedoch zunächst in der Organisation eingeführt werden. Der Vorgang der digitalen Transformation – also die Einführung und Verwendung digitaler Technologien (Gimpel und Röglinger, 2015) – stellt jedoch die Unternehmen vor enorme Herausforderungen (Kirchgeorg und Beyer, 2016). Bestehende Strukturen in der Organisation, wie zum Beispiel Geschäftsprozesse, Managementkonzepte, Vertriebswege oder Lieferketten, müssen unter Miteinbezug der digitalen Technologien neu durchdacht und ggf. angepasst werden (Matt et al., 2015).

Den Unternehmen stellt sich dahingehend die Frage, wie sie die digitale Transformation vollziehen können, um nachhaltig im Wettbewerb bestehen zu können bzw. sich dadurch Vorteile gegenüber Konkurrenten zu erarbeiten (Berman, 2012).

Johannsen (2017) beschreibt, dass die vielfältigen Herausforderungen der digitalen Transformation unter Zuhilfenahme des St. Galler Ansatzes des Business Engineering strukturiert werden können. Nach diesem Ansatz wird das Unternehmen in drei Ebenen unterteilt, wobei jede Ebene Techniken für die Transformation bereitstellt (Winter, 2003). Auf der Strategieebene werden die Marktposition festgelegt und die Zielgruppen für die Produkte spezifiziert, auf der Prozessebene wird die Strategie in Form von Prozessabläufen umgesetzt und auf der Systemebene wird die Unterstützung der Prozessabläufe mit Hilfe von Informations- und Kommunikationstechnologie sichergestellt (Johannsen, 2017, Österle und Blessing, 2005, Winter, 2003). Hierbei kommt der Prozessebene eine besondere Bedeutung zu, da sie das Bindeglied zwischen der Strategie- und Systemebene ist (Winter, 2011) und da in den Geschäftsprozessen die Wertschöpfung vollzogen wird. Dies geschieht in Form der zu erstellenden Prozessleistung durch eine definierte Abfolge der Prozessaktivitäten, Zuteilung von Verantwortlichkeiten und Beschreibung von Informationsobjekten (Johannsen, 2017, Winter, 2003). Die Integration von digitalen Technologien in die Geschäftsprozesse stellt hier eine große Herausforderung dar (Johannsen, 2017), da beispielsweise vor der Einführung Mitarbeiter entsprechend geschult werden müssen, um die möglicherweise abgeänderten Prozesse unter den neuen Arbeitsbedingungen ausüben zu können (Henriette et al., 2015). Da für diese Maßnahmen oft die finanziellen Mittel fehlen (Geissbauer et al., 2016), kann die erhoffte Verbesserung der Prozesse durch die digitalen Technologien oftmals nicht erreicht werden (Tallon, 2007), was einer Effizienzsteigerung in letzter Konsequenz entgegenwirkt.

Im Kontext der Prozessebene stellt sich zum Beispiel auch die Frage, ob ESN mit dieser ohne Weiteres vereinbar sind, denn Prozesse und ESN sind von ihrer Ausrichtung her stark verschieden. Auf der einen Seite überführen Prozesse systematisch und strukturiert die Anforderungen der Strategieebene in die operative Ausführung und geben damit genau spezifizierte Handlungsanweisungen an die Mitarbeiter (Winter, 2003, Winter, 2011), auf der anderen Seite können Mitarbeiter bei Verwendung von Enterprise Social Networks meist losgelöst von formalen Anforderungen interagieren (Behrendt et al., 2015) und damit auch unabhängig von den vom Prozess vorgegebenen Vorschriften.

Dies wirft einige interessante Fragestellungen auf, die im Rahmen dieser Arbeit beantwortet werden sollen. (1) Zunächst werden relevante Themen motiviert, die den aktuellen Stand von Wissenschaft und Praxis in den Bereichen BPM und ESN widerspiegeln. (2) Anschließend wird eine Technik vorgestellt, mit deren Hilfe Prozesse verbessert werden können. (3) Zuletzt werden Möglichkeiten zur Bewertung der organisatorischen Effizienz dargestellt.

(1) Wie bereits beschrieben ist die Prozessebene von zentraler Bedeutung. Da die Prozesse – vor allem die Geschäftsprozesse – im Hinblick auf die sich ändernden Rahmenbedingungen angepasst und nach Möglichkeit verbessert werden sollen (Andersson et al., 2005, Hammer, 2010), benötigt man Methoden und Techniken, die die Abgrenzung, Definition, Visualisierung, Verbesserung und das Monitoring von Geschäftsprozessen ermöglichen. Das Management der Geschäftsprozesse (engl. Business Process Management, kurz BPM) stellt das Rahmenwerk dafür zur Verfügung (Vom Brocke und Rosemann, 2010a, Vom Brocke und Rosemann, 2010b). Zunächst ist eine Erhebung des aktuellen Standes an umgesetzten BPM-Maßnahmen bzw., wie ausgeprägt einzelne Themenkomplexe des BPM (z.B. im Bereich der Prozessmodellierung und -verbesserung) in Organisationen eingesetzt werden, wichtig, da auf Basis der Geschäftsprozesse die Transformation vollzogen werden kann (Johannsen, 2017). Über die Umsetzung von BPM-Maßnahmen in der unternehmerischen Praxis wird in zahlreichen Studien bereits berichtet und es zeigt sich, dass größere Unternehmen sehr viel Kompetenz im Bereich BPM vorweisen (Harmon und Wolf, 2016, Minonne und Turner, 2012). Eine detaillierte Studie mit Fokus auf die besonderen Eigenschaften und Strukturen von klein- und mittelständischen Unternehmen (KMU) ist von besonderem Interesse, da diese für einen großen Teil der Wirtschaftsleistung verantwortlich sind (Söllner, 2014) und diese beispielsweise eine große Anzahl an „ad hoc“ Prozessen vorweisen (Kolár, 2014). Daher soll im Rahmen dieser Arbeit zunächst eine Studie im Hinblick auf KMU erarbeitet werden.

Als technologisches Mittel, welches zur effizienten Gestaltung der Organisation genutzt werden kann, wurde die Relevanz von ESN bereits erläutert (Leonardi et al., 2013, Stei et al., 2016, Viol und Hess, 2016). Seit dem Jahr 2006 ist eine Vielzahl an Publikationen erschienen, die sich mit ESN auseinandersetzen. Die dabei adressierten Themenfelder sind sehr breit gefächert: zum Beispiel befassen sich diese mit der Gestaltung der ESN-Software (Bente und Karla, 2009), der Governance (Han et al., 2015), den Auswirkungen auf das Knowledge-Management (Cetto et al., 2016, Figueroa und Cranefield, 2012) und der Analyse der Netzwerkstruktur (Behrendt et al., 2014, Cao et al., 2013). Aufgrund der Menge an Veröffentlichungen ist es sehr schwierig, einen Überblick über bereits adressierte Themenfelder zu bekommen. Ein Literaturüberblick ist daher nötig, um Literatur zu bestimmten Themengebieten im ESN-Kontext auffinden und auch weitere, offene Forschungsfelder für ESN identifizieren zu können.

Unter den Artikeln zu ESN finden sich ebenfalls viele Fallstudien wieder (z.B. (Chin et al., 2015a, Friedman et al., 2014, Gibbs et al., 2014, Leonardi, 2014)), welche den praktischen Nutzen von ESN im unternehmerischen Alltag zeigen. Beispielsweise bauen die Mitarbeiter durch die Verwendung des ESN „Meta-Knowledge“ darüber auf, wer im Unternehmen welche Kollegen/innen kennt oder wer Ansprechpartner für gewisse Themenfelder ist (Leonardi, 2014), sodass eine schnellere Wissens- und Informationsbeschaffung nachgewiesen werden konnte (Silic et al.,

2015, Zaffar und Ghazawneh, 2012). Nach der Einführung von ESN in Unternehmen werden diese jedoch nicht immer erzielt, da verschiedene Einflussfaktoren – die zum Erreichen der Benefits notwendig sind – nicht oder nicht ausreichend vorhanden sind. Beispielsweise beschreiben Chin et al. (2015a), dass die Unterstützung durch das Management und eine Toleranz gegenüber Fehlern förderlich wirken. Oftmals haben jedoch die einführenden Unternehmen falsche Vorstellungen, welche Benefits durch ESN erzielt werden können. Daher werden nach kurzer Zeit bei Nichterreichung der Benefits die Investitionen in das ESN in Frage gestellt (Li, 2015). Um vor allem Unternehmen, die noch vor der Einführung eines ESN stehen, vor falschen Erwartungen zu bewahren, ist eine Analyse der Literatur im Hinblick auf die bereits erreichten Nutzenpotentiale sinnvoll. So kann das jeweilige Unternehmen besser abschätzen, welche Benefits durch ESN erreicht werden können. Zusätzlich zeigt der Überblick den Unternehmen, die bereits Erfolge durch das ESN erzielt haben, welche weiteren Benefits das ESN noch bringen könnte.

(2) Nachdem die ersten drei Themenfelder dieser Arbeit auf den aktuellen Stand in Wissenschaft und Praxis abzielen, wird anschließend auf eine Technik zur Verbesserung von Prozessen näher eingegangen. Der explizite Vorgang der Verbesserung der Geschäftsprozesse kann auf verschiedene Weisen vollzogen werden. In einem vielversprechenden Ansatz nach Falk et al. (2013a) werden Muster auf Basis zahlreicher Verbesserungsprojekte identifiziert und in ein vordefiniertes Schema eingeordnet, welche dann – in weiteren Verbesserungsprojekten – wiederverwendet werden können („BPI-Pattern-Ansatz“). Die Anwendbarkeit des Ansatzes wurde in einem Praxisprojekt demonstriert (Falk et al., 2013b) und die Möglichkeiten diesen zu evaluieren wurden vorgestellt, wobei zwischen der Evaluation unterschiedlicher Artefakttypen (*Model, Instantiation, Method*) in Bezug auf den Ansatz unterschieden wird (Griesberger, 2014). Um zunächst zeigen zu können, dass einzelne identifizierte Muster eine Verbesserung bringen (Instanz, engl. instantiation), sollen die bereits bekannten Pattern im Rahmen dieser Arbeit evaluiert werden. Dadurch können die Auswirkungen von einzelnen Verbesserungsmaßnahmen gezielter beurteilt werden. Des Weiteren können im Zuge der Evaluation Faktoren identifiziert werden, die bei dem Einsatz einzelner Pattern fördernd oder hindernd wirken.

(3) Als dritter Schwerpunkt dieser Arbeit werden Möglichkeiten erarbeitet, um die Auswirkungen durch die Transformation anhand verschiedener Aspekte bewerten zu können. Bereits in zahlreichen Publikationen wurde die Kultur[5] als eine wichtige Einflussgröße auf Unternehmen identifiziert (z.B. (Hofstede et al., 1990, House et al., 2004, Schein, 2010)). Diese wird als ein Faktor angesehen, der im Speziellen auch das BPM stark beeinflusst, weswegen sie auch vermehrt Aufmerksamkeit in der BPM-Forschung bekam (Grau und Moormann, 2014b, Rosemann und vom Brocke, 2010, vom Brocke und Sinnl, 2011). Beispielsweise wurde nachgewiesen, dass verschiedene Ausprägungen der Organisationskultur auf die Prozessleistung Einfluss haben (Grau und Moormann, 2014a). Es ist ebenfalls zu erwarten, dass der jeweils selbe Prozess (z.B. der kundenspezifische Produktentwicklungsprozess) für unterschiedliche Nationen unterschiedlich ausgestaltet ist. Dies ist darauf zurückzuführen, dass die Mitarbeiter, die an den Prozessen mitarbeiten, verschiedene kulturelle Eigenschaften vorweisen und individuelle Verhaltensweisen an den Tag legen. Um auch die kulturspezifischen Auswirkungen bei Veränderung der Geschäftsprozesse besser abschätzen zu können, also zum Beispiel ob der Prozess von den Mitarbeitern akzeptiert wird, ist ein Messansatz nötig, der die kulturelle Ausgestaltung in den Prozessen direkt aufzeigt. Dies ist besonders im Zuge der zunehmenden Globalisierung von Vorteil, da die Mitarbeiter aufgrund der digitalen Technologien – wie zum Beispiel Enterprise Social Networks – auf immer einfachere und direktere Weise auch länderübergreifend zusammenarbeiten können und deshalb kulturelle Konflikte zu erwarten sind (Brett et al., 2009). Ein entsprechender Messansatz ist daher angesichts der digitalen Transformation in vielerlei Hinsicht wünschenswert, zum Beispiel um eventuelle kulturelle Komplikationen bereits bei der Prozessgestaltung ausschließen, oder die Kultur als Störgröße bei Schwankungen der Prozessleistung identifizieren zu können.

Des Weiteren kann im Kontext von ESN, aufbauend auf den identifizierten ESN Benefits, die Frage gestellt werden, unter welchen Bedingungen man das ESN als „erfolgreich“ bezeichnen kann. Dies hängt von mehreren Faktoren ab: i. Zunächst stellen Personen in verschiedenen Rollen im Unternehmen unterschiedliche Anforderungen an das ESN. Zum Beispiel möchte ein ESN-Nutzer durch die Verwendung des ESN einen Mehrwert in seiner alltäglichen Arbeit erfahren, während der ESN-Verantwortliche einen gewissen „Business Impact“ nachweisen muss, welcher die Investition in das ESN rechtfertigt (Richter et al., 2013). Die verschiedenen Anforderungen

[5] Definition Kultur: „*Culture is both a dynamic phenomenon that surrounds us at all times, being constantly enacted and created by our interactions with others and shaped by leadership behavior, and a set of structures, routines, rules, and norms that guide and constrain behavior*“ (Schein, 2010, S. 1).

und der Impact können beispielsweise anhand der zuvor identifizierten Benefits zunächst kategorisiert werden, um diese im Anschluss mittels verschiedener Metriken auch messbar zu machen (Behrendt et al., 2014, Herzog et al., 2013, Richter et al., 2013). Für viele der identifizierten Benefits ist dies bereits möglich. Zum Beispiel können die Mitarbeiter durch die Kommunikation über das ESN untereinander schneller Probleme lösen (Han et al., 2015, Mäntymäki und Riemer, 2016), welche durch die Metriken „Anzahl von gestellten Fragen" und „Anzahl an lösenden Antworten" gemessen werden kann (Richter et al., 2013). Jedoch trifft dies nicht auf alle Benefits zu, denn viele von diesen zielen auf zwischenmenschliche Aspekte ab, wie zum Beispiel ein gesteigertes Zugehörigkeitsgefühl zum Unternehmen (Han et al., 2015) und die Unterstützung des ESN, um am Arbeitsplatz Freundschaften zu schließen (Majumdar et al., 2013, Risius, 2014). Benefits, die durch die zwischenmenschliche Interaktion charakterisiert sind, werden in der Literatur oftmals unter dem Begriff „Social Capital"[6] zusammengefasst (Portes, 2000). Zur Messung von vielen dieser Benefits, die auf Social Capital abzielen, gibt es in der ESN-Literatur jedoch keine Anhaltspunkte, weshalb der Erfolg des ESN für diese Benefits nur schwer nachgewiesen werden kann. Dies würde jedoch vor allem das Management unterstützen, die eigenen Mitarbeiter und deren Bedürfnisse besser zu verstehen (O'Leary, 2016), um darauf aufbauend Entscheidungen auch im Hinblick auf soziale Belange auszurichten (Kugler und Smolnik, 2013). Ein entsprechender Messansatz soll daher entwickelt werden.

Nachdem diese Fragestellungen, die einen wichtigen Beitrag in den einzelnen Bereichen BPM und ESN leisten, erarbeitet wurden, stellt sich abschließend die Frage, auf welche Weise die beiden Bereiche gegenseitige Synergien schaffen können. Aufgrund der vielseitigen Einsatzmöglichkeiten von ESN ist zum Beispiel zu erwarten, dass diese auch als unterstützendes Mittel in den verschiedenen Phasen des BPM-Zyklus (z.B. (Dumas et al., 2013)) eingesetzt werden können. Wie mögliche Synergieeffekte aussehen können, soll auf Basis der zuvor in den einzelnen Bereichen erarbeiteten Teilergebnisse diskutiert werden.

Zusammenfassend kann festgehalten werden, dass die Relevanz für Unternehmen, sich effizient zu gestalten, aufgrund der aktuellen Treiber als sehr hoch einzustufen ist. In einem globalisierten Umfeld müssen die Unternehmen digitale Technologien nutzen, um langfristig im Wettbewerb bestehen zu können. Wegen der vielversprechenden Potentiale von ESN und des großen Interes-

[6] Definition Social Capital: „*Social Capital stands for the ability of actors to secure benefits by virtue of membership in social networks or other social structures.*" (Portes, 2000, S. 6).

ses der Wissenschaft und Praxis an diesem Thema wird diesen im Rahmen der Dissertation besondere Aufmerksamkeit geschenkt. Dies gilt ebenfalls für das BPM, da der Prozessebene als Bindeglied zwischen der Strategie- und Systemebene eine besondere Bedeutung zukommt.

1.2 Zielsetzung, Forschungsfragen und Forschungsvorgehen

Auf Basis der beschriebenen Motivation und Problemstellung werden in diesem Kapitel die Zielsetzungen der Dissertation beschrieben und die Forschungsfragen detailliert definiert. Darauf aufbauend wird zusätzlich das Forschungsvorgehen zur Lösung der Forschungsfragen beschrieben. In dieser Arbeit werden drei Forschungsziele verfolgt, die die effiziente Gestaltung der Organisation unterstützen sollen. Diese werden zunächst genannt und anschließend noch detaillierter erläutert:

Zielsetzung 1 (ZS 1): Erhebung des aktuellen Standes von Wissenschaft und Praxis anhand relevanter Fragestellungen in Bezug auf das Geschäftsprozessmanagement und Enterprise Social Networks.

Zielsetzung 2 (ZS 2): Evaluation einer existierenden Technik zur Unterstützung des kontinuierlichen Verbesserungsvorganges von Geschäftsprozessen.

Zielsetzung 3 (ZS 3): Identifikation und Entwicklung von Möglichkeiten zur Bewertung und Steuerung ausgewählter Aspekte der organisatorischen Effizienz.

Als Ausgangspunkt soll der aktuelle Stand der Wissenschaft und Praxis anhand selektierter Fragestellungen aus den Bereichen BPM und ESN erhoben werden. Dies umfasst sowohl den Stand der umgesetzten BPM-Maßnahmen in KMU, den Stand der Literatur zu ESN, als auch die Übersicht von ESN Benefits (ZS1). Anschließend sollen zur Unterstützung der Transformation auf Prozessebene Techniken der Geschäftsprozessverbesserung evaluiert werden, im Speziellen der Ansatz der BPI-Pattern (ZS2). Zur Bewertung der Veränderungen durch die Transformation sollen – aufbauend auf den zuvor erarbeiteten Ergebnissen – neue Möglichkeiten geschaffen werden. Dies umfasst die Identifikation und Entwicklung von Metriken, um auf der einen Seite kulturelle Werte in Geschäftsprozessen und auf der anderen Seite den Erfolg von ESN messen zu können (ZS3). Zur Erarbeitung der Zielsetzungen werden im Folgenden die Forschungsfragen abgeleitet, welche anhand von wissenschaftlichen Publikationen auf Konferenzen und in Journalen bzw. in der Dissertationsschrift veröffentlicht werden.

Zur Erreichung der **ersten Zielsetzung** werden drei wissenschaftliche Beiträge erarbeitet: Wie in Kapitel 1.1 bereits erwähnt, gibt es eine große Anzahl an Studien, die den positiven Einfluss des BPM bestätigen (z.B. (Kohlbacher, 2010, Komus, 2011)). Erst kürzlich erschien die Studie von

BPTrends, die seit mehr als einem Jahrzehnt alle zwei Jahre durchgeführt wird und aktuelle Entwicklungen im Bereich BPM aufzeigt (Harmon und Wolf, 2018). Diese beschreibt, dass durch die digitale Transformation und künstliche Intelligenz das Interesse an BPM steigen wird, da durch diese neuen Technologien die Prozesse verbessert werden können (S. 6). Einen generellen Überblick über Studien im BPM-Kontext wurde von Roeser und Kern (2015) erarbeitet. Darin zeichnet sich ab, dass es eindeutige Unterschiede in der Umsetzung von BPM-Maßnahmen je nach Unternehmensgröße, Branchen oder Ländern gibt (Braunnagel et al., 2016). Zusätzlich wird das Potential von BPM-Maßnahmen zumeist nicht vollständig genutzt (Minonne und Turner, 2012). Da KMU beispielweise kein oder wenig Personal für die Umsetzung von BPM-Maßnahmen abstellen können (Kolár, 2014), liegen für diese besondere Bedingungen vor und es stellt sich die Frage, inwiefern diese die Potentiale des BPM ausschöpfen können. Obwohl es viele Studien zur Umsetzung von BPM-Maßnahmen gibt, fehlt bislang eine Erhebung speziell in KMU. Daher zielt die erste Forschungsfrage auf den aktuellen Stand der BPM-Maßnahmen ab, die in KMU zum Einsatz kommen. Des Weiteren werden Faktoren identifiziert, welche sich fördernd oder hindernd auf die Anwendung von diesen auswirken. Mithilfe dieser Erhebung wird aufgezeigt, welche BPM-Maßnahmen in den Unternehmen zum Einsatz kommen (z.B. Prozessmodellierung, Prozessanalyse). Auch wird durch die Identifikation der hindernden Faktoren der Ursprung von Problemen aufgedeckt, die die Unternehmen bei der Umsetzung der Maßnahmen haben. Zusätzlich wird durch die Identifikation der fördernden Faktoren aufgezeigt, in welchen Gebieten man die Umsetzung der Maßnahmen besser unterstützen kann. Generell erhalten die Unternehmen Ansatzpunkte für ihr weiteres Vorgehen im Bereich BPM. Die Wissenschaft erhält einen Einblick, ob weiterer Forschungsbedarf besteht, zum Beispiel, ob es als sinnvoll erscheint auf KMU zugeschnittene Techniken im Fachgebiet BPM zu entwerfen.

Forschungsfrage 1 (FF 1):

In welchem Ausmaß sind BPM-Maßnahmen in KMU umgesetzt? Welche Faktoren können identifiziert werden, die sich fördernd oder hindernd auf die Umsetzung von BPM-Maßnahmen auswirken?

Für die Erarbeitung dieser Forschungsfrage gilt es verschiedene Aspekte bei der Wahl des Forschungsvorgehens zu berücksichtigen. Um eine breite Identifikation der BPM-Maßnahmen in KMU zu ermöglichen, erscheint eine Umfrage anhand von Fragebögen als zielführend (quantitativ). Um jedoch die Spezifika von KMU bei der Erhebung der fördernden und hindernden Faktoren aufzeigen zu können, ist es nötig, zusätzliche Erhebungen – wie zum Beispiel in Form von semi-strukturierten Interviews oder Fallstudien – durchzuführen (qualitativ). Eine Forschungsmethodik, die sowohl auf quantitative Aspekte abzielt als auch zusätzlich qualitative Aspekte einfließen lässt, liefert Gable (1994). Für die qualitative Erhebung werden Fallstudien (Wohlin et al., 2012) realisiert, um die speziellen Eigenschaften von KMU vertieft zu untersuchen. Darauf

aufbauend kann ein Fragebogen entworfen werden, um eine breite Erhebung in Form einer Umfrage zu ermöglichen und die Ergebnisse aus den Fallstudien zu bestätigen bzw. zu widerlegen (Wohlin et al., 2012).

Die zweite Forschungsfrage zur Erarbeitung von Grundlagen für die digitale Transformation wird im Kontext von ESN definiert. Neben der großen Beliebtheit von diesen in Unternehmen hat sich auch die Wissenschaft in den letzten Jahren vermehrt mit dem Thema auseinandergesetzt (Stei et al., 2016, Viol und Hess, 2016). Viele unterschiedliche Forschungsgruppen mit verschiedenen Forschungsschwerpunkten haben eine ansteigende Anzahl an Publikationen hervorgebracht, sodass es aktuell mehr als 150 veröffentlichte Artikel zu ESN gibt (Wehner et al., 2017a). Um einen generellen Überblick über diese zu bekommen und sowohl Praktikern als auch Wissenschaftlern einen schnellen Einstieg in die ESN-Literatur zu bieten, ist es daher nötig, eine Literaturübersicht anzufertigen. Diese zeigt den aktuellen Stand der Forschung auf. Des Weiteren wird die Literatur einer detaillierten Inhaltsanalyse unterzogen, um die bisher behandelten Themenfelder in den Beiträgen zu identifizieren. So können die Themenfelder, die von Interesse sind, direkt und schnell gefunden werden und es wird eine Grundlage geschaffen, um weitere Forschungsfelder zu definieren.

Forschungsfrage 2 (FF 2):

Was ist der aktuelle Stand der Literatur im Themenbereich Enterprise Social Networks und welcher Forschungsbedarf besteht weiterhin?

Zur Erhebung des aktuellen Standes der Wissenschaft in einem gewissen Themengebiet dient die Forschungsmethodik des „Literature Review“. Diese ermöglicht es aufgrund der definierten Zielsetzung und der daraus abgeleiteten Suchparameter (z.B. Suchwörter, Zeitraum der Suche, Literaturdatenbanken) eine möglichst vollständige Liste an Artikeln für die weitere Analyse anfertigen zu können (Cooper, 1988, vom Brocke et al., 2009, Webster und Watson, 2002). Für die anschließende Aufarbeitung der adressierten Themenfelder und der Identifikation weiterer Forschungsfelder werden die Artikel einer qualitativen Inhaltsanalyse unterzogen. Das detaillierte Vorgehen dafür wird von Mayring (2014) beschrieben. Dabei wird unterschieden zwischen einer deduktiven Klassifikation (Zuordnung der Artikel anhand zuvor definierter Kriterien) und einer induktiven Clusterbildung (Bildung der Kriterien während der Analyse) (Mayring, 2014). Für die Aufarbeitung können beide Verfahren sinnvoll angewendet werden, indem zunächst ein Framework für die generelle Zuordnung der Arbeiten abgeleitet wird (induktiv) und anschließend spezialisierte Themenfelder identifiziert und zu Themencluster zusammengefasst werden (deduktiv).

Die dritte Forschungsfrage fokussiert den Mehrwert von ESN im Vergleich zu traditionellen IT-Systemen. Zunächst stellt sich die Frage, welche Benefits durch den Einsatz von ESN generell

erzielt werden können (einige Beispiele wurden in Kapitel 1.1 bereits erläutert). Durch die Erstellung einer Übersicht an Benefits werden die Vorteile für Unternehmen direkt ersichtlich und unterstützt diese vor der ESN-Einführung, eine realistische Erwartungshaltung gegenüber diesem zu entwickeln. Ob das Leistungsvermögen von ESN über das von traditionellen IT-Systemen hinausgeht, kann im Anschluss abgeglichen werden. Davenport und Short (1990) beschreiben das Leistungsvermögen von traditioneller IT (engl. „traditional IT Capabilities“) anhand von neun Eigenschaften, wie zum Beispiel „geographical“, welche aussagt, dass Informationen durch die IT schnell und einfach über große Distanzen bewegt werden können, wodurch Prozesse geographisch unabhängig ausgeführt werden können (S. 17). In der Literatur zeigt sich, dass ESN eben diese Capability unterstützen (Silic et al., 2015, Suh und Bock, 2015, Wiesneth, 2016). Ob jedoch alle Benefits, die durch ESN erzielt werden, von den traditionellen IT Capabilities abgedeckt werden, ist fraglich, da diese zum Beispiel nicht auf soziale Aspekte abzielen. Als erstes Beispiel dient hier der Benefit des erhöhten Zugehörigkeitsgefühls zum Unternehmen, das durch die ESN-Nutzung erreicht werden kann (Han et al., 2015). Dieses kann den traditionellen Capabilities nicht zugeordnet werden, sodass womöglich die Definition neuer IT Capabilities notwendig sein wird.

Forschungsfrage 3 (FF 3):

Welche Benefits lassen sich durch den Einsatz von Enterprise Social Networks erzielen? Können alle Benefits den traditionellen IT Capabilities zugeordnet werden oder schaffen Enterprise Social Networks neue IT Capabilities?

Zur Beantwortung dieser Forschungsfrage tragen die Ergebnisse von Forschungsfrage 2 maßgeblich bei, insbesondere wird die identifizierte Literatur zu ESN als Grundlage verwendet. Um Benefits zu identifizieren, die von Unternehmen erzielt wurden, wird die Literaturbasis zunächst nach Fallstudien (Yin, 2013) gefiltert, sodass nur diejenigen Benefits betrachtet werden, die in realen Fällen in der Praxis erzielt wurden. Zur Identifikation der einzelnen Benefits werden diese anschließend einer induktiven qualitativen Inhaltsanalyse unterzogen, wobei der gesamte Text jedes Papers detailliert untersucht wird, relevante Textpassagen extrahiert und dann mit Schlagwörtern versehen werden. Ähnliche Schlagwörter werden anschließend nochmals gruppiert, sodass am Ende dieser Analyse eine Liste an klar unterscheidbaren Benefits vorliegt (Mayring, 2014). Diese können nun den traditionellen IT Capabilities zugeordnet werden, um zu identifizieren, in welchen Bereichen das ESN unterstützend wirkt. Die Benefits, die nicht zugeordnet werden können, müssen inhaltlich betrachtet werden und können anschließend zur Definition neuer IT Capabilities genutzt werden.

Nachdem relevante Grundlagen in den ausgewählten Gebieten geschaffen wurden, befasst sich die **zweite Zielsetzung** mit einer Technik, die zur Effizienzsteigerung im Unternehmen beiträgt, besonders im Hinblick auf die Prozessebene. Der Ansatz der “BPI-Pattern”, welcher in vorherigen

Arbeiten bereits entwickelt (Falk et al., 2013a) und als vielversprechend eingestuft werden kann, unterstützt den expliziten Vorgang der Verbesserung (engl. „act of improvement“). Dieser Vorgang transformiert den Prozess von einem ursprünglichen Zustand („as-is“) in einen, der die an ihn gestellten Anforderungen besser erfüllt („to-be“). Dadurch erhofft man sich zum Beispiel eine Reduktion der Prozesskosten, eine Verringerung der Prozessdurchlaufzeit, eine Erhöhung der Qualität oder der Flexibilität. Der Vorteil der BPI-Pattern ist, dass die Muster abstrakt genug beschrieben sind, um typische, wiederkehrende Probleme lösen zu können, sodass man auch mit wenig Erfahrung im Bereich Prozessverbesserung auf die bestehenden Muster zurückgreifen kann. Nachdem die konzeptionellen Grundlagen für BPI-Pattern und einzelne Instanzen von diesen definiert wurden (Falk et al., 2013a), konnte in einer Fallstudie deren Anwendung bereits demonstriert werden (Falk et al., 2013b). Darauf aufbauend soll nun auf breiter Basis die Evaluation von Instanzen der BPI-Pattern durchgeführt werden, um nachzuweisen, dass diese die Prozesse hinsichtlich verschiedener Kriterien (z.B. Zeit, Kosten) verbessern. Da sich Prozesse meist hinsichtlich ihrer Rahmenbedingungen unterscheiden (z.B. Automatisierungsgrad), sollen des Weiteren Einflusskriterien in Form von fördernden und hindernden Faktoren identifiziert werden. Dies ermöglicht es, besser vorhersagen zu können, unter welchen Bedingungen Verbesserungen zu erwarten sind.

Forschungsfrage 4 (FF 4):

Welche Auswirkungen (z.B. Zeit, Kosten) haben BPI-Pattern in verschiedenen Szenarien? Was sind fördernde und hindernde Faktoren für die Anwendung von einzelnen BPI-Pattern?

Um die Auswirkungen von BPI-Pattern bemessen zu können, sollen für einzelne Muster verschiedene Szenarien erarbeitet und verglichen werden. Diese unterscheiden sich zum Beispiel hinsichtlich der Anzahl der vorhandenen Organisationseinheiten und der Wahrscheinlichkeiten beim Durchlaufen der XOR-Konnektoren. In einem Experiment können diverse BPI-Pattern in den beschriebenen Szenarien simuliert und anschließend gegenübergestellt werden (siehe auch (Van der Aalst et al., 2010)). Dadurch erhält man belastbare Ergebnisse, die die Grundlage zur Identifikation von fördernden und hindernden Faktoren sind.

Die **dritte Zielsetzung** umfasst die Identifikation und Entwicklung von Möglichkeiten, um ausgewählte Aspekte im Zuge der Transformation zu bewerten. Die Kultur (Kroeber und Kluckhohn, 1952) ist ein wesentlicher Einflussfaktor auf das BPM (Grau und Moormann, 2014b, vom Brocke und Sinnl, 2011). Gerade bei globalen Kooperationen ist es wichtig, dass man sich über die kulturellen Unterschiede aller Beteiligten im Klaren ist, beispielsweise über das Kaufverhalten von Kunden oder die Verhandlungsstrategien von Lieferanten (Ford et al., 2003). Diese kulturellen Differenzen werden inhärent von den Prozessmodellen wiedergespiegelt, da diese das Verhalten der Mitarbeiter abbilden. So wird auch von Schein (2004) hervorgehoben, dass Prozesse für die

kulturelle Analyse herangezogen werden können, weil diese das kulturelle Verhalten in standardisierter Form widerspiegeln (engl., übersetzt, S. 26). Eine Annahme im Kontext der nationalen Kultur wäre zum Beispiel, dass Unternehmen, die in Ländern mit einem hohen Maß an Unsicherheitsvermeidung ihre Geschäft ausüben (z.B. Deutschland) (Hofstede, 1983), mehr Prüfaktivitäten aufweisen als Unternehmen in Ländern mit geringerer Unsicherheitsvermeidung (z.B. Indien) (Hofstede, 1983). Ein Messansatz, um kulturelle Eigenschaften in einem Prozessmodell quantitativ zu bewerten, ist daher vielversprechend, gerade wenn Prozesse in internationalen Konzernen designt werden, die in mehreren Ländern ausgerollt werden. Mit einem entsprechenden Messansatz kann vorab bewertet werden, ob kulturelle Konflikte zu erwarten sind. Aber auch bei Prozessverbesserungsinitiativen sind verschiedene Potentiale zu erwarten, welche auf Basis der gewonnen Erkenntnisse aufgearbeitet werden sollen.

Forschungsfrage 5 (FF 5):

Wie können kulturelle Eigenschaften anhand von Geschäftsprozessen gemessen werden und wie lassen sich die gewonnen Erkenntnisse in Prozessverbesserungsinitiativen nutzen?

Zur Lösung dieser Fragestellung müssen zunächst verschiedene kulturelle Ausprägungen auf Basis der Literatur zusammengetragen werden. Eine mögliche Aufteilung bietet beispielweise Hofstede (1983), der die nationale Kultur anhand unterschiedlicher Dimensionen beschreibt. Anschließend sind je Dimension die Kernaussagen zu erarbeiten, welche dann in Form von Metriken (z.B. (Braunnagel et al., 2014)) auf den Prozess angewendet werden sollen. Nachdem der Messansatz entwickelt wurde, soll dieser im Anschluss in einer Fallstudie eingesetzt und diskutiert werden (Wohlin et al., 2012).

Die sechste Forschungsfrage baut auf den Ergebnissen von Forschungsfrage 2 (ESN Literature Review) und Forschungsfrage 3 (ESN Benefits) auf und befasst sich mit der Erfolgsmessung von ESN. Deren Erfolg wird in der Literatur auf verschiedene Weisen bereits adressiert. Zum Beispiel beschreiben Muller et al. (2009) eine Metrik „Return on Contribution“, die den Einfluss von ESN auf seine persönliche Nutzung wiederspiegelt und Lehner und Haas (2011) erläutern das „system of knowledge management“ (aus Perspektive der Organisation), zu dem das ESN beitragen soll. Umfassende Erfolgsmesskonzepte werden von Richter et al. (2013) und Herzog et al. (2013) genannt, die mehrere Erfolgsfaktoren und Metriken definieren. Diese messen sowohl persönliche Aspekte der Mitarbeiter als auch organisatorische Aspekte. Die Metriken können jeweils Benefits zugeordnet werden, sodass diese eine gute Strukturierung der Metriken bieten (siehe Forschungsfrage 3). Einige der Benefits zielen jedoch auf „Social Capital“ ab, welche aktuell im Kontext von ESN nicht operationalisiert sind. Speziell für diesen Bereich wird daher ein Messkonzept entwickelt, das in Form einer Fallstudie angewendet und diskutiert wird.

Forschungsfrage 6 (FF 6):

Wie kann der Erfolg von Enterprise Social Networks im Kontext von „Social Capital“ gemessen werden und welchen Nutzen bringt ein entsprechender Messansatz?

Zur Entwicklung des Messansatzes wird die Design Science Methodik nach Peffers et al. (2007) angewendet. Diese umfasst sechs Schritte, wobei in den ersten beiden das Problem identifiziert und motiviert wird und die Zielsetzungen für den Messansatz beschrieben werden. Die Entwicklung des Messansatzes findet im dritten Schritt statt. Dazu werden die Benefits, die auf soziale Aspekte abzielen (aufbauend auf Forschungsfrage 3), möglichen Metriken gegenübergestellt und diese in Workshops mit Experten ausgewählt. Zur Demonstration (Schritt 4) des Messansatzes werden die Metriken anschließend in Form einer Fallstudie angewendet (Wohlin et al., 2012). Der Messansatz wird anschließend anhand eines Interviews evaluiert (Schritt 5), um auch den Nutzen für Unternehmen in einem realen Kontext identifizieren zu können. Im sechsten Schritt werden die Ergebnisse dann in Form eines Papers und der Dissertation veröffentlicht.

Folgende Tabelle gibt einen Überblick über die Zielsetzungen, Forschungsfragen und die dafür eingesetzte(n) Forschungsmethode(n).

Zielsetzung	Forschungsfrage	Methode
ZS 1: Erhebung des aktuellen Standes von Wissenschaft und Praxis anhand relevanter Fragestellungen in Bezug auf Geschäftsprozessmanagement und Enterprise Social Networks.	FF 1: In welchem Ausmaß sind BPM-Maßnahmen in KMU umgesetzt? Welche Faktoren können identifiziert werden, die sich fördernd oder hindernd auf die Umsetzung von BPM-Maßnahmen auswirken?	Mixed method approach
	FF 2: Was ist der aktuelle Stand der Literatur im Themenbereich Enterprise Social Networks und welcher Forschungsbedarf besteht weiterhin?	Literature Review, qualitative Inhaltsanalyse
	FF 3: Welche Benefits lassen sich durch den Einsatz von Enterprise Social Networks erzielen? Können alle Benefits den traditionellen IT Capabilities zugeordnet werden oder schaffen Enterprise Social Networks neue IT Capabilities?	Qualitative inhaltsanalyse
ZS 2: Evaluation einer existierenden Technik zur Unterstützung des kontinuierlichen Verbesserungsvorganges von Geschäftsprozessen.	FF 4: Welche Auswirkungen (z.B. Zeit, Kosten) haben BPI-Pattern in verschiedenen Szenarien? Was sind fördernde und hindernde Faktoren für die Anwendung von einzelnen BPI-Pattern?	Simulationsexperiment
ZS 3: Identifikation und Entwicklung von Möglichkeiten zur Bewertung und Steuerung ausgewählter Aspekte der organisatorischen Effizienz.	FF 5: Wie können kulturelle Eigenschaften anhand von Geschäftsprozessen gemessen werden und wie lassen sich die gewonnen Erkenntnisse in Prozessverbesserungsinitiativen nutzen?	Fallstudie
	FF 6: Wie kann der Erfolg von Enterprise Social Networks im Kontext von „Social Capital“ gemessen werden und welchen Nutzen bringt ein entsprechender Messansatz?	Design Science

Tabelle 1: Überblick über die Zielsetzungen, Forschungsfragen und Forschungsmethoden

1.3 Aufbau der Dissertation

Zur Erreichung der Zielsetzungen und zur Beantwortung der Forschungsfragen ist die Dissertation wie folgt aufgebaut: In Kapitel 1 (Einleitung) werden die Themenfelder der Arbeit, im Speziellen BPM und ESN, motiviert. Des Weiteren werden die Zielsetzungen, Forschungsfragen sowie die Forschungsmethoden zur Lösung der Forschungsfragen vorgestellt. Die Kernergebnisse der Dissertation sind in Kapitel 2 zu finden. Dieses umfasst sechs wissenschaftliche Beiträge, wobei jeweils eine der definierten Forschungsfragen beantwortet wird. Auf Grundlage der erarbeiteten Ergebnisse werden in Kapitel 3 die Potentiale von ESN zur Geschäftsprozessverbesserung diskutiert. In Kapitel 4 werden die Kernergebnisse der Dissertation zusammengefasst, nochmals hinterfragt und es wird ein Ausblick auf weitere Forschungsfelder gegeben. Folgende Abbildung gibt einen Überblick über den Aufbau der Arbeit:

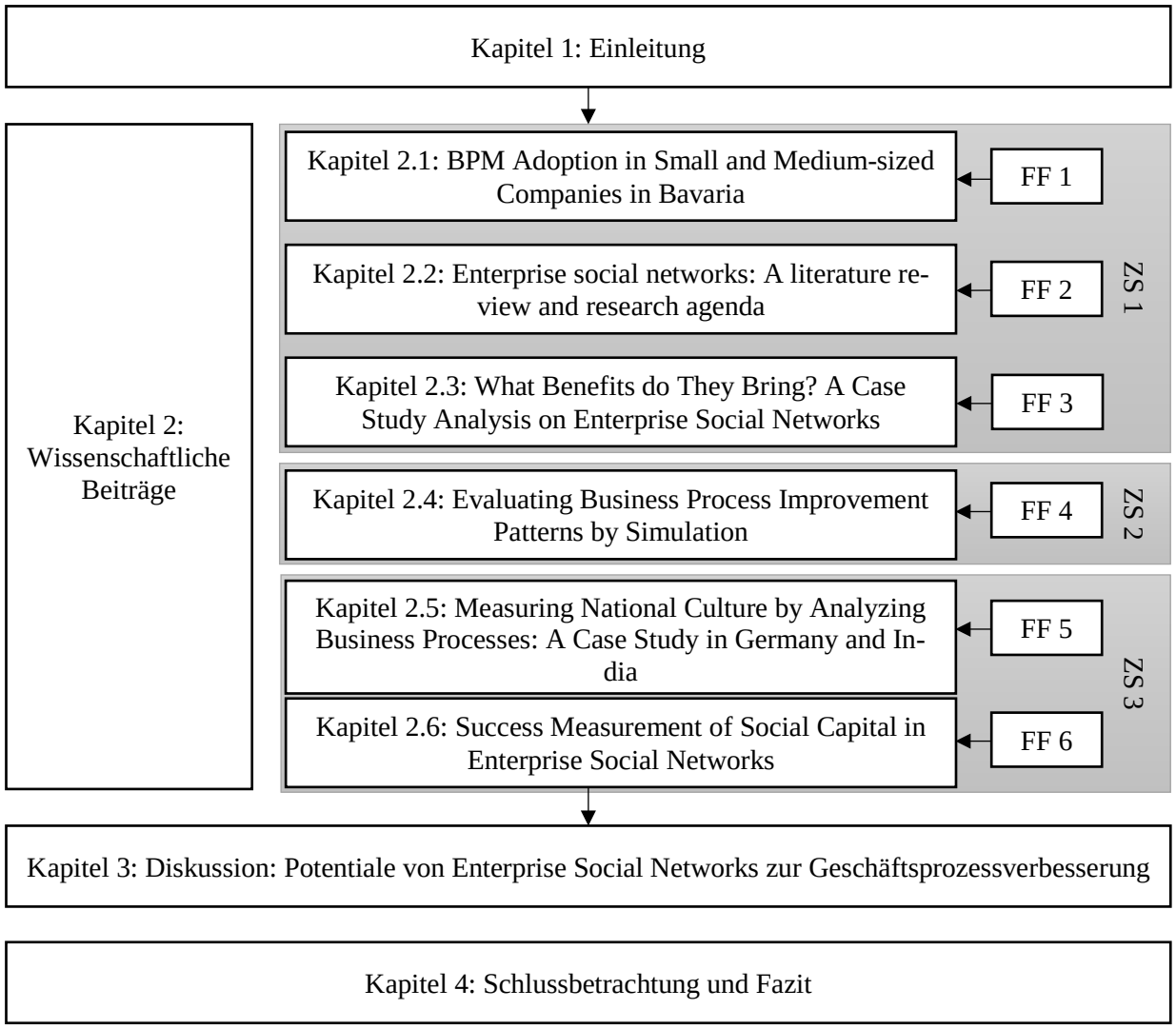

Tabelle 2: Aufbau der Arbeit

2 Wissenschaftliche Beiträge

In diesem Kapitel werden die einzelnen Forschungsbeiträge vorgestellt. Hierzu wird zunächst ein Überblick über alle veröffentlichten Beiträge gegeben und anschließend jeder Beitrag ausgeführt. Folgende Tabelle zeigt eine Übersicht über dieses Kapitel:

Kapitel	Typ der Veröffentlichung	Status	Zitation
2.1	Konferenzbeitrag	veröffentlicht	(Braunnagel et al., 2016): Braunnagel, D., Falk, T., Wehner, B., Leist, S.: *BPM Adoption in Small and Medium-sized Companies in Bavaria*. 24th European Conference on Information Systems (ECIS), Istanbul, Turkey, 2016.
2.2	Journalbeitrag	veröffentlicht	(Wehner et al., 2017c): Wehner, B., Ritter, C., Leist, S.: *Enterprise social networks: A literature review and research agenda*. Computer Networks 114, p. 125-142, 2017.
2.3	Konferenzbeitrag	veröffentlicht	(Wehner et al., 2017a): Wehner, B., Falk, T., Leist, S.: *What Benefits do They Bring? A Case Study Analysis on Enterprise Social Networks*. 25th European Conference on Information Systems (ECIS), Guimarães, Portugal, 2017.
2.4	Konferenzbeitrag	veröffentlicht	(Lang et al., 2015): Lang, M., Wehner, B., Falk, T., Griesberger, P., Leist, S.: *Evaluating Business Process Improvement Patterns by Simulation*. 23rd European Conference on Information Systems (ECIS), Münster, Germany, 2015.
2.5	Konferenzbeitrag	veröffentlicht	(Wehner et al., 2017b): Wehner, B., Falk, T., Leist, S., Ritter, C.: *Measuring National Culture by Analyzing Business Processes: A Case Study in Germany and India.* 13th International Conference on Wirtschaftsinformatik (WI), St. Gallen, Switzerland, 2017.
2.6	Konferenzbeitrag	veröffentlicht	(Wehner, 2018): Wehner, B.: *Success Measurement of Social Capital in Enterprise Social Networks*. 26th European Conference on Information Systems (ECIS), Portsmouth, United Kingdom, 2018.

Tabelle 3: Übersicht zu den wissenschaftlichen Beiträgen

2.1 Beitrag 1: BPM Adoption in Small and Medium-sized Companies in Bavaria

Adressierte Forschungsfrage	**Forschungsfrage 1:** In welchem Ausmaß sind BPM-Maßnahmen in KMU umgesetzt? Welche Faktoren können identifiziert werden, die sich fördernd oder hindernd auf die Umsetzung von BPM-Maßnahmen auswirken?
Zielsetzungen	(1) Erhebung des Status Quo der Adaption von BPM-Maßnahmen in bayerischen Unternehmen (2) Identifikation von fördernden Faktoren bei erfolgreicher Adaption und von hindernden Faktoren bei erfolgloser Adaption von BPM-Maßnahmen (3) Ableitung von weiterem Forschungsbedarf mit Fokus auf BPM-Methoden und -Techniken für KMU; Empfehlungen für KMU zur zielgerichteten Adaption von BPM-Maßnahmen
Forschungsmethode	Mixed method approach nach Gable (1994) Durchführung von 10 Fallstudien und einer Umfrage mit 114 Teilnehmern
Kernergebnisse (Überblick)	(1) BPM-Maßnahmen werden entweder zu einem sehr hohen oder aber zu einem sehr geringen Grad in KMU umgesetzt (2) Identifikation der vier Kategorien *scientific foundation, strategy, implementation of BPM measures* und *organizational embedding* zur Einordnung der fördernden und hindernden Faktoren; Ableitung von Vorschlägen zur Weiterentwicklung des BPM
Publikationsort	24th European Conference on Information Systems (ECIS), Istanbul, Turkey, June 12-15, 2016
Ranking VHB JQ 3	B
Autor(en) und Anteile	Daniel Braunnagel 30% Thomas Falk 30% **Benjamin Wehner 30%** Susanne Leist 10%

Tabelle 4: Fact Sheet „BPM Adoption in Small and Medium-sized Companies in Bavaria“

BPM ADOPTION IN SMALL AND MEDIUM-SIZED COMPANIES IN BAVARIA

Completed Research

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Abstract

Small and medium sized (SMEs) companies are a pillar of the Bavarian economy. With business process management (BPM) providing an important competitive advantage in the globalized economy, the adaption of BPM by SMEs has societal relevance. However, the reasons why, or why not, SMEs implement BPM measures are still not fully understood. Previous research addressed this topic either breadthwise as surveys or in depth as case studies, and thus only has a limited perspective. Therefore, in our work, we carry out a mixed method analysis.

We conduct 10 case studies to analyse the current state of adoption as well as the reasons for or against implementing further BPM measures. The insights gained guide the design of the subsequent survey. 114 results allow us to evaluate how widespread a particular reason may be. Lastly, the combined discussion of the results of both the case studies and surveys allow us to identify reasons that hinder or foster BPM adoption in SMEs, which are in-depth as well as generalizable.

The study results are analyzed to derive propositions to research and practitioners alike that support SMEs to introduce further measures of BPM and improve their global competitiveness. For example, we could identify that BPM is in some cases enforced by customers, that stricter certifications are necessary, and that BPM trainings aligned to the needs of SMEs are desirable.

Keywords: Business Process Management, BPM adoption, Survey, Case Study

1 Introduction

Business Process Management (BPM) is one of the key concepts in information systems and represents a comprehensive approach for managing an organization's business operations (Hammer, 2010). The BPM concept has continually evolved over the last few decades by integrating methods, techniques and tools from various fields (Harmon, 2010). Today BPM is recognized as a holistic management approach encompassing a wide range of aspects (e.g., strategic alignment, governance, methods, information technology, people, and culture (Rosemann and vom Brocke, 2010). Over the years, BPM has been adopted by organizations in various industries all over the world. One main motivation is found in the development of the globalized markets. Increasing demands on organizations for e.g., delivery speed, quality and flexibility together with a growing information transparency force companies to continuously optimize their processes in order to survive in competition.

BPM, if applied in an appropriate manner, facilitates process optimization and is thus considered a competitive advantage (Trkman, 2010). A significant number of studies confirm positive effects of BPM on

organizational performance (e.g., (Kohlbacher, 2010, Komus, 2011)). Further, several studies investigate the adoption of BPM by organizations, both on a worldwide scale (e.g., (Harmon and Wolf, 2014)) and for specific regions (e.g., (Bruckner-Kley et al., 2014, Minonne et al., 2011)). Studies dealing with BPM adoption commonly show (cf. Roeser and Kern (2015) for an overview), despite the generally acknowledged importance of BPM, considerable differences in the BPM adoption between countries, industries and company sizes. In addition, many organizations do not fully exploit the potential of BPM (cf. (Minonne and Turner, 2012)). Whereas large organizations have been making effective use of BPM for quite some time, especially for small and medium sized enterprises (SMEs), the successful adoption of BPM seems to be a particular challenge. Possible reasons identified by Kolář (2014) include, among other things, the lack of internal manpower dedicated to BPM and the different levels of process rigidity in SMEs compared to large organizations. As smaller companies tend to have a higher portion of flexible or ad-hoc processes, it is even more difficult for them to apply existing BPM measures in a SME context. However, a broader evaluation of BPM adoption in SMEs is missing.

Our research, for this reason, focuses on BPM in small and medium-sized enterprises. Especially in the German economy, SMEs play an important role. Currently, they represent 47% of the gross value added and 39% of the aggregated turnover (Söllner, 2014). Further, SMEs currently employ 94% of the employees in the private sector; even more, e.g., in the German state Bavaria, they employ 99.6% of the employees in the private sector (DESTATIS, 2015). In summary, because of their high societal relevance and thr role of BPM to sustain their competitiveness, the adoption of BPM by SMEs is a highly relevant topic for research. However, what is needed are reliable insights into this domain to derive the pivotal aspects of how to extend or enrich the future BPM research agenda towards SMEs.

The aim of this paper is to capture the status quo of BPM adoption in Bavarian SMEs. This aim is operationalized with three research questions. (1) To which extent are BPM measures realized in those companies? (2) Which factors influence the adoption of BPM? (3) Which of these factors are distinctive to foster or hinder SMEs in adopting BPM? To address these questions, we use a mixed method approach combining qualitative (i.e. case study) and quantitative (i.e. survey) research.

The remainder of this paper is organized as follows. Section 2 describes the conceptual basics including related work as well as our research method, which is a mixed method approach that integrates a survey and case studies. The results of the survey and the findings of the case studies are presented in section 3. There we elaborate on the findings related to specific BPM topics and carry out an overall evaluation. In section 4, the results are summarized and discussed in the light of SME-specific characteristics. Section 5 concludes the paper.

2 Conceptual Basics

2.1 Related Work

Previously, the adoption of BPM was empirically adressed by surveys. For example, the bi-annual survey “The State of Business Process Management”, a survey on the adoption of BPM, has been focusing operational BPM measures and tools from companies of all sizes and locations since 2006 (cf. (Harmon and Wolf, 2014)). Another example is the ZHAW study (Bruckner-Kley et al., 2014, Minonne et al., 2011), which has a particular focus on the strategic aspects of BPM adoption (see section 3.4). A literature review by Roeser and Kern (2015) examines the status quo and the use of surveys published in the BPM domain. They classify the surveys based on the research goals into six classes. Class IV shows surveys on the status quo of BPM in practice. However, none of these surveys answer our research questions because they focus different objectives or subjects. More empirical research in this area has been conducted by means of case studies, which also follow a slightly different focus in their research. E.g., Dallas and Wynn (2014) carried out a BPM initiative in a middle-sized Australian accounting firm

analysing whether BPM can be successfully applied in this particular SME, and Chong (2007) conducted a BPM initiative in an Australian wine company analysing factors that drive or hinder BPM adoption.

2.2 Methodology

To address the research questions, we follow a mixed method approach combining qualitative (i.e. case study) and quantitative research (i.e. survey). Since these two methods complement each other well, they have been advocated for the study of organizations in IS in particular. Whereas a case study allows an in-depth investigation into the fuzzy and complex nature of an organization, its findings can be tested for generalization with a survey. (cf. (Goes, 2013, Huysmans and De Bruyn, 2013, Venkatesh et al., 2013))

Gable (1994) formalized such an approach. He argues that a preceeding case study may inform the survey design, e.g., by pilot testing the survey instruments or construct validation. Also, in his case, notes from the case study were used to interpret survey findings (cf. (Gable, 1994)). Our work instantiates the mixed method approach as presented by Gable (1994). The methods' consistency is ensured in two ways. First, in both methods, the targets were selected from the same list of companies. Second, both methods' instrument is built on the same theoretical groundwork.

Regarding the aforementioned statements, our case studies involved repeated visits at the companies' sites over a longer period of time to conduct the studies in person. To make the case studies logistically possible and ensure their consistency, we decided to focus the research context on SMEs in Bavaria. As for that, Bavaria is suitable as it is an economically strong state in Germany having the majority of private sector employments in SMEs. Thus participants of both the case study and the survey were recruited from a list of Bavarian companies that have previously declared their interest in research co-operation. This list - provided by the Bavarian State Ministry of Economy - contained 10,864 companies fitting the criteria of SMEs.

Our measurement is based on the literature on BPM maturity models. BPM maturity models are meant to measure an organization's capabilities of implementing business processes which achieve their business goals (Van Looy et al., 2011). Characteristically, the said models provide, among others, lifecycle levels and capability areas for improvement. The levels reflect the progress of implementing measures towards a mature BPM (Van Looy et al., 2011). The adaption for our study was done as follows.

First are the assessment items resulting from a systematic search for BPM maturity literature. From these sources, we assembled the means for survey-based maturity assessment. Van Looy et al. (2011) found a common structure among maturity models' capabilities according to which we grouped our assessment items (see Table 2). For example, the category #1 items "Is the process documentation of your organization maintained permanently?" or "Does your organization have a process map?" stem from the maturity model by Schmelzer and Sesselmann (2008).

The second aspect of our instrument is the level classification. While the maturity models do not share a common calculation scheme, they are designed for an assessment of a finer scope than used in our study. However, each assessment item can be mapped to a category of BPM measures (see Table 2), and the item categories have a natural order. E.g., it is clearly mandatory to properly identify and document processes before it makes sense to introduce process performance management (PPM). In fact, this is the systematics of process maturity models and, as Paulk et al. (1993) observe, companies should follow this order. Also, we do realize that companies do not implement a full set of BPM measures for each and every auxiliary process. Because of that, we map the current progress of such companies to the highest category whose items are rated with at least 50% fulfilment on average. To further avoid terminological confusion, we will use the term 'category' for rating progress instead of 'maturity level'. The common list and the common measurement instrument were used in both the case study and the survey to ensure consistency.

2.3 Case Studies

To find participants for the case studies, we randomly selected companies from the list of Bavarian SMEs (see section 2.2) until ten companies agreed to participate in the study (see Table 1). In total, we contacted 137 companies. After 10 companies had agreed, the case studies, which consisted of two phases, were performed between March and October 2014.

First, we conducted a semi-structured interview with a representative from each of the participating companies, with these interviews being based on an interview protocol asking about the current situation of the company and its market, current and previous initiatives of BPM, the existence of process documentation, and the measure regarding process performance management. Due to the explorative nature of the interviews, we refrained from more specific interview items. The interviews, which usually took about one day, were conducted by two researchers, protocolled and consolidated afterwards.

Second, we launched a basic BPM initiative with the company, e.g., documenting or revising the existing documentation of a process, which served to provoke a very intensive discussion about BPM. Regarding the documentation, we conducted separate interviews with all employees involved in the process. We used these interviews to also ask about their knowledge of, experience with and attitude towards BPM. Finally, we presented the results of the initiative to the leading board in a workshop. This workshop also served to initiate a discussion of both potential uses and benefits of BPM initiatives and potential drivers or hindrances of implementing further BPM measures. In summary, this second phase produced a rich background of information about why or why not BPM is installed at Bavarian SMEs.

Integrating the case study, we could realize some of the benefits of the mixed method approach by Gable (1994). We piloted the survey at the companies, testing whether the participants were able to understand and answer the survey correctly. Moreover, while not generalizable, the case study notes provide in-depth information for the interpretation of the quantitative results. Even though these information are valid only for the company where the study was conducted, they can serve for triangulation with the survey results. Section 3 combines findings from the survey with our notes from the case study.

2.4 Survey

Our survey is built from measures for maturity assessment in literature and informed by the case study. The questionnaire contains the following items. After starting with five demographic questions (e.g., industry, number of employees, etc.), four questions about BPM as a strategic asset are asked. Subsequently we addressed process documentation (five questions), definition of process goals (five questions), process controlling and reporting (six questions), and process improvement (two questions).

Wherever possible, the answers are formulated as a 5-point Likert scale (e.g., degree of agreement, degree of fulfilment). In other cases, the items ask for a yes/no answer or for an open text. The survey was originally in German and items were translated into English for this publication.

The survey was conducted anonymously and the questionnaire was implemented as an interactive PDF file that could be sent by pressing a button at the end. All terminology was explained by mouse-overs, to reduce subjective interpretations. The PDF was distributed via e-mail to 10,864 Bavarian SMEs in total 128 of which responded.

Responses were filtered for relevance, completeness and internal consistency. First, we checked whether the demographics actually fitted with the definition of a SME. Regarding completeness, we eliminated incompletely answered responses, e.g., when the survey was blank from some point on, as this would have distorted our analysis. The consistency check refers to the natural order of categories mentioned before. If a responder claimed to have established all measures of performance measurement without even defining processes at all, we removed the survey for lack of plausibility.

After filtering the responses for completeness and internal consistency, 114 responses remained for evaluation and built the basis for the interpretation and discussion in the next section. If logical dependencies among survey items reduced the number of relevant responses (e.g., "Is your companies process documentation organized in a process map: Yes or No" and "Does your process map show dependencies"), the size of the subset is noted.

#	Industry	Employees
A	Cereal R&D	20
B	Automatization machines.	240
C	Bottling machines	250
D	Car accessory	10
E	Electronics	230
F	Measurement instruments	50
G	Electric components	200
H	Fittings & couplings	120
I	Steel construction	25
J	Steel processing	150

Table 1. Interviewed companies

#	Category
0	Initial category
1	Processes are defined and documented
2	Roles and resources are defined and documented
3	Process goals are continually revised and communicated
4	Process performance is continually measured and evaluated
5	Processes are continually optimized

Table 2. Categories for the classification of maturity progress

The demographic distribution of responses is as follows. As to the number of employees, 65.2 % of the companies report to have less than 50, while the remaining 44.8% have more employees. The most represented industries are electrical & mechanical engineering (20.9%) as well as the service sector (20.0%). The persons who answered the survey are usually head or CEO of the company (77.2%) and BPM is part of their daily work (71.1%). The results and their interpretation are subjects of the following sections.

3 Results

3.1 BPM and Strategy

The first part of the questionnaire aims at discovering the value of BPM for the companies' strategy and accordingly for their top management. 31.3% of the companies evaluate BPM as very important, as contrasted with 37.4%, which rate BPM as not important for their strategic planning. This corresponds to the objectives that SMEs try to achieve with BPM. The objectives mentioned most frequently are standardization (91.5%), increasing productivity (89.6%) and quality management (87.7%) all of which put the emphasis on operational activities. On the contrary, the impact of BPM for the companies' strategy is not well developed: only a few companies use BPM to support in-/outsourcing decisions (31.1%) or for the application of new technologies (e.g., support of mobile processes; 33.0%). The commitment of top management for BPM is respectable, 53.9% rate a strong commitment, which reflects the widespread knowledge and use of BPM in the Bavarian SMEs. However, it seems that, foremost, BPM means standardization and cost reduction to top management, while they do not see the potential of the knowledge achieved by conducting BPM measures to support strategic planning.

From our preceding case study research, we found two examples, which provide possible reasons for the most frequently named objectives (quality management, standardization) for the use of BPM in SMEs. A certification according to ISO (International Organization for Standardization) standards was mandatory for some companies to prove a certain level of quality to their partners, e.g., suppliers and customers. In those cases, meeting the certification requirements was the main motivation for e.g., documenting a company's processes. The introduction of ERP systems was another reason for a detailed process analysis with the aim of selecting an appropriate ERP system or replacing the existing one.

3.2 Process Purpose, Documentation, Quality and Capabilities

After the strategic perspective on BPM, the further items address the operational dimension. Items asked whether the processes achieve their goals and whether the goal is achieved reliably, a differentiation pointed at by company C. If the process runs through, it produces the expected results. However, lacking in overview, errors, e.g. delays, remain undiscovered until the customer reacts. Here, the process is not reliable. Figure 1 shows the respective results of the survey. The most frequent answer (36.0%) of the questions combined is that the processes generally achieve their goal and are mostly reliable as well. However, the number of companies considering their processes as generally failing (goal: not at all and occasionally: 7.0%) or mostly unreliable (10.5%) may, in total, be low. Nonetheless, it is still surprisingly high, considering that failing and unreliable processes most presumably have a strong negative impact on the company's performance.

In fact, in none of our case studies, we uncovered processes that predominantly failed or were predominantly unreliable. At company C, purpose achievement was rated high whereas the reliability was subject to improvement. The case study notes uncovered possible reasons: a high number of coordinative tasks ran over a very long period. It was prone to delays and other deviations, which went undetected over long periods of time. Also, the process was new and not fully established yet. Since the majority of tasks was performed by a small number of people, the company board did not consider any form of documentation necessary. Only when the project sizes and numbers increased, the need for change was perceived. In the BPM initiative, our process models made the process transparent, and the board realized that they had completely underestimated the complexity of the coordinative tasks in general. Further, the initiative uncovered many issues in detail that had never been communicated by the employees before, e.g., the lack of consistent data or diverging assumptions about the process in general. The board assumed that tackling these issues would improve the reliability greatly.

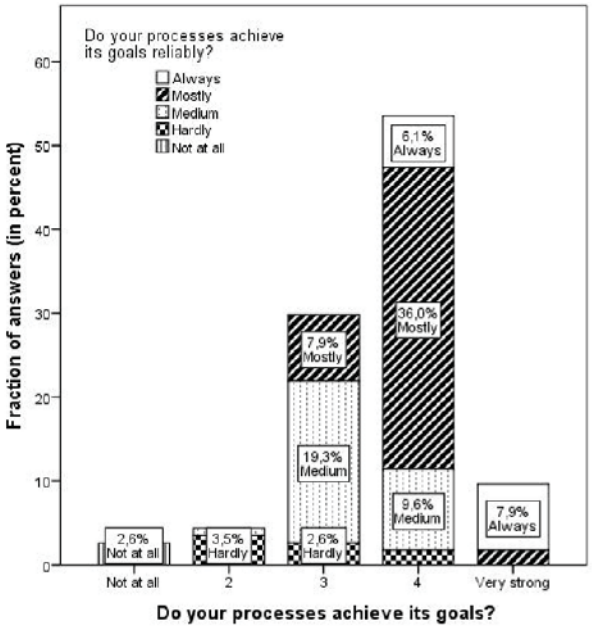

Figure 1. Goal achievement of processes

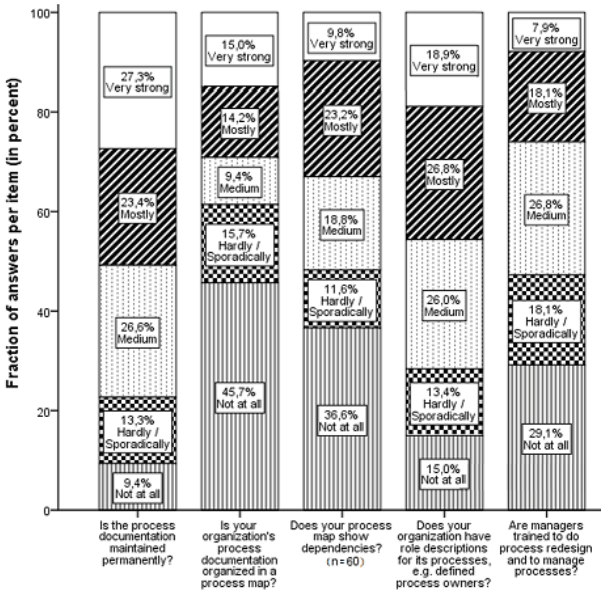

Figure 2. Documentation measures and capabilities

Figure 2 shows the results regarding process documentation and management capabilites. Less than a third (22.7%) of the participants declared to "not at all" or only "sporadically" update their documentation. We doubt that all of these companies fully realize the benefit and potential of BPM initiatives. It becomes evident that more advanced measures, e.g., the process map or role descriptions, are less frequently installed. The case study notes revealed possible reasons. Some of the companies had

installed a process documentation because important customers had urged them to do so. E.g., company J is a supplier for the automotive industry and is thus required to have an ISO certification and basic BPM measures installed. Still, BPM was essentially considered a costly nuisance. Hence the company had not trained any of their personel to perform BPM initiatives, was not willing to invest in BPM initiatives and maintained the least possible amount of documentation to sustain the certification. There were no attempts to manifest BPM as a means of improvement in any way. Other companies, e.g., company E, installed BPM staff out of their own motivation to improve processes. Thus, the persons involved implemented measures such as a process map being, in fact, well trained to do so.

3.3 Process Controlling and Improvement

Further, the questionnaire focuses on process controlling and process improvement asking whether goals for processes are defined and aligned to the business strategy. 42.5% of the respondents state that process goals have been defined for the majority of their processes, in contrast to 30.1% declaring that they do not use process goals at all, or only rarely. Companies that widely use process goals mostly also link them to the business strategy. Still, the majority of companies with only few goals in place do not derive them from strategy although there is a broader distribution to be observed. In no case, company-wide use of process goals goes without anchoring them to strategy (see Figure 3).

To evaluate if process goals are reviewed and adjusted where necessary, we considered a subset of companies (n=98) that had defined goals in the first place. About 58% of these companies claimed to be doing this at least once a year (Figure 4). As goals serve as a benchmark for process performance, they should be communicated to and understood by everyone involved in the process. However, in 51.3% of the SMEs, goals are not or only partially known to the employees involved (Figure 4).

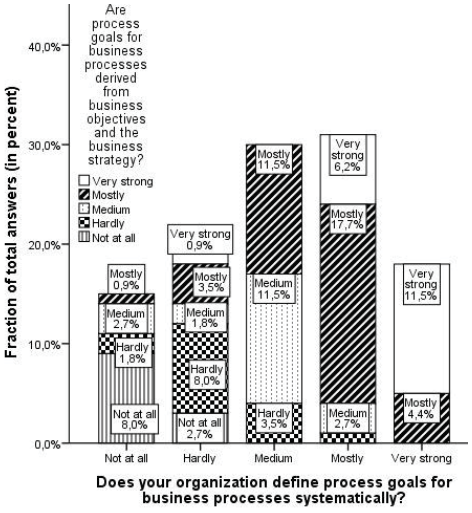

Figure 3. Definition of process goals

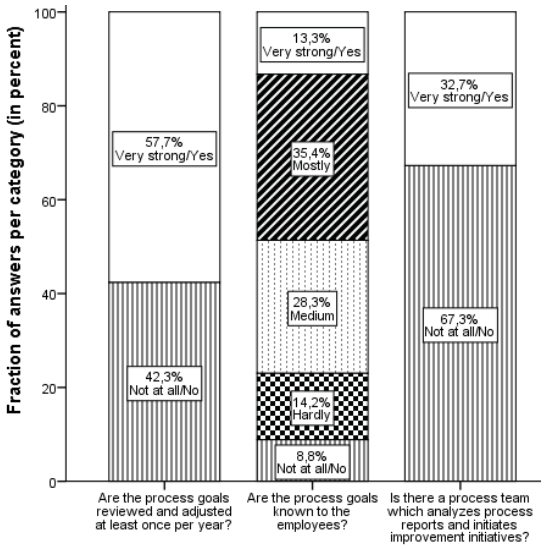

Figure 4. Process goals and organizational integration (n=98)

These results correspond to the findings in our previous case studies. Here, too, the majority of the companies defined process goals that were derived from strategy. However, checking the documents in company H, the last time they actually were updated had been 3 to 6 years ago. A regular review and an adaption to current requirements were missing. Also, it became apparent that employees involved in the process were not aware of the process goals, because these goals had not been communicated to them.

An important aspect relating to process monitoring and controlling is the operationalization of goals in terms of measurable performance indicators. As expected, a positive correlation between the determi-

nation of process goals and the use of process performance indicators was found. However, a considerable number of SMEs (21.9%) do not take advantage of process performance indicators at all. More than 42% have defined process goals for the majority of their processes but less than half of them have specified performance indicators to operationalize process goals. Most interestingly, even when the companies stated to have specified goals, for each business process, about 17.6% of them do not use any performance indicators whatsoever for measurement.

In addition, we asked which indicators SMEs usually employ for process performance measurement (Figure 5). By far the most important is "Adherence to schedule", which is used either regularly or often by 69.3% of the companies. Most notably is the rare usage of cost and time indicators, which show, with 18.4% and 15.8%, the lowest values of regular usage and are never used by about 25% to 28% of the companies. This stands, to some extent, in contrast to the answers given regarding the organizations' strategic objectives with productivity and cost transparency ranking relatively high. An example can be found in company G. After we introduced high quality process models as part of the BPM initiative, in the following workshop, also due to the rather small process size, a systematic measurement was easily derived.

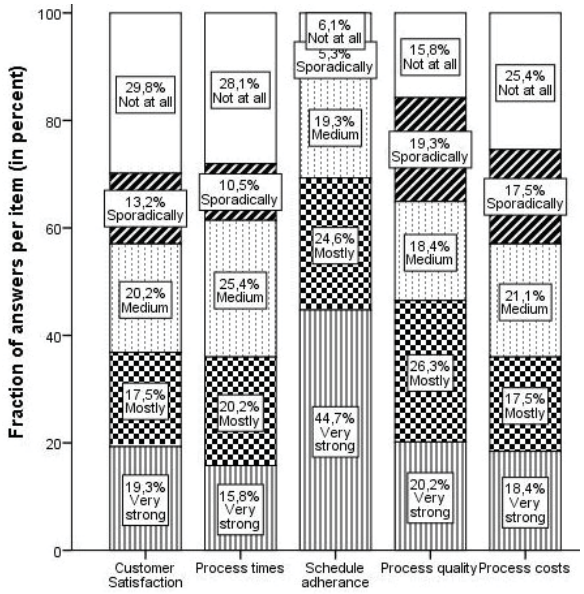

Figure 5. PPM indicators used by SMEs

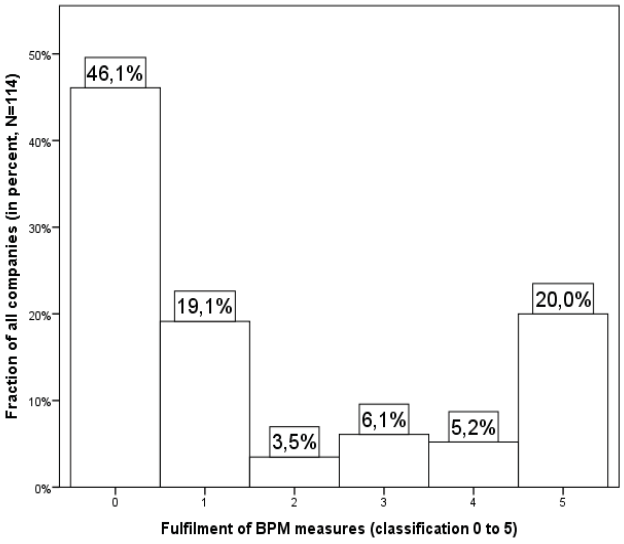

Figure 6. Overall classification of SMEs

To exploit the maximum possible benefit from BPM, it is crucial not only to collect measurements but also to establish a reporting system and analyse the data for active process controlling. For that purpose, it is necessary to regularly assess deviations from planned performance targets, identify and analyse their causes, and initiate corrective actions. 31.9% of the SMEs stated to be performing these tasks continually or very often whereas a similarly sized group made up of 38.9% of the companies never or only rarely do so. Altogether, 27.2% of the respondents have available a full or almost complete process reporting system whereas for a bigger share of companies (43.9%) reporting is either non-existent or only exists in a rudimentary form. A positive example in this regard was company E. They installed a completely automatized IT system for performance measurement providing regular performance reports to the management. This allowed a strict monitoring and quick reaction to occurring problems. Driving factors for this initiative were the available BPM capabilities and the management interest in BPM.

Regarding the domain of process improvement, we asked the SMEs if they regularly assessed the potential for improvement and actively search for measures to enhance existing processes. As the results show, most of them fall into the two categories of companies that do so occasionally (34.8%) or at frequent intervals (27.7%). At the top end, we found 10.7% of the SMEs having implemented a constant

identification and assessment of process improvement possibilities. On the other hand, there is a considerable group of companies for which process improvement is not part of their BPM approach (15.2%) or only plays a minor role (11.6%). Comparing these results to other items shows a considerably lower number of companies that can rely on a previously conducted analysis for process improvement. For example, of those companies engaged in process improvement quite regularly, less than half of them (48.8%) have systematic data (e.g., target deviations, root cause analysis, etc.) available as a basis for taking decisions. Regarding the organizational integration, only 32.7% have put a designated process team in place, which is responsible for analysing process reports and initiating improvement activities (Figure 4). This clearly indicates that the majority of SMEs neglect a clear allocation of tasks as well as the corresponding competences, which are necessary to effectively carry out process improvement initiatives.

3.4 Overall evaluation

After interpreting the items in detail, we cover the overall results. We use the order of the categories to classify the companies (see Table 2). A company's class is the highest class the items of which have been fulfilled for at least 50%, due to the nature of the survey targeting the overall BPM. Probably, a company will not implement the whole set of measures even for the least important auxiliary business process. The classification shows the fulfilment of BPM measures while considering these conditions.

Figure 6 shows how many companies reached the respective category. Surprisingly, the majority of answers tend towards the borders. First, 46.1% of the companies reside in category zero. Hence, they reportedly document very little, if at all. Our case study notes show that company J is an example of this observation. Mostly, their employees are involved in the manufacturing process, which is determined by the manufacturing necessities. However, due to changing markets, the time and flexibility of their design and tender process (designing the customized component and calculating a tender for the production) came into focus. The company has about ten employees covering this process among others. By their own account, the existing process documentation written to acquire a certification is not related to the actual process. In fact, the involved personnel know their own tasks very well but only have an abstract notion of the overall process. Nonetheless, our case study notes show that, a process model covering the entire process reveals several possibilities to increase the flexibility and performance of the process. As a consequence, the head of the company considered modelling very useful. However, since the employees have neither the time nor the capabilities, they do not plan to conduct further BPM initiatives.

The second most frequented class, class 5 with 20.0% of the companies, includes companies that continuously optimize their processes and have implemented the measures from the previous classes as well. An example for class 5 is company E. While we were revising the process model for the product design, we realized that the company is highly process driven. They perform continuous monitoring and the feedback is used for optimization. Asked for the reasons of the high degree of BPM involvement, the head of quality referred to the complexity of their processes. The product design combines mechanical engineering, optical engineering (i.e. optical lenses and sensors) and software development as well as a large amount of external regulatory demands and engineering tools and processes for mass production. Since the company does not outsource any steps, they need BPM to deal with the immense complexity. While the company had already implemented most of the known BPM measures, they were still interested in further methods and techniques to increase the efficiency of their processes.

Third, about 19.1% of the companies reports' are classified as class 1, having a process documentation. Even though the example from class 0 showed that realistic process models are no mandatory requirement for a certification, the certification was the initial motivation for company G to document their processes. The models were further used to define the responsibilities of the employees and monitor their delivery. However, responsibilities and roles from a process perspective (e.g., process ownership etc.) were not defined, since that concept was not known to the company. The existing documentation

was created with MS Visio flowcharts and e.g., routing constructs of modelling languages (e.g., OR, XOR, AND connectors) were omitted. We revised the models introducing a proper control flow and important milestones. Now using the model, the company showed great interest in introducing further BPM measures, especially a process performance measurement.

Last, only few companies fall into classes 2 to 4. Reflecting our previous experience and our notes, we found a possible explanation for this distribution. While class 2 can already be achieved with few measures (i.e., process documentation), achieving class 3 to 5 requires continuous efforts. BPM initiatives are either done with as little effort as possible, for which they seldom produce a proper documentation and remain at the initial level. This is sometimes the case if initiatives are conducted for certification purposes only, for example. However, when the initiatives are actually considered beneficial, e.g., due to complexity issues, a proper BPM with the necessary resources is installed. In this case, due to the small structures of the SMEs, the effort to implement the additional measures from class 4 and 5 is manageable. A closer look at class 5 reveals that the majority of companies score 50% to 65% of the items in class 5 (39.1% of the companies in class 5). A higher effort is assumingly not warranted for.

Our results differ strongly from the prior studies by (Harmon and Wolf, 2014) and (Bruckner-Kley et al., 2014, Minonne et al., 2011). There, companies were predominantly categorized to either level 2 (Harmon and Wolf, 2014) or level 2-3 (Bruckner-Kley et al., 2014, Minonne et al., 2011). We argue that this is due to vastly different methods and subjects, which make a comparison of the results very difficult. For example, Bruckner-Kley et al. (2014) and Minonne et al. (2011) ask one single question only to identify the BPM maturity level of their subjects. We argue that this very abstract question (almost) encourages uncertain answers regressing to the mean. (Harmon and Wolf, 2014) conclude that level 2 is the dominant maturity level since, overall, the answer "occasionally" was the most frequent answer. In our study, each subject is classified individually based upon a large set of questions (see section 2.2.). Last, our study focuses SMEs in Bavaria, whereas the other studies have no such focus. In summary, the results of the two previous studies cannot be compared with ours in a meaningful way.

4 Discussion

The integration of the results of our survey and multiple case studies puts us in a position to evaluate the status quo of BPM adoption in Bavarian SMEs in general, and to identify motivations and reasons that help to explain the results observed. In this section, we discuss the main findings in a broader perspective. First of all, the overall results provide a divergent picture regarding the adoption of BPM in Bavarian SMEs. As highlighted in section 3.4, there is a notable cluster of companies that are clearly dedicated to BPM and have implemented most of the relevant BPM measures. This shows that it is indeed possible for SMEs to comprehensively adopt BPM. However, the vast majority reaches only lower levels of BPM adoption. It is an interesting question whether those companies do not see any benefit from adopting BPM given their concrete situation or if they are actually willing to adopt BPM but struggle with the realization for various reasons.

Thus, we discuss the issues regarding the adoption of BPM on the basis of our previous findings in more detail. We link these findings to possible reasons, and compare them to the requirements of the maturity levels. Hence, we are able to derive propositions, which enables practitioners to define next steps to possibly arrive at a higher maturity level or solve individual problems, and define requirements for BPM research focusing on SMEs. Table 3 gives and overview of the propositions. The columns in Table 3 show the observations, starting points and the derived propositions, and the rows are grouped to the domains that we identified among the observations: scientific foundation, strategy, implementation of BPM measures, and organizational embedding. In the following, each of these domains is explained.

A question worth paying attention to is whether SMEs draw on the broad **scientific foundation** that exists in the BPM domain. For example, do they utilize established concepts and approaches that have already proven their usefulness for the intended purposes? To our surprise, when we initially asked the

case study participants which one of the manifold BPM approaches they use, all of them replied that they do not adhere to a special one. Rather, they developed a company-specific ad-hoc procedure that worked for their individual purposes. This, in turn, leads to problems such as an incomplete or inconsistent BPM implementation, which are reflected in the survey results, too. For example, we found companies extensively measuring the performance of their processes but never using the gathered data for process controlling activities (see section 3.3). The same is true for the documentation of business processes where well-known modelling languages (e.g., EPC, BPMN) are not used but, instead, self-designed graphical representations. Together with a missing awareness of quality requirements, this leads to a process documentation that is not appropriate for many BPM related topics. In summary, we found that, for SMEs in Bavaria, the orientation on existing BPM approaches and instruments is rather low. This may involve the danger that some extra effort is necessary for the implementation and that the resulting BPM is less effective in the end as common best practices are not exploited (see Table 3).

The interplay between BPM and business **strategy** is an interesting topic. This more prominent relation covers the contribution of business strategy for the definition of business and process goals. Our investigations reveal a mostly consistent derivation of process goals. However, the operationalization of those goals by means of performances indicators is not done consistently in many SMEs. As a result, the defined performance indicators are aligned to the process goals to a limited extent only and do not fully reflect the business strategy (see section 3.1 and 3.3). A possible reason disclosed in the case studies is a lack of communication, which is why employees are simply not aware of the strategic goals. Further, SMEs avoid monitoring the performance of their employees. In either case, the results indicate that SMEs do not use the potential of BPM to pursue long-term goals. They rather monitor their production to prevent deviations from schedule or quality problems, which may be subject to a contractual penalty. Interestingly, certifications (e.g., according to DIN EN ISO 9001) are often not considered as a chance to adopt BPM but are rather regarded as a duty, which has to be fulfilled in some way or other. We have observed that some companies hold the certificate, even though their process documentation was mostly not up-to-date and its quality on a low level. The potential of BPM for strategic purposes, such as processes for mobile business or in-/outsourcing decisions, is mostly overlooked by SMEs. They rather perform BPM on an operational level and regard strategic planning as a separate task. The missing linkage is reflected in e.g., the use of performance indicators being inconsistent to the business strategy (see section 3.3). Thus, the achievement of strategic objectives cannot be measured by means of BPM. Hence, we found that SMEs often lack an appropriate instrument to review and adapt their strategic focus. Another point is that the use of performance indicators does not only enable to measure the current performance of business processes, but also allows to rate the possible process performance in the near future by using techniques of mathematical forecasting and simulation (see Table 3).

Another issue relates to the **implementation of BPM measures** where we differentiate three aspects that we could observe in the course of our study: (I) the degree of fulfilment of BPM measures, (II) the consistent implementation across different categories, such as strategy, documentation, PPM, etc., and (III) the pervasiveness in the company with regard to complete process coverage. In general, we found that only a small group of SMEs adopted BPM measures to the full extent (see section 3.4). The majority selectively implements measures to fulfil a current demand. In this context, process documentation takes a special position as it is often introduced only to fulfil certain requirements for e.g., ISO certifications. We also found that BPM measures are inconsistent with each other since they were introduced in isolation without following a systematic approach. Hence, e.g., process targets do not match the strategic goals and extensively gathered data is never used for process controlling (see section 3.3). The main reason for that is the absence of an employee who is solely responsible for BPM tasks. Further, poor communication and information sharing encourages the emergence of isolated measures. With regard to pervasiveness and process coverage, our results show that SMEs in Bavaria mostly focus on single processes when implementing BPM measures (see section 3.2 and 3.3). Though it might be a sensible approach to focus the efforts on important key processes, an over-excessive concentration may cause

problems. Since we found that most companies do not describe the interdependencies among their processes (e.g., by depicting them in process maps), mismanagement and high coordination efforts are the consequences. As a general view on business processes is not available for managers, overall management control and alignment to strategy becomes difficult (see Table 3).

	Observation	Reason/Starting Point	Propositions
Scientific Foundation	Established BPM approaches not implemented	Complexity of single BPM approaches; lack of BPM knowledge and manpower	Development of BPM approaches and trainings adapted for SMEs; usage of best practices
	Well-known modelling notations not used; missing quality requirements for documentation; self-designed graphical representation for processes visualization	Lack of modelling skills; lack of manpower; expensive BPM tools; missing awareness for the benefits	Development of and participation in BPM trainings; affordable BPM tools
Strategy	Mismatch of used performance indicators, process goals and strategic objectives	Lack of communication between management and employees; avoidance to measure performance	Consistent delineation of performance indicators from the strategy; establishment of a comprehensive measurement and reporting system; raise awareness for strategic benefits and of long-term planning
	Poor quality of process documentation due to external requirements (e.g., certifications)	Missing awareness for the benefits of process documentation and qualitative benefits of certification	Raise awareness for the qualitative benefits of certification; participation in modelling trainings; raise awareness for the benefits of process documentation; rigorous certification audits
	Development of business strategy on basis of BPM not performed;	BPM only performed on an operational level; strategic planning as a separate task; poor operationalization of process goals to performance indicators	Raise awareness for the contribution of BPM to strategic planning; participation in BPM trainings on methodological knowledge; usage of BPM for forecasting to review and adapt the strategy
Implementation of BPM measures	Selective or isolated implementation of BPM Measures	BPM is used to cover current needs; fulfillment of certain requirements; established BPM approaches not used; lack of manpower; no definition of responsibilities; poor communication/ information sharing	Participation in method trainings; awareness for benefits of a consistent, integrated BPM approach; creation of a holistic view on diverse BPM measures
	Focus on single business processes	Short-term and problem oriented focus; no process map showing interdependencies	Participation in method trainings; awareness for benefits of holistic BPM approaches; definition of responsibilities for a comprehensive BPM
Organizational embedding	Lack of anchoring BPM in the organization: -limited use of BPM measures for decision making -limited process improvement or process redesign possibilities -limited reporting of performance achievements	No clear role definitions; no employees with main topic BPM; not sufficient resources; lack of communication; lack of employee skills regarding BPM	Establishment of roles and provision of sufficient resources; organizational embedding of measurement and reporting system; communication of goals and achievements

Table 3. Derivation of propositions

A further issue that we found important in the SME domain is the missing **organizational embedding** of BPM. Many companies do not provide sufficient resources, first and foremost staff, for BPM activities, and clear definitions of roles (e.g., process owner etc.) are also scarce (see section 3.2). Whereas in large companies there usually are positions dedicated to BPM topics, smaller-sized companies of focus on operational daily business. During all of our on-site visits, we never met any employees whose main

task was BPM. Mostly, it was the quality manager who had been assigned the additional responsibility for this topic, and only a small number of SMEs have process teams to discuss problems and develop measures for improvement. In case BPM standards or requirements are defined, they are poorly communicated in most SMEs (see section 3.3). As a consequence, e.g., process goals defined by the management are unknown to those employees working in the respective processes. On the other hand, process reporting, which is supposed to provide decision makers with relevant data (e.g., process performance measures), is poorly implemented, too. This may cause wrong decisions both at the operational and the strategic levels. Another problem SMEs struggle with is the lack of BPM knowledge and qualified personnel. In particular, we found the quality of the process documentation at a rather low level. Other companies having successfully implemented a PPM do not succeed in drawing the right conclusions from it as they were not trained in redesigning business processes (see Table 3).

The deficits are also a great challenge for scientists since all the itemized problems can be supported by methods, techniques and tools that have already been available for a long time. Further, there is a tremendous amount of scientific literature in which, mostly based on the design science research method, the development and the evaluation of these BPM methods, techniques and tools are described. The fact that many practitioners do not use them, although they are available and have proven to be useful according to the relevant literature, indicates either a knowledge gap or a lack of willingness. The latter contradicts the contribution described in scientific BPM literature and can be interpreted as a request to scientists to develop new or update existing methods, techniques and tools that are more suitable for everyday routines of SMEs. We see our research as a starting point to investigate the usefulness of the available BPM methods, techniques and tools and to bring them more in line with the needs of SMEs. The former, namely the knowledge gap, motivates to develop further possibilities to train managers in BPM to close the said gap. However, it has to be considered that managers nowadays are confronted with a tremendous amount of BPM courses with different emphases and in different learning settings. Therefore, the reasons of this knowledge gap should be closely investigated, and new training possibilities need to be developed that are explicitly in line with the needs of the employees in SMEs.

5 Conclusion

In this paper, we assessed the state of BPM adoption in Bavarian SMEs. A mixed method approach combines the results of 10 in-depth case studies with 114 responses of a survey. Considered together, they uncover the state of adoption regarding measures about BPM and strategy, purpose achievement and reliability, documentation, capabilities, performance management and redesign. This assessment shows potentials for improvement left untapped, together with possible reasons.

On the base of the identified reasons, we developed our main contribution, next to the results of the survey and the case studies (research question 1 and 2), namely propositions for practitioners and propositions for researchers (research questions 3). These propositions expectedly improve the BPM adoption and thus support the competitiveness of SMEs. In this regard, we answered the three research questions defined in the introduction (a summary of which is shown in Table 3).

Still, our work is not without limitations. First, the interpretation of the case studies, though conducted by two researchers and discussed in a group of four, leaves room for subjectivity. They have to be cross-verified by the results of the survey. Another limitation originates from the selection of participants. As they were contacted at random, it is possible that only those companies responded that had a particular interest in implementing BPM measures. In the light of the previous discussion, companies without any interest in BPM at all might contribute to the size of category 0 (see section 3.4).

Results and limitations lead to further research. First, the study was conducted in Bavaria and needs to be extended to structurally different regions. In that context, further case studies may sustain or contradict the present results. Last, in future work, we will implement and evaluate the propositions in order to verify their relevance and extend their number.

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2.2 Beitrag 2: Enterprise social networks: A literature review and research agenda

Adressierte Forschungsfrage	**Forschungsfrage 2:** Was ist der aktuelle Stand der Literatur im Themenbereich Enterprise Social Networks und welcher Forschungsbedarf besteht weiterhin?
Zielsetzungen	(1) Identifikation von Literatur mit Schwerpunkt auf ESN (2) Analyse der Artikel im Hinblick auf adressierte Themenfelder (3) Identifikation von Forschungslücken und Definition einer Forschungsagenda
Forschungsmethode	Literature Review nach Webster und Watson (2002) mit anschließender qualitativer Inhaltsanalyse nach Mayring (2014)
Kernergebnisse (Überblick)	(1) Identifikation von 106 relevanten Forschungsbeiträgen (2) Identifikation von 70 unterschiedlichen Themen; am häufigsten: Einfluss von ESN auf das Wissensmanagement (17 Beiträge) (3) Definition von 43 Forschungsfragen auf Basis der identifizierten Forschungslücken
Publikationsort	Computer Networks 114
Ranking VHB JQ 3	Kein Ranking vorhanden
Autor(en) und Anteile	**Benjamin Wehner** **45%** Christian Ritter 45% Susanne Leist 10%

Tabelle 5: Fact Sheet „Enterprise social networks: A literature review and research agenda“

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Enterprise social networks: A literature review and research agenda

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ABSTRACT

Enterprise Social Networks (ESNs) have been receiving increasingly more attention in academia and practice over the past years. ESNs are implemented to improve collaboration among employees and to foster knowledge management by capturing tacit knowledge, among other reasons. However, ESNs do not always fulfill the companies' expectations and consequently companies question their investment. Due to the growing popularity of ESNs in practice and the still unanswered questions of how to ultimately achieve ESN success, a growing number of researchers have started to analyze the ESN phenomenon, leading to a steadily growing number of publications in a variety of outlets. However, research groups are not in accordance yet on what terminology to use for the given phenomenon. This shows that the young research field of ESNs is still in development. To support future research and practice, we perform a literature review to answer three research questions: first, we analyze which terms for the phenomenon of ESNs were used and which term tends to be accepted by the community recently. Second, we analyze ESN publications regarding the addressed topics to provide a state-of-the-art in regard to ESN research. We elaborate a framework using the dimensions ESN implementation status and focus of investigation to structure the publications and to provide a comprehensive overview of the research topics. Third, we identify areas of future research on the basis of the current publications and trending topics.

1. Introduction

With affordable and reliable internet service for everyone and information technology evolving quickly, the first digital natives, also referred to as 'Generation Y', have been exposed to technology and the internet from early childhood. As a result, they are technologically savvy and are used to applying technology, especially for communication [1]. The resulting communication needs were fostered by the emergence of Social Media at the turn of the millennium [2]. By entering the workforce, Generation Y started to transfer their communication habits and their demand for Social Media into the workplace [3] and are expecting their employers to provide technology to fit their 'social needs'. As a result, large corporations have started to implement Enterprise Social Media in their portfolio of IT applications, e.g., Henkel, one of Germany's largest companies in the chemical industry, introduced the Enterprise Social Network 'Yammer' at the end of 2015. According to Henkel's CEO Kasper Rorsted, Yammer's introduction at Henkel was a result of the rising expectations of Generation Y employees. They are socially connected via Snapchat, Facebook, or Instagram in private life and also expect this in their professional life [4]. As Generation Y is now slowly taking over the responsibility of making strategic business decisions as newly promoted managers [5], they will define the future use of Social Media in the business world in the upcoming decades.

Enterprises introduce Social Media for various reasons, e.g., to improve innovation management [6] or to provide social collaboration [7]. Examples of well-known Social Media platforms are Online Social Networks (OSN) like Facebook or Google+, Microblogging platforms like Twitter, or video sharing platforms like YouTube. However, companies also use Social Media platforms specifically designed and implemented for their internal use. An example for a class of internal applications are Enterprise Social Networks (ESNs), which represent the in-business counterpart to OSN. ESNs support companies by providing new use cases for their workforce as they expect benefits from ESNs by supporting collaboration, strengthening social connection, fostering situation awareness, and facilitating knowledge management [8]. ESNs also pave the way for companies to extend their efforts regarding *"crowdsourcing, open innovation, or the inclusion of external experts in internal processes"* ([9], p. 151).

ESN adoption in enterprises has accelerated over the past years as customer-driven social technologies like OSN cannot provide necessary enterprise collaboration capabilities (e.g., document storage, knowledge search, integration with existing communication

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1389-1286/

systems) [7]. Market research has been showing a significant rise in ESN investment recently. For example, IDC's February 2013 Social Business Survey mentions an ESN adoption rate of 79% among all respondents. Between 2014 and 2019, the worldwide revenue of ESN software is expected to more than double [10]. However, ESNs do not always fulfill the companies' expectations as usage often dwindles after an initial spike and companies question their investment [11].

Due to the growing popularity of ESNs in practice and the still unanswered questions of how to ultimately achieve ESN success, a growing number of researchers have started to analyze the ESN phenomenon. Multiple research groups have evolved over the last years contributing to this topic. These groups have mostly been focusing on their own ideas and definitions. Thus, to get the state-of-the-art about literature on ESNs, a literature review including a detailed topic analysis is necessary. Further, to structure articles in regard to ESNs, we develop a general framework to classify all literature dealing with ESNs containing the two dimensions *focus of investigation* and *ESN implementation status*. Both the detailed topic analysis and the framework are the basis to identify gaps and redundancies in current research, which enable us to define a profound research agenda. As a result of the problem statement, our paper addresses the following three research questions:

RQ1: Which terms and definitions referring to ESNs does the IS community apply?
RQ2: What topics are currently addressed in IS research on ESNs? How can these topics be classified in a framework?
RQ3: What are the main topics for future research on ESNs and what would a research agenda look like?

We address these three research questions by conducting a systematic literature review applying the well-established method of Webster and Watson [12]. It is followed by a qualitative analysis of all identified literature according to Mayring [13]. This leads us to a universal framework for ESN research, ultimately resulting in a proposed research agenda for the field of ESNs.

The paper is structured as follows: Section 2 introduces definitions, our research methodology, related work and a new framework for structuring ESN research. Section 3 presents the results of our literature review and highlights the most interesting findings concerning current research topics. In Section 4, we analyze and discuss further research questions raised by literature. The paper closes with a conclusion in Section 5.

2. Research method and application

2.1. Terms and definitions

Social Media can be classified as „*…a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content*" ([14], p. 61). These internet-based applications incorporate blogs, social networking sites, collaborative projects, content communities, virtual social worlds as well as virtual game worlds [14]. The term Social Media is strongly associated with platforms for private use. However, Social Media has also gained increasing attention in the business world recently. Social Media applied by an enterprise is referred to as Enterprise Social Media (ESM) (cf. [15]). ESNs platforms typically combine multiple social technologies with the goal to support collaboration among business users and can thus be defined as "*web-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing*" ([16], p. 2).

According to Turban et al. [17], there are five general approaches of how companies can apply ESM: (1) using publicly available Online Social Networks (OSN), (2) introducing internal Enterprise Social Networks (ESNs), (3) creating enterprise-owned, publicly accessible social networks, (4) enhancing existing communication technologies (e.g., e-mail) with social functionalities, or (5) developing tools that include capabilities to support social networking applications. Consequently, the term ESM is twofold: On the one hand, ESM entails the use of any of the publicly available Social Media platforms for the purpose of marketing, recruiting, and the like (cf. [15,18]). However, while customer-facing Social Media platforms (e.g., Facebook, Twitter, LinkedIn, Pinterest, Snapchat) aim at keeping users engaged to gather more and more of their personal data, the goal of a company when applying ESM is to increase efficiency and effectivity in accomplishing its business objectives [15]. On the other hand, ESM platforms for internal company use (e.g., ESN) typically combine multiple social technologies, e.g. microblogging and social networking, with the goal to support collaboration among business users. From a technical perspective, ESNs can be defined as "*a web-based technology that supports users' contributions of persistent objects to a shared pool and that enables company-wide responses to these objects*" ([19], p. 3). For clarification, Fig. 1 depicts the definition of ESM in the context of Social Media (highlighted horizontally by a dotted line).

Topics regarding research on ESNs include its impact on employees' collaboration and communication, its contribution to flatter hierarchies, or its success factors [20]. As research in the area of ESNs has only started recently and is still evolving, many different terms and definitions have been developed and used interchangeably to describe the same phenomenon. This is mainly caused by different terms introduced by different research groups and the ongoing evolution of the underlying technology of ESNs and corresponding tools. We will address this issue with Research Question 1. Examples of terms used in literature include but are not limited to: Enterprise Social Software [19,21]; Corporate Social Software [22]; Corporate Social Network [23]; Enterprise Social Networking Sites [24,25]; Enterprise 2.0 [26]. While these terms are not real substitutes for each other, their general understanding refers to the same phenomenon and differs mainly by either the time the terms were introduced or by their initial scope. As we strive towards clarification of terms (see RQ1), we will use the expression ESN in this paper if not stated otherwise.

2.2. Related work

Despite the fact that demand for ESN implementation has been steadily increasing over the past years [27], research regarding Social Media Networks has mainly focused on OSNs so far (cf. [20]). However, many IS researchers have been focusing on OSNs without considering the organizational context of Social Media [16]. Nevertheless, research on the use of Social Media in organizations has been continually evolving and expanding over the last five to ten years and has gained some popularity in IS research. Thus, we needed to check whether any of our research questions have already been answered by other publications recently. We therefore searched for publications that provided – in the context of Social Media – one of the following three goals: an overview of the state-of-the-art, a research agenda, or a framework to classify literature.

We first searched for publications addressing similar research questions in the context of Social Media [20,28,29] and Enterprise 2.0, i.e., elaborating the evolution of enterprises using Web 2.0 technologies (e.g., [26,30,31]). We identified the following publications:

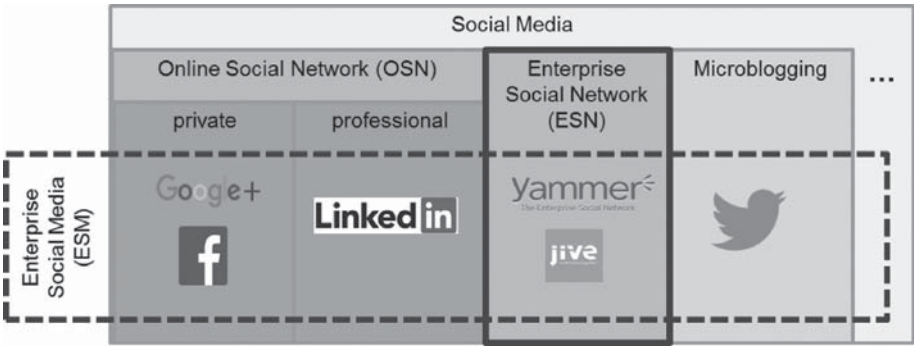

Fig. 1. ESNs in the context of enterprise social media.

- A literature review by Berger et al. [20] provides an overview of the state-of-the-art of OSN research. The authors describe the manifold research areas in this context, e.g., general characteristics of OSNs, or OSNs in an organizational context.
- Schlagwein et al. [28] elaborate on the unique features of social information systems and provide an overview of research topics in this particular field, e.g., crowdsourcing and viral marketing.
- Hanafizadeh et al. [29] focus on the business impacts of social networking sites used both internally and externally by organizations, e.g., to support E-Commerce and advertising.
- Williams et al. [30] describe the various key topics in Enterprise 2.0 research, e.g., strategies for Enterprise 2.0 use and barriers to adoption.

Further publications describe the application of Web 2.0 in one particular field, e.g., how to analyze the usage of Social Media tools in the different product lifecycle phases (cf. Roch and Mosconi [32]), or how to achieve one particular goal, e.g., to foster collaboration (cf. Dürr et al. [33]).

Even though these publications seemed promising at a first glance, all of them analyze literature in related fields which have a broader or different focus than ESNs. Thus, the literature analyzed in these articles can, if at all, only be reused in a very limited way to solve our research goals. This is especially true as none of it focuses on ESNs in particular. As a result, the topics in these articles are also not aligned to fit research on ESNs.

We found only one literature review conducted by Viol and Hess [34] that focuses on ESNs and classifies the articles based on a high-level topic analysis. Although the focus of this article is narrowed down to ESNs, the results of its analysis are very abstract. Their paper only describes six meta-topics, which have been defined by deductive topic identification (see [31]). In contrast to their paper, we conducted an in-depth analysis on a broader article base and induced category development (cf. [13]; see 2.3), as this is an adequate approach to obtain a clear and detailed picture of the state-of-the-art and to derive a research agenda (cf. [12]). Thus, we differ strongly from their work in terms of the method of analysis used. However, when comparing our results (see Section 3) with theirs, we see no contradiction, but instead a more detailed reappraisal of ESN research.

As mentioned earlier, we also define a framework to classify ESN related articles. Before developing our own framework, we searched for existing frameworks that we could potentially use for our research. We therefore identified four frameworks in the context of Social Media that provide similar goals to ours:

- van Osch and Coursaris [35] developed a framework for classifying organizational Social Media research providing six interrelated dimensions (artifacts, actors, activities, management, employees, external stakeholders) to deduce a research agenda. The "artifact" dimension discriminates between the various types of Social Media, e.g., virtual social worlds, blogs, or social networking sites. As our research strictly focuses on ESNs and thus on only one single Social Media artifact, this dimension cannot be applied to our research and the framework cannot be applied to answer our research questions.
- A more focused classification framework was published by Kane et al. [36]. Their 2×2-framework structures research in Social (Media) Networks using the two dimensions "explanatory mechanisms" (structure vs. content) and "explanatory goals" (user behavior vs. platform induced). Their publication strictly focuses on a framework and a research agenda for Social Network Analysis in Social Media contexts.
- Aral et al. [37] defined a framework for Social Media research containing different levels of analysis.
- Herzog et al. [19] define a conceptual framework for the evaluation design of Enterprise Social Software to support different stakeholders.

While all of these publications provide some sort of framework in the Social Media context, we could not identify any publication regarding a framework particularly developed for classifying ESN related articles. The deduction of the framework and its details will be explained in Section 2.4.

The in-depth topic analysis of the current literature in combination with the defined framework enabled us to identify a well-grounded research agenda. The in-depth analysis supported our work by ensuring the originality of the identified research questions (see RQ3).

2.3. Research method

To address the three research questions described in Section 1, we conducted a systematic literature review. As such, our research is structured in accordance to Bandara et al. [38] and follows the proposed procedure of Webster and Watson [12]. To provide full transparency of our research and to make our literature review reproducible, all relevant steps (see Fig. 2) are explained in detail in the following.

First, the *review scope* is defined in accordance with the research questions (cf. [39], see Section 1). Afterwards, seminal works that deal with ESNs (e.g. [15–17]) were drawn on to define key terms and to extract *key concepts* that were later on used to define the search terms and the time period for the literature search. Based on these results and the knowledge about the variety of different terms used to describe the phenomenon of ESNs (see Section 2.1), we identified the most promising search terms for our literature review as presented in Table 1, e.g., 'Enterprise Social Networking'. A reasonable time period for our literature search seemed to be the advent of the first ESN related literature in 2004, which also marked the point in time where the first 'mainstream'

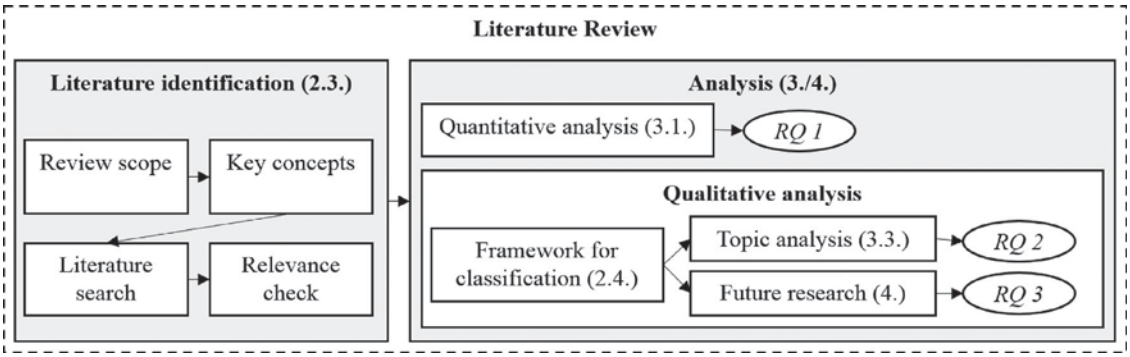

Fig. 2. Research method.

Table 1
Overview of search parameters.

Search Terms (all combinations)	Enterprise Corporate	*AND*	Social	*AND*	Network(s/ing) Software media
	Social intranet				
Time period	2004 - 2015				
Search fields	Title, Abstract, Keywords (where possible)				

Social Networks started to emerge (cf. [40]). Table 1 provides an overview of the search parameters of our literature review.

The *literature search* was conducted in two sequential steps. In the first step, we searched for relevant publications using the defined search terms and filtered the results for the relevant literature. Afterwards, we performed a backward (screening the references used in these papers) and forward search (publications that have cited these papers; cf. [41]).

To conduct a successful literature search, appropriate journals and conferences which provide high quality articles and major contributions in IS research have to be chosen [12]. To select the relevant ones, a well-known approach is referring to rankings [42]. Widely accepted rankings for the IS community are the MIS journal ranking[1] and the VHB-Jourqual 3 ranking. [2] For our selection process, we picked the 30 top journals of the MIS journal ranking and enriched this list with journals that focus on similar or adjacent topics as our research from the VHB-Jourqual 3 ranking, e.g., Journal of Computer-Mediated Communication, AIS Transactions on Human-Computer Interaction.

Further, conference proceedings are a valuable means to exchange new ideas especially in a young field (cf. [42]), which ESN indeed is. To select appropriate conferences, we referred to the VHB-Jourqual 3 ranking that lists the proceedings of the most relevant conferences in IS research. In addition to these ranked conferences, we extended our search to specialized conferences that are explicitly covering our research topic, as suggested by Koch et al. [9]. We therefore added European Conference on Social Media (ECSM) to our list, as ESN is mentioned as one of the main research topics of this conference. The complete list of the selected journals and conferences for our literature review is presented in Appendix 1.

After defining the search parameters (see Table 1), the literature search was conducted and resulted in a total of 3825 publications initially. Then, we checked them for their relevance to our research questions (cf. [38]) based on their title, the provided keywords and their abstract. To reduce the subjectivity of the selection process, two researchers evaluated the relevance of each paper individually. The main reasons for discarding articles for the upcoming classification and topic analysis were a different focus of the article (e.g., Online Social Networks (cf. [2]), inter-firm network analysis (cf. [43])) or the application of general social media concepts in entrepreneurial settings (e.g., public microblogging used by a company (cf. [38]), analyzing video sharing platforms used by a company (cf. [44])). Afterwards, the results of both researchers were compared by calculating Krippendorff's alpha, which is a well-known measure to verify the reliability of agreement [45]. The two researchers disagreed on a total of 60 publications, which led to $\alpha = (\frac{2*(3825-60)}{2*3825}) = 0.984$. This value shows a high agreement between the two researchers, as social scientists consider $\alpha > 0.8$ as being a high value [45]. The remaining 60 disagreements were discussed with a third researcher and, in all cases, a consensus was found eventually, e.g., we eventually discarded a paper in which IT, and not an ESN as defined in Section 2.1, was used as a driver for building social capital in supply chains (cf. [46]).

After evaluating all publications, we identified 99 articles as being relevant to our research questions. We extended our literature search by analyzing these 99 publications in regards to their references (backward search) and in which outlets they were cited in (forward search; cf. [41]). Hereby, we identified seven additional articles that had not been included in our collection as they were not published in the top ranked IS journals and conferences. However, all of them were either published in other peer-reviewed journals (e.g., Journal of Database Management) or conference proceedings (e.g., Mediterranean Conference on Information Systems) and contained promising content for our research questions. For this reason, we decided to add them to our literature review, which ultimately led to a final number of 106 relevant articles for a further in-depth topic analysis.

Before we could start with this analysis, we had to specify its topics. It is important to note that topics include subjects of an ESN (e.g., network structure, technologies) and/or the different perspectives of an ESN (e.g., benefits, success factors, impact), but they do not include research methods. The subsequent topic analysis in this paper is based on the concept-centric approach presented by Webster and Watson [12] and the qualitative content analysis according to Mayring [13], entailing deductive category application and inductive category development. As a starting point for the analysis, we searched through existing literature to identify potential categories. This search entailed, for example, literature on Enterprise

[1] http://aisnet.org/general/custom.asp?page=journalRankings
[2] http://vhbonline.org/service/jourqual/vhb-jourqual-3/teilrating-wi/

2.0 meta-topics [31], on categories of ESN applications [17], on advantages and disadvantages of ESN application [16], on challenges and opportunities [47], or on ESN use in companies [48]. Based on these findings, we deducted generalized categories for the qualitative analysis of our literature review, e.g., *knowledge management, collaboration*, and *communication* [17]. We used these categories to classify the 106 articles (deductive category application). However, not all categories addressed by the 106 publications fit into one of these initial categories as it turned out in some cases that they were too broad to comply with our approach. Therefore, we further divided them into more specialized categories (inductive category development) to which the identified topics were allocated. Then, we aligned the categories to the ESN context to clearly show the particular connection to ESNs, which ultimately led to the topics to be used for the in-depth analysis (e.g., *ESN impact on knowledge management*). We classified the identified literature and analyzed the topics addressed in these publications using the framework proposed in the next section. This classification in the framework helps to better structure and review the articles found.

2.4. Framework for classification

To structure current and future research topics derived from the 106 identified articles, we developed a framework to initially classify the articles. As a starting point for our framework, we first analyzed existing frameworks in a similar context to determine their applicability to our research question (see 2.2). We then built our framework adopting the best fitting dimensions and ideas from these frameworks to create one that supported our goals.

The first dimension, focus of investigation, is rooted from various frameworks we analyzed. For example, van Osch and Coursaris [35] use management, employees, and external stakeholders and three dimensions of their framework to represent the different focus views on organizational Social media research. A similar approach can be identified in the framework published by Kane et al. [36] as they differentiate between explanatory mechanisms and goals. Aral et al. [37] use the dimension "Level of Analysis" to distinguish general layers that are important over time and do not focus on particular technologies or concepts in the rapidly changing field of Social Media. As we wanted to classify and structure the literature by the main perspective of investigation, we particularly chose their dimension, enriched it with ideas from the other frameworks and adapted it to the specific field of ESN research. As a result, our dimension consists of three distinct, but synthesizing layers, ranging from an individual user's perspective through a platform perspective to a higher-level company's perspective.

- **Individual focus**: Research focusing on employees and their direct environment. Exemplary questions are: *What are the benefits of ESNs for employees? How can we measure employee surplus generated by ESNs? How do ESNs affect user behavior? What motivates an employee to use an ESN?*
- **Technical focus**: Research focusing on software, technical aspects and functionalities. Exemplary questions are: *How should an ESN be designed to ideally meet user expectations and demands? Which functionalities increase employee acceptance? What should the introduction process of an ESN look like?*
- **Organizational focus**: Research focusing on the company level (network and effects). Exemplary questions are: *How can short- and long-term effects of ESNs on an enterprise level be measured? How is the organizational culture affected by an ESN? How should an ESN be governed?*

The second dimension of our framework, *ESN implementation status*, is adapted from the dimension *"time"* as presented by Herzog et al. [19]. While other existing frameworks use activities (e.g., Aral et al. [37], van Osch and Coursaris [35]) or content/structure (e.g., Kane et al. [36]) to classify research, we identified the implementation status of the ESN at the time of the research addressing it as the major discriminant for classifying papers, especially when trying to provide guidance to practitioners. Additionally, topics of the research will strongly be influenced by the state of implementation and will therefore allow us to distinctly classify the articles. Research will either cover specific ESN topics before (*ex-ante)*, during (*ongoing*), or after implementation (*ex-post*). While the ex-ante perspective focuses on expectations of all ESN stakeholders, the ex-post perspective provides experiences and best practices.

- **Ex-ante**: All topics before the implementation of ESNs. For example: *Platform design, assessment of user requirements, and alignment of business strategy*.
- **Ongoing**: All topics during or right after the implementation of ESNs (short-term perspective). For example: *Barriers during the implementation, early adopters and their influence on propagation in the company, description of implementation phases*.
- **Ex-post**: All topics after the implementation of ESNs (long-term perspective). For example: *Effects on the network structure, success measurement, organizational change*.

We combined the two presented dimensions focus of investigation and ESN implementation status into a 3×3 framework (see Tables 2 and 3) to provide us with a structured overview of the general research focus of the extracted literature. Using the framework, we were able to classify all of the 106 publications within the two dimensions. This classification supports both researchers and practitioners. Researchers can identify existing literature fitting their specific research, e.g., a researcher who studies the general effects of ESNs on employees will use the framework dimension focus of investigation and select literature from the three areas dealing with user focus as a starting point. For practitioners, our framework offers a substantial collection of topics related to the introduction, execution, and effects of ESNs. Thus, the framework provides a company with articles fitting the company's specific situation, e.g., a company that intends to newly introduce an ESN will foremost search for articles in the ex-ante category of the dimension ESN implementation status.

3. Results

3.1. Quantitative results

To address RQ1, we needed to analyze terms and definitions used by the IS community in the ESN context. Thus, we first analyzed the number of articles regarding the year of publication, the publication outlet, and the publication type to gain a status quo insight in the importance of ESN research in the IS community. Next, we analyzed the terms used to describe the phenomenon of ESNs in total and over time to analyze the current terminology used in the IS community and to describe recent developments in terminology over time.

Looking at the *year of publication* (see Fig. 3), ESNs can generally be classified as a young research field. With a total of only 9 publications in the years 2004 to 2009, the publication rate was expectedly rather low at the time of the first emergence of early ESN applications. From 2010 on, IS research leaned more towards ESNs as companies became more aware of ESNs and first larger scale implementations were put in place. Afterwards, the publication rate increased steadily until 2015, with one slight dent in 2013. The highest number of publications so far was achieved in 2015 with 24 articles, confirming the continuously rising interest of IS research in ESNs.

As is to be expected in a young research field like ESNs, more articles were published in conference proceedings (75%) than in

Table 2
Classification of articles found.

		ESN implementation status			
		Ex-ante	Ongoing	Ex-post	
Focus of investigation	**Individual focus**	12 articles 11.3%	*3 articles 2.8%*	15 articles 14.2%	30 articles 28.3%
	Technical focus	**17 articles 16.0%**	10 articles 9.4%	*7 articles 6.6%*	34 articles 32.1%
	Organizational focus	15 articles 14.2%	*6 articles 5.7%*	**21 articles 19.8%**	42 articles 39.6%
		44 articles 41.5%	19 articles 17.9%	43 articles 40.6%	**N=106**

Table 3
Topic analysis of articles found.

		ESN implementation status		
		Ex-ante	Ongoing	Ex-post
Focus of investigation	**Individual focus**	• (Intended) ESN usage (4x) [21,54,55,60] • Influencing factors of ESN usage (4x) [59,61,67,68] • Motivation factors of ESN usage (2x) [60,69] • User requirements regarding ESNs (2x) [68,70] • (Intended) benefits of ESN usage (1x) [54] • (Intended) ESN impact on collaboration (1x) [71] • ESN user acceptance (1x) [23]	• User behavior in ESNs (2x) [62,63] • ESN impact on knowledge management (1x) [57] • ESN user perceptions (1x) [57]	• User behavior in ESNs (8x) [27,53,64,65, 72–75] • ESN impact on communication (4x) [52,74,76,77] • ESN usage (2x) [78,79] • ESN impact on knowledge management (2x) [52,77] • ESN user acceptance (2x) [66,80] • Network structures in ESNs (2x) [75,79] • ESN impact on collaboration (1x) [53] • Content shared in ESNs (1x) [73] • Lurking (1x) [65] • Privacy issues of ESNs (1x) [66]
	Technical focus	• Design of ESN systems (7x) [15,81–86] • (Intended) ESN impact on knowledge management (6x) [25,83,84,87–89] • (Intended) ESN usage (2x) [56,90] • (Intended) User behavior in ESN (2x) [15,48] • (Intended) ESN impact on collaboration (1x) [86] • Cultivation of ESNs (1x) [56] • ESN evaluation framework (1x) [19] • Innovation created in ESNs (1x) [24] • Success measurement of ESNs (1x) [48] • (Intended) ESN impact on team performance (1x) [91]	• Implementation of ESNs (3x) [17,92,93] • Social search using ESNs (2x) [94,95] • Benefits of ESN usage (1x) [96] • ESN impact on collaboration (1x) [96] • Content shared in ESNs (1x) [93] • ESN impact on knowledge management (1x) [40] • Project management in ESNs (1x) [97] • ESN in SME (1x) [97] • Best practices of ESN deployment (1x) [98] • Visualization of ESN structures (1x) [99]	• Network structures in ESNs (3x) [100–102] • Success measurement of ESNs (2x) [102,103] • ESN usage (1x) [104] • Gamification in ESNs (1x) [105] • User behavior in ESNs (1x) [105] • Visualization of ESN structures (1x) [106]
	Organizational focus	• (Intended) ESN impact on knowledge management (5x) [107–111] • (Intended) ESN impact on collaboration (3x) [107,111,112] • (Expected) ESN impact on organizational culture (3x) [112–114] • (Intended) ESN impact on communication (2x) [115,116] • Influencing factors of ESN usage (2x) [117,118] • Organizational change induced by ESNs (2x) [47,109] • User behavior in ESNs (2x) [113,114] • ESN usage (1x) [119] • Success measurement of ESNs (1x) [120] • ESN user acceptance (1x) [117]	• Implementation of ESNs (2x) [121,122] • Benefits of ESN usage (1x) [123] • Governance of ESNs (2x) [123,124] • Network structures in ESNs (1x) [122] • ESN impact on organizational culture (1x) [125] • Organizational change induced by ESNs (1x) [126]	• Content shared in ESNs (7x) [127–133] • Network structures in ESNs (7x) [134–140] • ESN usage (4x) [128,129,131,141] • Organizational change induced by ESNs (3x) [130,133,142] • User behavior in ESNs (3x) [143–145] • ESN impact on knowledge management (2x) [132,134] • Benefits of ESN usage (1x) [146] • Cultivation of ESNs (1x) [128] • Governance of ESNs (1x) [145] • Organizational charts deducted from ESN (1x) [140] • Success measurement of ESNs (1x) [127] • ESN tool evaluation (1x) [141] • Visualization of ESN structures (1x) [147]

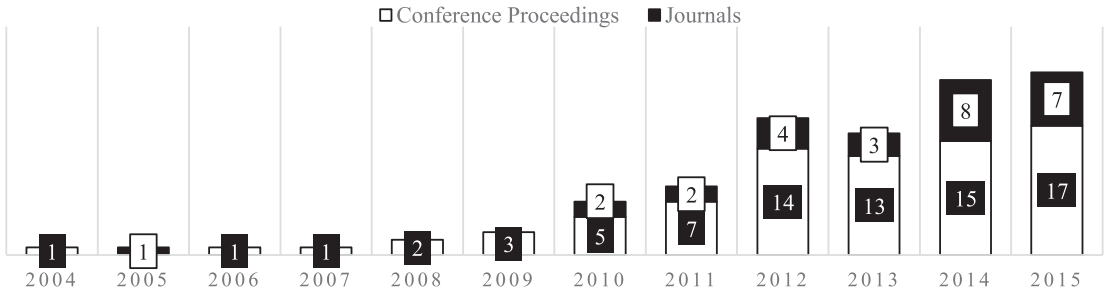

Fig. 3. Year of publication.

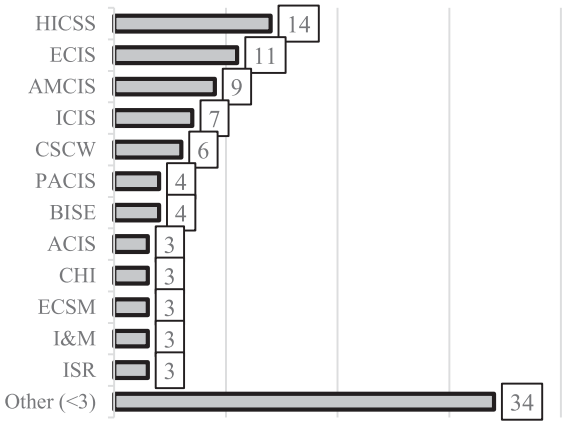

Fig. 4. Publication outlets.

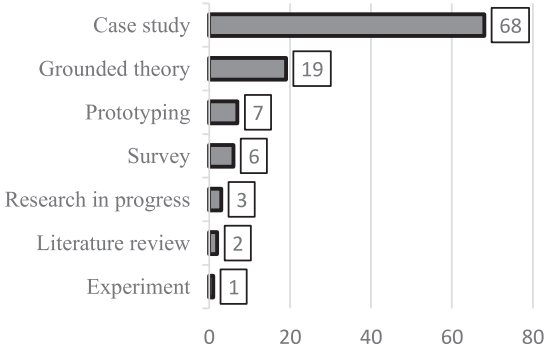

Fig. 5. Type of articles.

academic journals (25%) in total. In this regard, looking at the *publication outlet* in detail, we see that the top five publication outlets are solely conference proceedings (see Fig. 4). However, with research advancing, the proportion of journal publications has been steadily increasing, reaching 34% in 2014 and 29% in 2015 respectively (see Fig. 3). The journal with the most publications relevant to ESNs so far is BISE (4 articles), followed by I&M and ISR (3 articles each). BISE is the journal with most articles due to the publication of a special issue with ESNs as one of the main topics. The fact that a special issue regarding ESNs has already been published shows the particular and trending interest on the topic ESN in the IS community. Given the growing publication rates in the well-established journals and conferences analyzed, we can state that the topic ESN has been established in the IS community and is considered to be an interesting and innovative research area. However, the share of ESN articles in relation to all publications of a conference or a journal is still low. This becomes obvious when looking at the past five years as only about 0.5% of the articles at HICSS, 1.1% at ECIS, and 0.8% at AMCIS deal with ESNs. Further, there are many journals and conferences with less than three publications only (see Fig. 4). These include the International Conference on Complex, Intelligent and Software Intensive Systems (CISIS), the International Conference on E-Commerce (ICEC), and the Computer Networks Journal. This shows that the topic of ESNs is not only addressed by IS research, but also by many adjacent research disciplines due to its manifold nature, e.g., in the fields of knowledge management, collaboration, and communication [17].

Looking at Fig. 5, we allocated each article to one of the following types: case study, survey, experiment, literature review (cf. [49]), grounded theory (cf. [50]), prototyping information systems (short. prototyping) (cf. [51]), and research in progress. By far the biggest share of articles in our analysis are case studies (68, see Fig. 5). These case studies describe how ESNs are observed in actual corporate implementations in regard to specific topics, e.g., how organizational knowledge is shared using an ESN [52] or how task performance is affected by using an ESN [53]. The category of grounded theory comprises 19 articles and analyzes ESNs from both a theoretical and practical perspective, e.g., by describing a model to assess the individual benefits of ESNs for employees [54] or by developing a measurement instrument to empirically assess influencing factors of ESN usage [55]. Most articles found are practice-driven research publications. Consequently, we only found a small number of theoretical works. According to these findings, we see a large share of articles based on single cases only that therefore lack in generalizability in their specific topics. To sum it up, we can define ESN as a research field that has large practical influence on research with a smaller share of the theoretical foundation.

In regard to the *authors of ESN publications*, we summarized the number of articles of each author and analyzed co-authorships. The 106 articles were published by 223 different authors, which amounts to an average of 2.1 authors per article. Interestingly, the seven most publishing authors account for 31 of the 106 articles (29.2%). One explanation is a high number of co-authorships that also shows that there are several distinct research groups in regard to ESNs. However, the research groups currently start to collaborate and co-publish.

In our analysis, we discovered that a lot of different expressions for the phenomenon of ESNs are used. We see the large number of different authors (223), the already mentioned different research groups and the adjacency of ESNs to other research areas as an explanation. Additionally, an analysis of the 106 articles revealed that the terms used to describe ESNs have shifted over time. In the early years of ESN research (2004–2012), paraphrases like intranet embedding social arrangements [56] and intranet with social aspects [40], or terms like Corporate Social Network [23,57] were used frequently. Lately, we see a shift towards the use of the term Enterprise Social Network. In fact, with 25 out of 51 publications, it is the term used most often in the last four years (see Fig. 6). Further, the term ESN is used in a total of 28 out of the 106

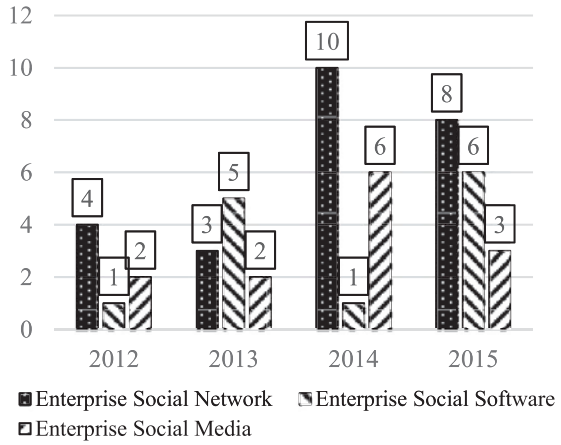

Fig. 6. Most frequent used terms since 2012.

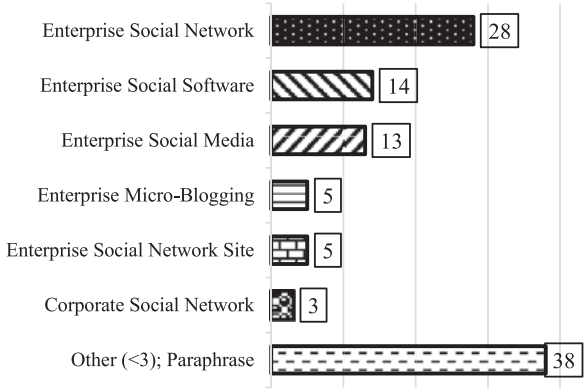

Fig. 7. Used terms since 2004.

publications and thus is the most-used expression since 2004 (see Fig. 7).

In summary, our quantitative analysis revealed the increasing relevance of the topic ESN in both academia (see Fig. 3) and practice (see Fig. 5; cf. [58]). Given the current trend, the number of publications will most likely increase further in the next years. Due to the fact that most articles use the term Enterprise Social Network and that those were published most recently (see Fig. 6), we expect the term Enterprise Social Network to be the dominant expression for the future. Still, expressions like Enterprise Social Software will probably be used if an article has a more technical focus. In regard to the discrepancy between the practical and theoretical elaboration of the topic and the still young field of ESNs, we expect an increase of both theoretical and practical articles in the near future.

3.2. Classification of articles

After analyzing the quantitative results, we further investigated the articles found in regard to *RQ 2: What topics are currently addressed in IS research on ESNs?*

We analyzed the 106 articles in detail with regard to the two dimensions *focus of investigation* and *ESN implementation status* (see Section 2.4) and both researchers classified them independently into our framework. Differently classified publications were discussed with a third researcher until consensus was achieved. Every publication was finally assigned to exactly one area of the framework. Table 2 shows the distribution of the articles in the nine framework areas. Regarding the dimension *focus of investigation*, we see a rather equal distribution with a tendency to the organizational perspective. Most articles deal with the implementation of an ESN on a company level (39.6%), followed by technical topics (32.1%), and employee based topics (28.3%). In contrast, the dimension *ESN implementation status* shows a diverse distribution. While articles classified as ex-ante (41.5%) and ex-post (40.6%) constitute a major part, the number of articles dealing with ongoing ESN implementation is much smaller (17.9%).

By analyzing the nine framework areas, we see a large discrepancy in the distribution of the research. There are only a few articles that analyze ESN implementation in regards to the individual employee (2.8%) and the organization (5.7%). Further, the ex-post analysis of technical topics (6.6%) is poorly covered by current research as well. On the other hand, there is a large number of articles analyzing the ex-post effects of ESN implementation on an organizational level (19.8%) and the prerequisites of an ESN platform before its implementation (16.0%).

On the basis of both the analysis of the two dimensions and the nine framework areas, we see that IS research has been focused on several specific areas so far, while other areas seem to have been neglected by most researchers. To gain further insight into the specific topics of each article, we analyzed the 106 articles regarding the topics they addressed (see section 0).

3.3. Topic analysis

The results of our topic analysis are presented in Table 3. It contains all identified topics in our literature review for each of the nine areas of our framework. We also appended a counter to each topic, indicating the number of publications this topic was addressed by in the particular framework area. Every publication was assigned to at least one and a maximum of three topics. The number of topics per framework area obviously varies due to the different number of underlying publications. The presented topics in each area are sorted by their number of underlying publications. When looking at the occurrence of the individual topics in the nine framework areas, we see that there are one or two mainly addressed topics of research for each area, while the framework in general shows a broad variety of topics.

When looking at the **individual focus**, *ESN usage* and *influencing factors of ESN usage* are the mainly addressed topics in publications focusing on the pre-implementation stage. Examples of the topics addressed in these publications are frameworks for companies on how to include Social Media into the Knowledge Management process [59], analyze usage practices of ESN users [60], or barriers to change when introducing an ESN [61]. Also *motivation factors of ESN usage* and *user requirements regarding ESNs* before its implementation are addressed, both laying out user expectations and providing help in designing an effective ESN implementation process. Publications addressing the ongoing ESN implementation mostly focus on *user behavior in ESNs*. They analyze why employees use ESNs in an early-adoption stage [62] and how their user behavior can be classified in a post-acceptance stage of ESN implementation [63]. Publications focusing on the post-implementation phase address *user behavior in ESNs* most often, too. Hereby, analysis ranges from how ESN use in disperse teams affects structural change [53] to how an employee's social network affects the assessment by colleagues [64]. There are also some very specific topics that some researchers address, e.g., an analysis of user behavior in regards to *lurking* (only reading and not actively contributing to Social Media) [65] or how users' *privacy issues* affect the intention to use an ESN [66].

The second dimension represents research topics with a **technical focus**. We identified *design of ESN systems* and *ESN impact on knowledge management* as the most popular topics in publications describing the pre-implementation phase of ESNs. *Design of ESN systems* is obviously a major topic when specifying ESNs with

technological enhancements or on the basis of new requirements by the workforce. Examples in the identified literature regarding this topic vary from very general guidelines to actual implementation proposals. For example, general guidelines include how platform design affects employee relations, how it affects accessing and sharing content, how it enables users to network more effectively, and how to enable them to share and protect content effectively [15]. Other research focuses on how to implement an automatic tagging of newly posted items to enhance search and recommendation efficiency in ESNs [85]. *ESN impact on knowledge management* is another major topic in this framework area. The identified publications focus e.g., on how to find the real experts, not just managers with higher influence [87], on problems of integrating heterogeneous applications in the emergent enterprise environments [83], or on how ESNs seem to be better suited for improving performance when supporting non-routine tasks [89]. Besides these two primarily addressed topics, we also identified a great variety of 'niche' topics within our literature review, e.g., *cultivation of ESNs, innovation created in ESNs*, or *ESN impact on team performance*. The center area of our framework points out various topics addressed by researchers, with only *implementation of ESNs* and *social search using ESNs* being mentioned more than once. Implementation topics deal with the identification of the essential phases in which sense-making and appropriation take place, contributing to identifying better ways of spreading knowledge [93], or how users seem to adapt their communicative behavior to the context [17]. Social search focuses e.g., on expert finding using social influence analysis [94]. Topics only identified once include the implementation of *ESNs in small or medium-sized enterprises, project management in ESNs* or *ESN impact on collaboration*. While the last framework area described covers the actual implementation and its challenges, the post-implementation literature we identified aimed at the technical focus and mainly addressed analytical questions. We found three publications focusing on *network structures in ESNs*, e.g., analyzing cross-country user interactions in an ESN [101] or analyzing and visualizing experts in an enterprise [100]. Two publications present research in the area of *success measurement of ESNs* (e.g., metrics to measure ESN success [103]). A rather specific topic we identified dealt with *gamification in ESNs* [105].

The third row in our framework contains topics addressing an **organizational focus**. In this context, the emphasis of pre-implementation publications is not as clear as in some of the other framework areas. While we identified *ESN impact on knowledge management* with five publications as the leading topic, we also retrieved five other topics that were at least addressed by two publications (*ESN impact on collaboration/ organizational culture/ communication, influencing factors of ESN usage, organizational change induced by ESNs, user behavior in ESNs*). This wide range of different topics shows the interest of both research and practice in analyzing as many potential effects an implementation of an ESN can entail for a company. Regarding *ESN impact on knowledge management*, we identified several grounded theory publications, e.g., dealing with analyzing "*the effects of trust, risk and benefits, critical mass, and social influence on knowledge sharing intentions of employees using social media technology in the organization*" ([108], p.1). *ESN impact on collaboration* addresses e.g., the importance of distance and frequency of relationships for knowledge exchange [107]. An example for *ESN impact on organizational culture* research was identified as the analysis of how Social Media use facilitates the socialization of newly hired employees [113]. Publications on ongoing implementation also show a wide diversity of topics. Besides the obvious topic *implementation of ESNs* from a company's perspective (e.g., regarding challenges and outcomes of ESN implementation [121]), we found some otherwise hardly mentioned topics like *Governance of ESN* (e.g., Social Media Guidelines for enterprises [124]), *ESN impact on organizational culture* (e.g., the challenges when a company with an organizational culture that conflicts with ESNs still implements an ESN [125]) and *organizational change induced by ESNs* (e.g., the challenges of completely replacing e-mail communication by an ESN [126]). This can be easily explained by the fact that these topics play an important role when implementing an ESN on the enterprise level. The last remaining area in our framework contains the highest number of publications (see Table 2). Despite its variety, we could identify two leading topics with seven occurrences each: *content shared in ESNs* and *network structure in ESNs. Content shared in ESNs* can only be performed ex-post when actual data is available, which is why this topic was not assigned to the first two stages of the ESN implementation status. Examples for this topic include the impact of hierarchy and communication activity on user's influence in ESNs [133] or a genre analysis of employees posts within an ESN [128,129]. An example of a *network structure in ESNs* topic is the identification of factors relating closeness between employees in professional vs. personal life [138]. *ESN usage* as a closely related topic was mentioned four times and thus entails the third most publications. An example for this topic is the identification of use cases within an ESN [141]. *Organizational Change induced by ESNs* (3x), *user behavior in ESNs* (3x), and *ESN impact on knowledge management* (2x) are the remaining topics addressed more than once. A unique topic found was the comparison of *organizational charts* with a 'hierarchy' *deduced from an ESN* [140].

3.4. Discussion of the current state of research

After revealing the main research topics of the 106 publications, we further examined our findings to gain more insights into the current state of research. We analyzed the topics addressed by the identified publications (see Section 3.3) from a general point of view. When looking at the absolute numbers of topics addressed, we see *ESN impact on knowledge* (17) ahead of *user behavior in ESNs* (16) and *ESN usage* (14) as the TOP-3 topics in ESN research. The follow-ups are *network structures in ESNs* (12), *content shared in ESNs* (9), *design of ESN systems* (7), and *ESN impact on collaboration* (7). However, it is more interesting to analyze topics addressed over time than in total to reveal past developments and current trends. Fig. 8 presents the distribution of the mentioned seven most addressed topics over the last six years (2010–2015). The publication frequency before 2010 was very low and thus would exaggerate the importance of earlier addressed topics compared to the ones after 2010.

In the following, we point out some interesting patterns regarding changes in the addressed topics by researchers over time that we identified from Fig. 8. For every topic described, we provide an explanation and interpretation of the pattern based on our point of view.

ESN impact on knowledge management was the main topic of ESN research in our literature review. In the early years of ESN research (2004/2005), this topic clearly dominated the publications (cf. [40,109]). Afterwards, it lost some importance as other topics arose when technology was advancing. However, it has been constantly regaining attention over the last seven years except for 2013. We see a rather simple explanation for this pattern: knowledge management is an essential task for today's enterprises as their knowledge must be made available to their employees in an adequate and sustainable manner (cf. [148]). Despite all research in the knowledge management field, companies have been struggling ever since to motivate employees to share their tacit knowledge with their colleagues (cf. [149]). With ESNs, this dilemma could be solved as reputation in social networks is built on knowledge sharing and communication (cf. [64,150]). Thus, knowledge management is a continuous topic in ESN research.

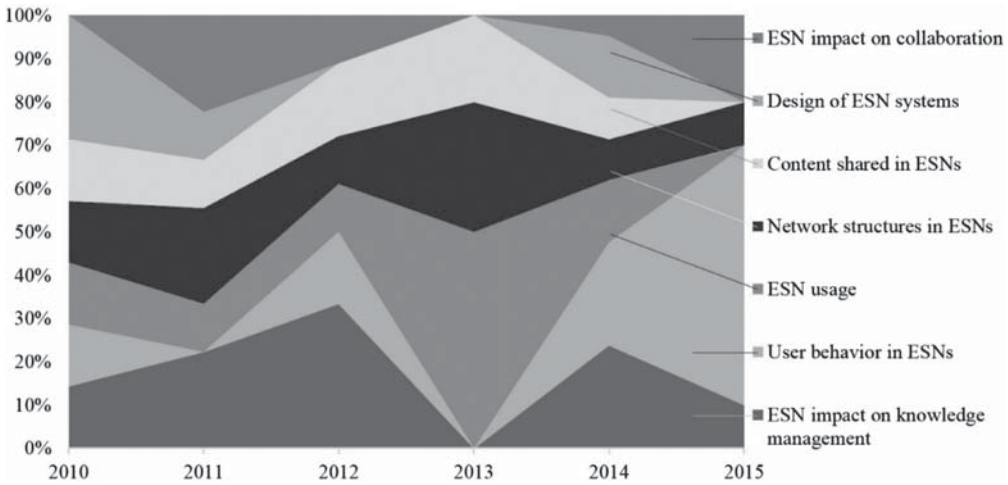

Fig. 8. ESN research topic distribution over time (TOP 7 topics).

Research regarding *design of ESN systems* seems to reemerge periodically, once around 2009 and once in 2014. We explain this with the successful implementation of the first enterprise microblogging platforms, e.g., Yammer was introduced at Capgemini in late 2008, and Siemens introduced their own proprietary solution in early 2009 (cf. [151]). These new developments raised an initial interest in the first decade of the millennium and thus inspired researchers to thoroughly investigate system design questions in this area in 2010/2011. After the initial hype of enterprise microblogging platforms (e.g., [119,130]), there have only been minor advancements shortly thereafter, which is reflected in lower interest in the IS research community. Around 2012/2013, new developments of extensive 'next-level' ESNs that provided new social features and extended their functionalities from simple enterprise microblogging platforms to feature-rich social networks (cf. [151]) created new use cases and consequently led to a second, though smaller focus of IS research on design of ESN systems in 2014.

Interestingly, we see *ESN impact on collaboration* topics always occurring shortly after a high interest in *design of ESN systems* (e.g., in 2011 and 2015). We assume this coherence is related to the fact that new developments concerning ESN platforms also provide new forms and possibilities for enterprise collaboration, and thus analyzing the effects on collaboration after an initial ESN implementation seems to be an important starting point for further ESN research (cf. [53,71]).

ESN usage has been constantly addressed over the last decade and reached its maximum relative importance in 2013. However, the interest of researchers in this topic has diminished lately and is basically non-existent in 2015. A very similar pattern also accounts for research on *network structures in ESNs* and *content shared in ESNs*. Both topics were drivers for ESN research in the timeframe from 2011 to 2014, but have steadily been losing interest from IS researchers lately. We can explain these patterns by researchers' long-term goal to deduct design recommendations for ESNs by analyzing the users' relationships (e.g., [136]), their behavior (e.g., [144]), and their reasoning for using ESNs (e.g., [69]). After initially focusing on the analysis of network structures (e.g., by centrality metrics [24]) to identify key users [27] and the relationships among users in general ("*who*")), research went on to the analysis of content (e.g., by genre analysis [141]) to identify *what* users are sharing through an ESN. These two topics have already been addressed thoroughly, leading to a profound understanding of *how* ESNs are organized and of how employees communicate, leaving little room for immediate further research.

The reasoning for actually using an ESN ("*why*") is covered by the topic *user behavior in ESNs*, which has gained a lot of momentum in the last two years and seems, according to our research, to be the most trendy topic for researchers right now. This new focus of research can be explained by the fact that user behavior is most likely the major instrument for better understanding why ESNs are accepted or rejected by the workforce [66,117]. Consequently, this focus hints at how to prevent ESN implementation from failing and how to explain the main factors of its successful application (cf. [103,127]).

4. Research agenda

After analyzing the state of the current ESN research in Section 3, we now identify further research topics to support researchers in advancing ESN research. In this regard, our procedure comprises of two steps: first, we analyze the articles of the literature review to identify explicitly mentioned areas of further research. We use our framework dimension *focus of investigation* (see Section 2.4) and the topics presented in Section 3.3 for classifying promising areas of further research. These questions are compared to research that has been conducted in the meantime to avoid asking research questions that have already been answered. We generalized the questions to fit a broader scope to allow researchers to include their own ideas. Second, areas of further research are identified on the basis of the overall distribution of the articles (see Table 2), the topic analysis (see Table 3) and the discussion about trending topics (see Section 3.4). The upcoming research questions are classified in the dimensions and topics, too.

4.1. Individual focus

In regard to the individual focus, further research suggestions regarding the topic *content shared in ESNs* are frequently found. A linguistic analysis of content in ESNs will provide new insights into conversations [52], enables researchers to assess the different organizational rhetorical practices of different stakeholders [116] and reveals peculiarities of different types of content, e.g. messages, posts or comments [85]. In particular, different types of messages should be analyzed to assess their individual effects or to check how non-work communication contributes to work-related topics like collaboration [115]. Finally, the analysis of individual relationships will provide new insights into the dynamics of relationships [136] and the quality of relationships, e.g. as information source

[74]. The topics *privacy issues of ESNs* raise questions about employee privacy, in particular regarding the reduction of privacy concerns [66], privacy in the workplace [104] and legal challenges, e.g. after privacy violations [81], the moderator effect of trust [66], and how trust influences the willingness of knowledge sharing [108]. *ESN impact on organizational culture* in its various aspects is an interesting field in regard to ESNs, too. Authors propose to gather data to evaluate cultural differences [59,70], e.g. to assess usage differences between employees and managers [123], the influence on employees' social connectedness [144] and differences between users [104]. In addition, contextual cultural factors should be defined, quantified and their influence be evaluated [59], e.g., on socialization processes, on ESN introduction [90], and on the effects in heterogeneous teams and processes [86]. *Influencing factors of ESN usage* have already been elaborated [117]. Still, they need to be evaluated and checked for completeness in regard to specific issues, e.g., which factors motivate the abandonment of knowledge in ESNs [59]. In this regard, *ESN user perceptions* have to be further examined, e.g., the perceived usefulness and the perceived ease of use [114]. As research methods, an online survey [67] or additional case studies [68] are proposed. These will give further insights into the reasons why ESN implementations were successful or why they failed [127]. In terms of *benefits of ESN usage* (cf. [96]), it is necessary to structure and conceptualize the individual benefit dimensions of employees and explore the causes and relations [63], e.g., perceived fairness, turnover intentions and organizational commitment [23]. In contrast, also negative effects of ESN usage should be examined [78]. The questions that seem to be the most interesting ones are the effects on *user behavior in ESNs*. ESNs constitute a technology which affects the communication and interaction between employees. Thus, the changing behavior is one important research area [89], e.g., in taking decisions with ESNs being an additional information source [143], how ESNs affect everyday work of employees [131], which usage patterns can be identified [48], the combination between (online) relations using the ESN and (offline) relationships [141], the different behavior of employees in OSNs and ESNs [132], and the influence of the organizational network on personal behavior [142]. Furthermore, the interrelation between different user types, e.g., key users, should further be specified [27], as well as the difference between active and inactive users [52].

We realized that no study has yet analyzed the user groups of ESNs in detail. From a long-term perspective, it would be very interesting to analyze if users with different demographic attributes (e.g., age, gender, education) show a different behavior in ESN usage. Interesting research questions could thus entail if "Generation Y" [5] uses ESNs differently from previous generations, or if the ESN acceptance rate is higher among different age groups. In this regard, behavioral differences have already been identified in OSN [152] and could serve as a starting point. A correlation between general Social Media competence and the intention to use ESNs may bring further insights into how to better motivate employees to use ESNs. In addition, it would be interesting to analyze the willingness of employees to combine private and professional Social Media usage, and their connection strategies (cf. [153]), e.g., to whom employees are connected or if they are willing to use a private Social Media account to connect to their employer's ESN and share private content in that ESN. The various questions in this dimension are generalized and summarized in Table 4.

4.2. Technical focus

Research addressing a technical focus mainly entails questions regarding the *design of ESN systems*. Frequently, platforms have gone through a steady evolution with added functionalities over time, e.g., collaborative functionalities like wikis have been added to what initially were micro-blogging sites only [131]. Due to this collocation of different functionalities, single functionalities have to be better integrated and improved, e.g., on the basis of technological innovations [94,129], or they have to be aligned, e.g., with a greater sensitivity to relationship facets [138]. Hence, a further evaluation of user satisfaction is necessary, e.g., by evaluating hedonic components in ESNs [103]. Besides research on current functionalities, also new functionalities will be added to ESNs, e.g., an automated assignment of team members to a new project on the basis of further metadata [139]. This metadata could automatically be gathered by implementing interfaces to other systems or by integrating external applications in ESNs [97]. To generally evaluate the maturity of an ESN, a maturity framework of the application should be developed including metrics and measures [103]. The topic *ESN impact on organizational culture* is an additional area for further research in this dimension. As ESNs are often implemented in international companies, user groups from different nations may use it. With their different intentions and values, the relationship between culture and technology has to be further investigated [115]. Possibly, an ESN should be differently designed on the basis of a shifting user group with a different cultural background.

Looking at ESN software in particular, a comprehensive tool comparison is missing. We could imagine a comparison of different ESN tools like Yammer, tibbr or Jive on the basis of a predefined set of characteristics to better support companies in choosing an appropriate tool for their individual needs (see [154] as an example). Additionally, with ESNs becoming a more and more integral part of today's enterprises, the question of how to model an ESN arises. Networks in general can be modeled using nodes and edges [155]. However, the existing network modeling notations mainly serve as a possibility to analyze the network structure, not taking into account the particular characteristics of ESN communication (e.g., what information is shared among whom). Thus, a modelling language that covers the specifics of ESNs is missing. In the field of network modeling, various tools like Gephi are available (cf. [156]). These tools provide established instruments for network analysis, which can possibly be used for analyzing several aspects of ESNs. Finally, as ESNs combine various Social Media technologies like microblogging, wikis, instant messaging and feeds, we suggest analyzing their individual usage within the ESN and their interrelated positive or negative effects on each other. The various questions in this dimension are generalized and summarized in Table 5.

4.3. Organizational focus

The third dimension, organizational focus, comprises the largest amount of arising research questions. In regard to the topic *privacy issues of ESNs*, current research has not yet provided a set of security regulations for ESNs that prevent confidential information from spilling over to competitors or the public in general [110]. *ESN impact on organizational culture* deals with the organizational change due to ESN usage, e.g., power struggles for social dominance should be explored [113]. To analyze cultural differences, data should be collected [59], e.g., to systematically analyze global challenges and check how these can be solved by ESNs [88] and to compare ESNs in different companies to solve a possible ESN-culture conflict [125]. Further, organizational cultural factors should be revealed [142], for example to uncover settings that support or hinder ESN adoption (e.g., the industrial context) [145]. Many open questions in regard to *ESN impact on knowledge management* still need to be answered, too. Authors ask for factors that activate knowledge socialization [59], e.g., organizational affordances to share knowledge [25] on the basis of the analysis of current knowledge sharing activities [115] and how non-work communication contributes to knowledge sharing [115]. Communica-

Table 4
Further research areas on the basis of the dimension individual focus.

	Topic	Arising research questions
Individual focus	Content shared in ESNs	• How do linguistic practices in ESNs content influence user behavior? (cf. [52,85,116]) • What are the individual effects of different types of messages? (cf. [115]) • How do individual relationships shift and how can they be used for personal interest? (cf. [74,136])
	Privacy issues of ESNs	• Which special role does privacy play for employees? (cf. [66,81,104]) • Which effects has trust on user behavior in ESNs? (cf. [66,108])
	ESN impact on organizational culture	• Which cultural differences between users exist and what are their effects on further ESN topics (e.g., trust)? (cf. [59,70,104,123,144]) • How do contextual cultural factors influence ESN introduction, usage and collaboration? (cf. [59,90])
	Influencing factors of ESN usage	• Which influencing factors of ESN usage exist and how can they be evaluated? (cf. [59,117])
	ESN user perceptions	• What is the influence of user perception on the success of ESN implementation? (cf. [67,68,114,127])
	Benefits of ESN usage	• How can benefit dimensions be framed and what are their exact causes? (cf. [23,63]) • Which negative effects of ESNs can be identified? (cf. [78])
	User behavior in ESNs	• How is user behavior changed and how can these effect dimensions be framed? (cf. [48,89,131,132,141–143]) • Can behavior patterns in ESNs be identified? (cf. [27,52]) • How do users with different demographic attributes show different behavior in ESNs? (cf. [152]) • How can private and business use of ESNs be usefully combined? (cf. [153])

Table 5
Further research areas on the basis of the dimension technical focus.

	Topic	Arising research questions
Technical focus	Design of ESN systems	• What is an optimized collocation of functionalities provided by an ESN? (cf. [94,103,129,131,138]) • Which functionalities based on current needs and innovations should be implemented into an ESN? (cf. [97,139]) • How should an ESN maturity framework look like? (cf. [103]) • Which ESN tools exist, how can they be compared, and how do they differ? (cf. [154]) • What is the individual usage of the employed Social Media technologies in an ESN and which positive and negative interrelation among them exist?
	ESN impact on organizational culture	• What is the influence of culture on the design and adoption of ESNs? (cf. [115])
	ESN modelling	• Which particular characteristics of ESNs can be modelled and how does a modelling language to model ESN look like? (cf. [155])

tion on a network basis gives insights into network characteristics and their effects on knowledge transfer [134] and into how cognitive and relational dimensions have influence on knowledge transfer [132]. Information quality in knowledge environments is another promising area, e.g., the analysis of the impact of knowledge requested and the quality of answers in direct messaging [132] - also referred to as tacit knowledge [117]. In this regard, the type of company (e.g., service industry, manufacturing) that takes the most advantage needs to be determined on the basis of defined parameters like knowledge intensity [60]. The topic *benefits of ESN usage* on a company level raises questions whether the benefits will be long lasting over time [122]. Some benefit dimensions, like the impact on general innovation capacity, need to be further evaluated [23]. In regard to *innovation created in ESNs*, the question of how ESNs can best be used to foster innovation management and how the innovation process can be optimized using ESNs, starting from ideas arising in direct messages or discussion boards to a final innovation, are still unanswered [24]. Further topics with less literary reference are (i) *success measurement of ESNs*, e.g., the causal relationships between ESN investment, ESN assets and ESN impacts towards organizational performance [120] or measuring productivity in system support work [61], (ii) *visualization of ESN structures*, e.g., a graphical analysis of activity graphs in ESNs [27], (iii) *ESNs in SMEs*, e.g., the impact of company size on ESN success [145], (iv) *network structures in ESNs*, e.g., examine network characteristics to facilitate ESN implementation success [102] and (v) *governance of ESNs*, e.g., analyzing further social media guidelines to set up a governance framework [124].

In this dimension some crucial aspects have not yet been investigated at all. Current publications mostly focus on data of one particular company only (e.g., [101,118,130]). Thus, a survey with a large number of participating companies from various industries with a sufficiently large data sample is missing. This data would deliver new insights into the challenges and best practices of ESN adoption across various companies and industries. A regulatory issue that has not yet been answered is data ownership [157]. This seems to be an important issue not only from a privacy point of view, but also in how it affects legal and strategic choices for ESN implementation (cf. [158]). For example, if a company implements an ESN and decides to switch ESN providers after a certain time-

Table 6
Further research areas on the basis of the dimension organizational focus.

	Topic	Arising research questions
Organizational focus	Privacy issues of ESNs	• Which ESN regulations prevent confidential information from spilling over to competitors? (cf. [110])
	ESN impact on organizational culture	• How do ESNs change the organizational culture (e.g., shifting power/hierarchy)? (cf. [113]) • How do ESNs support companies in solving global challenges? (cf. [88]) • Which organizational cultural factors support or hinder ESN adoption? (cf. [142,145])
	ESN impact on knowledge management	• Which factors increase knowledge sharing among employees? (cf. [25,59,115]) • How can knowledge transfer be optimized in ESNs? (cf. [132,134]) • How can tacit knowledge be manifested? (cf. [117]) • Which parameters (e.g., knowledge intensity) best support a community in regard to knowledge management in ESNs? (cf. [60])
	Benefits of ESN usage	• Will the benefits of ESNs be long lasting over time? (cf. [122]) • Which benefit dimensions exist and how can they be evaluated? (cf. [23]) • Which challenges and best practices can be identified between various industries and company sizes?
	Innovation created in ESNs	• How can innovation management be fostered on the basis of ESNs? (cf. [24]) • How can the innovation process be adapted to better utilize the advantages of ESNs? (cf. [24])
	Success measurement of ESNs	• What are the causal relationships between ESN investment, assets and organizational impact? (cf. [61,120])
	Visualization of ESN structures	• Which insights can be observed from a graphical analysis of relationships in ESNs? (cf. [27])
	ESNs in SMEs	• What is the impact of company size on ESN success? (cf. [145])
	Network structures in ESNs	• Which network characteristics facilitate ESN implementation success? (cf. [102])
	Governance of ESNs	• How could a governance framework for ESNs look like? (cf. [124]) • Which legal and regulatory issues have to be dealt with when implementing an ESN? (cf. [157])
	ESN impact on business processes management	• How do ESNs affect the design of business processes? (cf. [159]) • How can ESNs be used in business process improvement initiatives? (cf. [161])

frame, how can this company migrate the data from the old into the new ESN? Is data stored in a universal data format and accessible by the company or will the old ESN provider take the company 'hostage' by withholding their data? Thus, we also suggest the investigation of a universal data exchange format for ESNs as well as the development of guidelines for both companies and ESN service providers. A further area of research we encourage researchers to explore is the impact of ESNs on business processes (cf. [159]). Possible hypothesizes would be, for example, that ESNs increase the flexibility of the innovation process, that they can be used as a further information source in service processes, or that they support business processes with communication among distributed members. The effects of these new use cases on organizational culture (cf. [160]), e.g. hierarchy, can then be observed. The various questions in this dimension are generalized and summarized in Table 6.

5. Conclusion

In our paper, three research questions dealing with ESNs were defined. The first question focused on the elaboration of terms and definitions used for the phenomenon of ESNs in the IS research community. We delineated the term ESN from others like OSN and on the basis of the subsequent analysis; we identified the term *Enterprise Social Network* to be the one used most often in general and in the last four years specifically. Thus, we expect the term ESN to be the dominant expression in the future for describing this phenomenon.

The second research question dealt with the current state of IS research on ESNs. We chose a literature review as our research method [12]. Its application resulted in 106 relevant articles for further qualitative analysis. For the detailed analysis of the articles, we developed a two-dimensional framework containing the dimensions *focus of investigation* [37] and *ESN implementation status* [19]. This framework enabled us to classify all publications thus providing a collection of relevant publications for researchers and practitioners. Each article was further examined and classified according to its mainly addressed topics, e.g., *user behavior in ESNs, privacy issues of ESNs*, or *success measurement of ESNs*. By adding the topics into our framework we provide a comprehensive view of the current state of IS research in regard to ESNs. The third research question asked for topics of future research. Based on the analyzed articles, we extracted future research areas and defined specific questions, which we then classified. Further, we defined interesting questions in regard to ESNs, which were analyzed in adjacent research fields.

With our analysis, we contribute to both research and practice. To research, we contribute in three ways. We showed that there are various terms used to describe the phenomenon of ESNs and, thus, we support the community's process of term consolidation by presenting the most commonly used ones. Further, we have developed a framework, which we used to classify the current state of ESN research. Consequently, we enable researchers to directly identify which topics have been covered by research in detail so far. In addition, the identified future research areas show interesting and highly relevant questions to be addressed by researchers. Furthermore, we provide additional research ideas inspired by our litera-

ture review and enhanced with our own experiences from research and practice. From a practitioner's perspective, the large number of case studies being part of the analysis provide references for best-practices on ESN implementation and success factors. Further, practitioners can use the topic analysis in the framework to specifically search for individual topics they are currently struggling with.

However, our research is not without limitations. By its nature, a literature review only captures a snapshot of publications available at a certain point in time. In a young and trendy field like ESNs (see Section 3.1), a large number of publications is to be expected in the upcoming years requiring continuous update of our work. Additionally, we cannot guarantee that we found all relevant articles as we may unintentionally have sorted them out during the selection process, e.g., due to the definition of the search terms. However, as two researchers conducted the search and selection process independently from each other, we reduced this issue as much as possible. Finally, we revealed that nearly one in three articles was published by a relatively small number of co-authorships, which possibly led the research of ESNs in specific directions. This fact, of course, influences our quantitative analysis, especially when comparing absolute numbers. Nevertheless, with the disclosure of all relevant details of both our procedure and analysis, we comply with well-known research methodologies that make our research replicable. Finally, we strongly encourage other authors to research in the interesting and innovative field of ESNs, which will definitely remain a relevant topic in IS research in the next years.

Appendix

Table A1

Table A1
Selected journals and conferences.

Journals	Academy of Management Journal
	ACM Computer Networks/Database Systems/Transactions
	AI Magazine
	AIS Transactions on Human-Computer Interaction
	Artificial Intelligence
	Business & Information Systems Engineering (BISE)
	Computer Networks
	Communications of the ACM
	Communications of the AIS
	Decision Science
	Decision Support Systems (DSS)
	European Journal on Information Systems (EJIS)
	Harvard Businesssss Review (HBR)
	Human-Computer Interaction
	IEEE Transactions (Software/Software Engineering/Systems, Management and Cybernetics/Computers)
	Information and Management (I&M)
	Information Systems Frontiers/Journal/Research (ISR)
	International Journal of Electronic Commerce
	Journal of the AIS (JAIS)
	Journal on Computing
	Journal of Computer and System Sciences
	Journal of Computer-Mediated Communication
	Journal of Information Technology
	Journal of Information Technology Theory and Application
	Journal of Management Systems
	Journal of Management Information Systems
	Journal of Strategic Information Systems
	Journal of the ACM
	Management Information Systems Quarterly (MISQ)
	Management Science
	Organization Science
	Sloan Management Review
Conferences	Americas Conference on Information Systems (AMCIS)
	Australasian Conference on Information Systems (ACIS)
	Computer Supported Cooperative Work (CSCW)
	European Conference on Information Systems (ECIS)
	European Conference on Social Media (ECSM)
	Hawaii International Conference on System Sciences (HICSS)
	International Conference on Design Science Research in Information Systems and Technology (DESRIST)
	International Conference on Information Systems (ICIS)
	Internationale Tagung Wirtschaftsinformatik (WI)
	Pacific Asia Conference on Information Systems (PACIS)

(*continued on next page*)

Table A1 (*continued*)

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Susanne Leist took over the chair of Business Informatics, particularly Business Engineering, at the University of Regensburg in 2004. Prior to her appointment, she had worked in several research and business projects and had been teaching at several universities in Germany and Switzerland. Her research focus is on process and quality management, with the emphasis on investigating the influence of new technologies (e.g. social media) on processes and value creation, with an emphasis on enterprises in the digital economy. In addition to publicly financed research projects (ESF, German Federal Ministry of Education and Research), she has maintained extensive projects with industry partners esp. in the digital economy and executing numerous practice-oriented research projects (e.g., with Alphabet Fuhrparkmanagement (=vehicle fleet management), DAB Bank, E.ON Bayern (=Bavarian energy provider), Maschinenfabrik Reinhausen). Also, she developed, e.g. in cooperation with SMEs in Bavaria, algorithms to analyze customer comments in social media to support quality management. She is a member of the Editorial Boards of the Enterprise Modeling and Enterprise IS department of the international journal BISE, the quarterly magazine "BIT Banking and Information Technology", and the Regensburg University research magazine "Blick in die Wissenschaft" and the spokeswoman of the section information systems in the Financial Management of the German Informatics Society. She has also been acting as a reviewer in several international committees.

2.3 Beitrag 3: What Benefits do They Bring? A Case Study Analysis on Enterprise Social Networks

Adressierte Forschungsfrage	**Forschungsfrage 3:** Welche Benefits lassen sich durch den Einsatz von Enterprise Social Networks erzielen? Können alle Benefits den traditionellen IT Capabilities zugeordnet werden oder schaffen Enterprise Social Networks neue IT Capabilities?
Zielsetzungen	(1) Identifikation von Benefits, die durch ESN erzielt werden können (2) Abgleich der Benefits mit traditionellen IT Capabilities, um den Mehrwert von ESN gegenüber traditioneller IT aufzuzeigen
Forschungsmethode	Qualitative Inhaltsanalyse nach Mayring (2014) von 37 Fallstudien zum Clustern der Benefits; anschließend Gegenüberstellung der Benefits zu den IT Capabilities (Davenport und Short, 1990)
Kernergebnisse (Überblick)	(1) Identifikation von 99 klar unterscheidbaren ESN Benefits (2) Zuordnung von 69 Benefits zu den bestehenden IT Capabilities; Definition einer neuen IT Capability „Social Capital“, welche 25 Benefits umfasst; Identifikation von fünf sehr generischen Benefits (nicht zuordenbar)
Publikationsort	25th European Conference on Information Systems (ECIS), Guimarães, Portugal, 2017
Ranking VHB JQ 3	B
Autor(en) und Anteile	**Benjamin Wehner** **34%** Thomas Falk 33% Susanne Leist 33%

Tabelle 6: Fact Sheet „What Benefits do They Bring? A Case Study Analysis on Enterprise Social Networks“

WHAT BENEFITS DO THEY BRING? A CASE STUDY ANALYSIS ON ENTERPRISE SOCIAL NETWORKS

Completed Research

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Abstract

Over the last years, Enterprise Social Networks (ESN) have gained increasing attention both in academia and practice, resulting in a large number of publications dealing with ESN. Among them is a large number of case studies describing the benefits of ESN in each individual case. Based on the different research objects they focus, various benefits are described. However, an overview of the benefits achieved by using ESN is missing and will, thus, be elaborated in this article (research question 1). Further, we cluster the identified benefits to more generic categories and finally classify them to the capabilities of traditional IT as presented by Davenport and Short (1990) to determine if new capabilities of IT arise using ESN (research question 2).

To address our research questions, we perform a qualitative content analysis on 37 ESN case studies. As a result, we identify 99 individual benefits, classify them to the capabilities of traditional IT, and define a new IT capability named Social Capital. Our results can, e.g., be used to align and expand current ESN success measurement approaches.

Keywords: Enterprise Social Network, Benefit, Case Study, Qualitative Content Analysis.

1 Introduction

Enterprise Social Network (ESN) adoption has accelerated over the past years. With these platforms, companies hope to foster collaboration, support communication and facilitate knowledge management, for instance (Leonardi et al., 2013). Market research has shown a significant rise in ESN investment recently. For example, IDC's February 2013 Social Business Survey mentions an ESN adoption rate of 79% among all respondents. Between 2014 and 2019, the worldwide revenue of ESN software is expected to more than double (Thompson, 2015). However, ESN do not always fulfil the companies' expectations as usage often dwindles after an initial spike, making companies question their investment (Li, 2015). For example, a study by Gartner states that 80% of these initiatives fail at achieving the stated goals (Mann et al., 2012).

When analyzing the large number of practice-driven articles (e.g., case studies, field studies), which describe the impacts of ESN in a particular company, it becomes obvious that many benefits can be achieved by the use of ESN. For example, it has been shown that employees' performance on non-routine tasks increases (Mäntymäki and Riemer, 2016) and that geographical boundaries are reduced (Wiesneth, 2016). Due to the nature of ESN, with the community and social aspects in the foreground, many of the benefits are non-tangible and, following Harden (2012), based on "the subjective perception about the potential positive values resulting from the online interactions" (p. 3891). Therefore, apart from the difficulty of describing the *Business Value* by monetary metrics (Herzog et al., 2013) ex post, the major challenge is to anticipate the positive effects (ex ante) that support the design and implementation of ESN considering company-specific needs.

While there is a great variety on topics that are elaborated in the context of ESN (Wehner et al., 2017), which, e.g., explore the applications of ESN (Turban et al., 2011), their success dimensions and measurements (Richter et al., 2013a), the different technologies in ESN (Chin et al., 2015b) and the use cases of ESN (Herzog and Richter, 2016), a detailed elaboration on the benefits achievable by ESN is missing. However, a detailed list of achievable benefits would prevent false expectations and help to anticipate the real value of using an ESN. It could convince practitioners of their added value, as many of them still struggle with using an ESN (Kügler et al., 2012). Thus, in this paper, we review the benefits of ESN on the basis of case studies (Yin, 2013), which show the proven impact of ESN.

The investigation of Information Technology (IT)-benefits has a long tradition in literature, e.g., (Bharadwaj et al., 1999a, Lin and Penvan, 2003), shifting the focus on these benefits from single applications, whose competitive advantage is at best short-lived, to company-wide IT capability that provides a substantive basis for sustained IT innovation (Bharadwaj et al., 1999b). We will therefore organize the identified ESN benefits with regard to the IT capabilities they support. In so doing, this assessment will be based on the general IT capabilities defined by Davenport and Short (1990). Since social software (including ESN) are different from traditional IT, as sociality, and not functionality, is in focus (Bouman et al., 2007), we will especially expose the corresponding benefits of ESN. In addition, we investigate whether all of these benefits support the traditional IT capabilities or whether we have to define a new IT capability. In summary, we will elaborate on these two research questions:

(RQ1) Which proven benefits are achieved by using Enterprise Social Networks?

(RQ2) Which traditional IT capabilities are supported by ESN benefits and are traditional IT capabilities able to comprehend all ESN benefits?

To address these two research questions, we set up a broad literature base using three literature reviews on ESN that have been published recently and perform an additional literature search. We then conduct a qualitative content analysis to aggregate the benefits achieved by ESN (RQ1) followed by a comparison to the capabilities of traditional IT (RQ2). With our research, we aim to contribute to a better understanding of the value of ESN. Especially practitioners will get an overview of the proven benefits gained by using ESN, which are described in case studies, e.g., an increased creativity of the employees (Qi and Chau, 2016). In addition, our research will support managers in making their decision, clarify what benefits may be expected, and which IT capabilities are strengthened. Finally, with our analysis, we hope to contribute to a better understanding of ESN success, possibly enabling researchers to expand or adjust ESN success measurement models and define areas of further research.

The remainder of this paper is organized as follows: in section two, we give a brief overview of related work in regard to ESN including ESN success and benefits as well as IT capabilities. In section three, our research method is explained in detail. Section four provides our findings, namely the benefits of ESN and the comparison to the IT capabilities by Davenport and Short (1990). In section five, we discuss our findings and elaborate the added-value of ESN in comparison to traditional IT. Section six concludes the paper, giving a short summary, limitations and an outlook on future research.

2 Theoretical Background

2.1 Enterprise Social Networks

Research on ESN has gained increasing attention in recent years (Viol and Hess, 2016, Wehner et al., 2017). A definition of ESN that is often used in ESN articles was published by Leonardi et al. (2013) with ESN being *"web-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing" (p.2).*

As such, the possibilities of the application of ESN can be described in the following categories: *communication, collaboration and innovation*, *information dissemination and sharing*, *management activities and problem solving*, *training and learning*, and *knowledge management* (Turban et al., 2011). Due to the interplay of employees, software and the enterprise itself in ESN, various facets can be analyzed. Thus, a growing number of articles on ESN have been published with different objects of analysis. As a consequence, researchers have recently aimed at providing an overview of ESN articles, resulting in three literature reviews published by different co-authorships in 2016/2017. Even though the search parameters are similar and the three articles intend to identify research gaps and define a research agenda, the results are presented in different or overlapping categories, e.g., *user behavior*, *effects of ESN usage*, and *data and data analytics* (see (Stei et al., 2016, Viol and Hess, 2016, Wehner et al., 2017)). Wehner et al. (2017) additionally define a framework and perform a topic analysis resulting in ~70 detailed ESN topics, e.g., gamification in ESN and governance of ESN. All the above shows the large variety of topics in ESN research. There is, however, a consensus in all of the three literature reviews that further research is needed on the effects and impacts of ESN both on the employees and the organization.

2.2 Success and Benefits of Enterprise Social Networks

In general, social software – including ESN – differ from traditional IT, as sociality, and not functionality, is in focus (Bouman et al., 2007). It has been shown that measurement models assessing the success of traditional IT (e.g., the Information Systems (IS) success model by DeLone and McLean (1992) or the IS-Impact Measurement Model by Gable et al. (2008)), are hardly applicable to social software (Steinhueser et al., 2011). Consequently, a measurement model on social software was developed with the two success dimensions *quality* and *impact*, in particular *individual* and *organizational impact* (Steinhueser et al., 2011). In the specific context of ESN, success measurement models were defined, too, trying to evaluate ESN success from different perspectives. For example, Muller et al. (2009) defined a metric "return on contribution" (ROC) to measure the impact of ESN on individual employees. Lehner and Haas (2011) focus on success factors on an organizational level describing the "system of knowledge management". Richter et al. (2013a) as well as Herzog et al. (2013) define metrics for both dimensions (users and business value), e.g., *reduced time to find correct information*. In each of them, success is measured by means of success factors or metrics, which, if a certain degree or value is achieved, define success on the basis of these individual benefits. However, among these models, there is no congruence regarding these perceived benefits, neither on an individual nor on an organizational level (Herzog et al., 2013). Therefore, we focus on the achievable benefits of ESN as a basis for discussing the added value of ESN.

Benefits of web 2.0 technologies have been discussed and defined in multiple studies comprising internal as well as external impacts, e.g., communication and customer relationship management, respectively (Andriole, 2010). Looking at ESN benefits in particular, only three articles could be identified focusing on this topic. Kugler and Smolnik (2013) develop a conceptual model to measure the impact of ESN usage on individual performance, employee connectedness, decision-making and innovative performance, and they define hypotheses for these constructs. However, they do not present an evaluation of this model in their article. Majumdar et al. (2013) perform 10 interviews to assess benefits and usage patterns of ESN. Even though a list of 17 benefits is provided, e.g., *communicating across time zones* or *gaining knowledge*, the results are very abstract and do not provide a broad overview of benefits achievable by ESN. Holtzblatt et al. (2013) perform 63 interviews, analyze log data and perform a survey within the MITRE corporation to assess the benefits in this particular company. However, this article focuses on one company only and, thus, a broad overview (across companies and branches) is missing.

Even though there are only three articles explicitly addressing ESN benefits, there is a large number of case studies on ESN (Wehner et al., 2017) that present benefits without focusing on them. For example, Han et al. (2015) focus on the governance of the ESN at Statkraft (Norwegian energy company)

and also present the benefits of ESN usage, e.g., stating that it is e.g., "creating a greater overall business understanding within the company across geographical regions" (p. 9). Thus, we focus on case studies (Yin, 2013) to extract the proven benefits being achieved using ESN.

2.3 IT Capabilities

The usage of IT has a substantial impact on organizations in many regards and affects business models, organizational structures as well as the way business processes are performed. An important aspect is to explore the strategic value of IT capabilities, e.g., to gain competitive advantage (Bharadwaj et al., 1999b, Fink, 2011), and several studies have shown that the use of IT positively impacts business performance (Bharadwaj et al., 1999a, Mata et al., 1995). IT capabilities can be defined as "combinations of IT-based assets and routines that support business conduct in value-adding ways" (Sambamurthy and Zmud, 2000). However, the types of existing IT capabilities are manifold and range from physical aspects, e.g. technology, to human aspects (e.g., IT knowledge and experience), to organizational aspects, e.g. relationship assets and culture of IT use (Kim et al., 2011). Moreover, IT capabilities are subject to changes for mainly two reasons. First, technological advance brings about new possible applications for IT and its capabilities change or extend when new technologies emerge. Second, the way IT is used within organizations has significantly changed over time. In the past, IT was mostly used as a tool to support business processes or to assist people in their work. Nowadays, IT is closely fused with the business environment and additionally blurs the line between work and personal life as well as between public and personal information, thereby continuously augmenting its capabilities (El Sawy, 2003).

As the use of social software in an organizational context is a relatively new topic (Berger et al., 2014a), commonly accepted capabilities for this type of IT (e.g., ESN) have not been established yet. For that reason, we use the capabilities ascribed to traditional IT as a starting point to classify those capabilities we were able to identify for ESN. A set of nine generic IT capabilities is presented by Davenport and Short (1990) who also describe their organizational impact and benefits: **Transactional** capabilities describe the ability of IT to support routinized transactions and thus standardize existing working routines. A higher **Geographical** independence is achieved because information can be shared across large distances and within narrow time frames. **Automational** capabilities reduce the amount of human labor since tasks which were previoulsy conducted manually are now performed automatically by an IT system. IT also facilitates the use of complex **Analytical** methods, which can be used to derive useful information from data gathered during business operations. **Informational** capabilities of IT on the other hand make vast amounts of detailed information available to users who, in turn, are enabled to manage increased data complexity. With regard to **Knowledge Management**, IT provides support to several stages such as capturing, organizing and sharing of information. To better differentiate between the two aforementioned capabilities, we refer to Davenport and Prusak (1998), who state that knowledge derives from information. This transformation occurs through the processing or enrichment of information, e.g. by comparison, connection, conversation, or drawing consequences. Further, the use of IT helps to break open the strict **Sequential** order of tasks and often enables users to work on multiple tasks simultaniously. The transparency of business processes can be increased as IT allows the **Tracking** of task statuses as well as inputs and outputs. Finally, **Disintermediation** covers the ability of IT to improve communication and coordination by directly connecting parties that would otherwise communicate through an intermediary.

3 Methodology

To address our research questions, our research process was designed in accordance with the qualitative content analysis by Mayring (2014). As our analysis aims at elaborating the proven benefits of ESN presented in case studies, our initial goal was to set up a literature database including all peer-

reviewed papers on ESN. For that purpose, we summed up the literature from the three literature reviews, i.e., Stei et al. (2016), Viol and Hess (2016) and Wehner et al. (2017) as shown in section 2.1. Due to a large overlap of articles among them, initially, 114 articles were identified. However, only articles from 2004 until mid-2015 were included in the three literature reviews. Thus, to also include publications that were published in the meantime, we performed an additional literature search on ESN articles in three meta-databases (EBSCOhost Business Source Premier, dblp and Google Scholar) covering the timeframe from 2013 to 2016 using the same search terms as the three literature reviews, i.e., a combination of *(1) Enterprise/Corporate, (2) Social* and *(3) Network/s/ing, Software/Platform, Network/ing Site, Microblogging, Knowledge Sharing* and *Intranet* appearing in the search fields *title, abstract* or *keywords*. In this step, we identified an additional 40 articles published in peer-reviewed conferences and journals. Finally, our literature database comprised 154 high quality articles to undergo further analysis. In the subsequent selection process, we initially reviewed the research method of each article. For further analysis, we only considered articles, which were case studies as defined by Yin (2013), with, e.g., in-depth interviews being performed or a participant observation (Gable, 1994). Of the remaining 60 articles, 37 articles explicitly mentioned benefits using the ESN, while the other 23 articles had a different focus regarding their object of investigation, e.g., content attractiveness in ESN (Heim and Yang, 2015). Table 1 presents the codification of the 37 articles, which are the basis for our further analysis.

[1] (Wiesneth, 2016)	[9] (Riemer et al., 2015b)	[17] (Chin et al., 2015c)	[25] (Wu et al., 2010)	[33] (Wu, 2013)
[2] (Qi and Chau, 2016)	[10] (Riemer et al., 2015a)	[18] (Chin et al., 2015b)	[26] (Liu et al., 2013)	[34] (Majumdar et al., 2013)
[3] (O'Leary, 2016)	[11] (Merz et al., 2015)	[19] (Chin et al., 2015a)	[27] (DiMicco et al., 2009)	[35] (Seebach, 2012)
[4] (Mäntymäki and Riemer, 2016)	[12] (Kügler et al., 2015a)	[20] (Risius, 2014)	[28] (Richter and Riemer, 2009)	[36] (Riemer et al., 2011b)
[5] (Greasley and Wang, 2016)	[13] (Kügler et al., 2015b)	[21] (Mäntymäki and Riemer, 2014)	[29] (Zaffar and Ghazawneh, 2012)	[37] (Riemer et al., 2011a)
[6] (Weiss et al., 2015)	[14] (Han et al., 2015)	[22] (Leonardi, 2014)	[30] (Riemer and Scifleet, 2012)	
[7] (Suh and Bock, 2015)	[15] (Gonzalez et al., 2015)	[23] (Gibbs et al., 2014)	[31] (Friedman et al., 2014)	
[8] (Silic et al., 2015)	[16] (Ding et al., 2015)	[24] (Zhang et al., 2010)	[32] (Holtzblatt et al., 2013)	

Table 1. Codification of the 37 articles to be analyzed

The qualitative content analysis was performed on each of these 37 articles according to Mayring (2014) to derive the benefits achieved by using ESN. The full text of each case study was analyzed in detail, relevant text passages were extracted and tagged afterwards. In the course of this analysis similar benefits were grouped and assigned to categories (inductive categorization) to better structure the benefits and to highlight their thematic focus (Mayring, 2014). This led to clearly distinguishable categories of benefits. Some of the categories turned out to be relevant from both an individual user's perspective and an organizational business perspective, whereas others could be found for only one of the perspectives, depending on the context of the text passage. The distinction between an individual and organizational perspective was deduced from the success models presented in section 2.2 (Steinhueser et al., 2011). Afterwards, we classified each category (including the distinct benefits) to the IT capabilities by Davenport and Short (1990) (see section 2.3). For example, from the case description: "creating a greater overall business understanding within the company across geographical regions" (Han et al., 2015, p. 9), we derived the benefits *reduces geographical boundaries*. In sum, we identified eight case studies showing identical benefits and, thus, we aggregated them to the category *breaking through geographical boundaries*. Afterwards, this category was assigned to the organizational perspective and the capability Geographical (see section 2.3 and Table 2). The codification was performed accordingly for all 37 articles. Due to this alignment of the benefits achieved by ESN and the

capabilities of traditional IT, we are able to present the benefits by the traditional IT capabilities (see RQ1) and discuss the additional benefits of ESN (see RQ2).

All steps – identification of benefits, assignment to categories and classification to the capabilities of traditional IT and individual or organizational perspective – were performed by two researchers individually to reduce subjectivity. In case of disagreement, the article in question was analyzed by a third researcher followed by a discussion until a consensus was reached. For example, we discussed the question of flattened hierarchies being a benefit or not. However, as the respective article explains that flattened hierarchies lead to a reduction of information asymmetries (Chin et al., 2015a), we included this point as well.

4 Findings

The extraction of the benefits described in the 37 case studies resulted in 99 distinct benefits, which were achieved by applying ESN. Their classification resulted in three groups: 69 benefits could be classified using the capabilities of traditional IT by Davenport and Short (1990), a further 25 benefits built a newly created, ESN-specific capability named "Social Capital", while the remaining 5 benefits were too generic to be classified into one particular capability as they are results of combinations of various individual ESN benefits, which are presented in sections 4.1 and 4.2.

The latter group is characterized by common and familiar benefits usually attributed to ESN or social media in general. The benefits described in the case studies can be summarized into the following categories: increased performance, collaboration, and business value. Although detailed information on the actual contribution of ESN, i.e., how the added value is created and which particular features of the ESN lead to the benefit, cannot be derived from the description in the case studies, the benefits allow to identify some general implications of ESN for business operations. An **increased performance** [4,7,10,12,13,14] through ESN has been determined in several empirical studies. The improvements regarding task or job performance are attributable to concepts such as crowdsourcing [4], better team coordination [7], or an effective and efficient access to information [10] and expertise [14]. ESN support extensive **collaboration** [1,14,28] by connecting employees regardless of their geographical location and by making knowledge easily accessible to them [8]. They further provide a platform for employees to easily discuss ideas [14] or to ask experts for help in case of problems [14]. Finally, the category **business value** covers a number of rather fuzzy aspects, which are considered to be beneficial to organizations but are difficult to isolate or measure. An ESN is a means to exploit collective intelligence [32] and to strengthen social connections [32]. Further, they bring about a competitive advantage [35], as for instance the time-to-market for newly developed products is shortened [8].

However, most of the aforementioned general implications do not qualify as distinct benefits per se but are in fact results of a bundle of other ESN benefits that take their full effect in combination. For that reason, increase of performance, enhanced collaboration, and contribution to business value are attributable to other benefits that are clearly based on the decisive capabilities of ESN. The aforementioned 69 benefits, which were matched to the capabilities of traditional IT, are explained right behind in section 4.1. As ESN also show benefits that cannot be classified in terms of existing capabilities, we strongly anticipate that additional capabilities for ESN will have to be defined. The corresponding 25 benefits focusing on social aspects are presented in section 4.2.

4.1 Benefits classified to Capabilities of traditional IT

When analyzing the benefits of ESN derived from the case studies, the nine IT capabilities as described by Davenport and Short (1990) were used for classification. No particular ESN benefit could be assigned to the three categories Automational, Analytical, and Sequential. This does not necessarily mean that ESN do not possess such capabilities, but rather that in the case studies evaluated no benefits regarding one of those categories were explicitly mentioned. The classification of the identified benefits to the remaining six capabilities – Transactional, Geographical, Informational, Knowledge

	Individual	Organizational
Trans.		**Formalization of Processes:** documents unstructured processes [5]; formalizes processes [11]; increases process flexibility [11]
Geo.	**Breaking through Geographical Boundaries:** integrates teleworkers better [6,23]	**Breaking through Geographical Boundaries:** reduces geographical boundaries [1,7,8,14,18,19,23,31]; connects dispersed teams [7]
Informational	**Exchange of Information:** allows sharing information [4,21,24,25,27, 34]; sharing information becomes easier [11,14]; provides real-time access to information [8,10,14]; increases information diversity [33] **Promotion of Creativity:** increases creativity [2]; helps to explore new solutions [16]; increases innovative capability [2,16,23]; allows sharing ideas [4]; facilitates the generation of new ideas [4,16,21]	**Exchange of Information:** spreads news quickly [1]; synchronizes formal and informal information [5]; reduces the costs of managing information [8]; directs attention to certain matters of interest [11]; reduces information asymmetries [3,35]; reduces search costs [35] **Promotion of Creativity:** supports discussion of ideas [1,14,21,25,34]; crowdsources ideas [10,18,19,30]; increases innovative performance [13]; gathers ideas from various employees [17]; leads to more innovative products and services [22]; enables collective intelligence [32]
Knowledge Management	**Knowledge Sharing:** encourages employees to share knowledge [2]; easier knowledge sharing [14]; increases knowledge sharing [23] **Access to Expertise:** more efficient and direct way to access expertise [14,26]	**Knowledge Sharing:** creates knowledge [2,30,34]; improves knowledge extraction and retention [14]; turns individual knowledge into organizational knowledge [29] **Access to Expertise:** provides meta-knowledge on "who-knows-what" [22]; improves knowledge exchange [35]; helps to solve problems [4,10,14,17,18,19,24,28,29,30,36,37]; provides access to knowledge faster [8,22,29]; finds experts faster [10,17,19,26,28, 34] **Reduction of Redundancy:** reduces knowledge duplication [22] **Training and Learning:** increases organizational learning [2]; better understanding of job and role expectations [15]; supports mutual training [18,19]
Tracking	**Transparency of Responsibilities:** makes own work visible to others [24]; increased transparency of work of colleagues [11,14,17,24,36,37]	**Transparency of Responsibilities:** provides information about collaborative activities [17]; increases visibility of employees' actions to others [19] **Improved Task Assignment:** helps to align activities in a team [36,37] **Traceability:** provides meta-information on who changed what [11]
Disintermediation	**Eased Point-to-Point Communication:** supports and increases communication [1,20,23]; less effort handling messages [11]; easy and more convenient way to receive instant feedback [11,24,37]; streamlines communication between employees [18] **Elimination of Intermediaries:** connects employees [12, 30]; helps to make new connections [24,27]; reduces barriers to contact colleagues [28,34]	**Eased Point-to-Point Communication:** reduces e-mail for internal communication [8,11]; introduces more balanced communication structures [9]; communication remains accessible [11]; promotes communication within teams [11]; collective communication among team members [11]; ensures communication reaches entire team [11]; supports communication among team members [20]; less formal communication [24]; facilitates discussions [36] **Elimination of Intermediaries:** reduces hierarchical boundaries [9,17,19,23]; reduces organizational boundaries [4,14,31]: better connects all employees [8]; involves a wider group of people [8]

Table 2. Benefits of Enterprise Social Networks (Categories by Davenport and Short 1990)

Management, Tracking, and Disintermediation – is shown in Table 2. Each benefit is allocated to one corresponding IT capability (rows) and, depending on its primary focus, divided into being either individual or organizational (columns).

Within the context of the capability **Transactional (Trans.)**, ESN facilitate both the documentation [5] and the formalization of unstructured or semi-structured processes [11] as they occur, e.g., during recruitment, project management, or promotion campaigns. At the same time, ESN help to maintain or even increase the flexibility of the processes in which they are applied [11]. This is of special importance in the case of ad-hoc processes that are extended or changed during their execution.

Further, ESN facilitate to break through geographical boundaries (capability **Geographical (Geo.)**), which is among the benefits mentioned most often in the case studies [1,7,8,14,18,19,23,31]. They support communication and professional networking independent of the physical location of the parties involved. Here, the geographically-dispersed silos are broken and employees are able to connect globally [18]. This is of special advantage for dispersed teams [7] or teleworkers who are better integrated in the company when using an ESN [6,23].

Looking at the capability **Informational**, ESN show benefits in the two categories exchange of information and promotion of creativity. One crucial aspect of the exchange of information is that it happens quickly, providing almost real-time access to highly topical information, [1,8,10,14] and in an easy way [11,14], allowing a wide range of users to participate. Hence, information asymmetries, e.g., among employees within a company, are reduced [3,35]. News can be spread quickly [1] to a great number of recipients directing the attention to current matters of interest [11]. Another benefit of an ESN compared to other, traditional, communication channels is the combination of different types of information, e.g., formal as well as informal [5] on the very same platform reducing the effort of information management [8] or searching costs [35]. Regarding the promotion of creativity [2], ESN provide some functionalities that support the collection and the development of new ideas [4,16,17,21] and foster innovation [2,13,16,22,23]. This can be achieved by exploiting the collective intelligence [32] of a vast number of contributors who interact via the ESN to share and discuss ideas [1,14,21,25,34] and refine them, e.g., via crowdsourcing [10,18,19,30].

In the capability **Knowledge Management**, four categories of benefits can be distinguished: knowledge sharing, access to expertise, reduction of redundancy, and training and learning. In contrast to the capability Informational, which focuses on speed and the simplicity of information interchange, the main emphasis of knowledge management capabilities is on the access to reliable expert knowledge of high relevance and quality. Regarding knowledge sharing, ESN provide helpful tools, e.g., (micro-) blogs or wikis, which make this often unpopular task easier [14] and thus encourage employees to participate and publish their knowledge [2]. The factor of convenience combined with low administrative barriers and participation on a voluntary basis constitute the main advantage of ESN compared to traditional knowledge management systems. Further, by enabling individual employees to share their personal and tacit knowledge, the latter is converted into organizational and explicit knowledge [29] that is kept available for other colleagues [14]. In regard of access to expertise, ESN facilitate the exploitation of the knowledge basis and provide a direct and efficient way to access existing knowledge [8,14,22,26,29]. One of the most prominent benefits mentioned by the case studies is the help ESN provide in solving problems [4,10,14,17,18,19,24,28,29,30,36,37] by making on-topic information available. However, not only the codified knowledge is a valuable asset but also the ability of ESN to bring experts and persons in search of advice together [10,17,19,22,26,28,34]. Authors posting experiences valuable to other employees as well can directly be contacted as they are likely to provide assistance in case of similar tasks. All aforementioned points create a lock-in effect strongly committing the employees to the ESN because they obtain added value in terms of, e.g., getting help faster or finding information on working solutions, etc. Finally, using ESN has benefits in the category training and learning. Organizational learning [2] is promoted as mutual training among employees is supported [18,19] and employees better understand their job and role expectations [15].

The capability **Tracking** comprises the categories transparency of responsibilities, improved task assignment and traceability. Transparency of responsibilities is accomplished by ESN as they reveal what employees are currently working on, e.g., by a status update. Thus, their current work becomes visible to other colleagues [11,14,17,24,36,37] and may identify them as qualified contact persons on similar topics. An overview of collaborative activities [17] is of importance when working in teams. ESN contribute to an improved task assignment e.g., by helping to align activities in a team [36.37] or to synchronize activities among two or more employees. Finally, an ESN increases the traceability of the employees' actions as, e.g., meta-information on changes made via the system are logged [11].

The final capability, **Disintermediation**, comprises the two categories eased point-to-point communication and elimination of intermediaries. In the first category, ESN streamline communication [18] by supporting and increasing direct interaction among employees [1,20,23] and by providing a convenient way to receive instant feedback [11,24,37]. In certain scenarios, ESN start to supersede emails as the prevailing medium of internal communication [8,11]. They provide valuable benefits for collective communication as it is needed within teams [11,20] and facilitates discussions [36] on a certain topic. Finally, more balanced communication structures are the result [9], as messages are less formal in ESN [24]. The second category covers ESN benefits relating to the elimination of intermediaries. This is achieved by ESN because they involve a wide group of people [8] and directly interconnect all employees [8,12,30] of either the own company or a wider cooperation network, often even beyond the actual business context. Due to the availability of private pages in ESN, barriers to contact colleagues are reduced [28,34]. Thus, employees directly contact these colleagues and, finally, make new connections [24,27]. This fosters direct communication among the users of an ESN without depending on intermediators. On an organizational level, a reduction of both hierarchical [9,17,19,23] and organizational boundaries [4,14,31] can be observed brought about by the utilization of ESN.

In summary, a large number of the benefits accruing from the use of ESN could be classified into the capabilities of traditional IT, which can be explained by the fact that, on the one hand, the IT capabilities by Davenport and Short (1990) are rather generic and, on the other hand, ESN themselves represent a specific sub-type of IT possessing capabilities similar to those of other IT-systems. However, even if many ESN benefits match the IT capabilities in general, they often exceed the original notion of IT capabilities and generate added value based on the distinctive characteristics of ESN. These aspects, e.g., Knowledge Management and Tracking, are discussed in section 5.

4.2 Social Capital as a new Capability of ESN

As already explained at the beginning of section 4, there are 25 benefits that could not be classified to the capabilities of traditional IT. These benefits can be grouped into five distinct categories: personnel development, merging of private life and business, trust-based community, common identity, and disclosure of hidden interactions. All of these aspects refer to the value of an individual member that can be promoted in the network, social relationships of individuals and the corporate network itself, often subsumed in literature under the term Social Capital (Portes, 2000). These aspects were not covered by the IT capabilities by Davenport and Short (1990), as functionality and not sociality was in focus at that time. Thus, it is necessary to derive a new IT capability to cover these aspects, too. Social Capital "stands for the ability of actors to secure benefits by virtue of membership in social networks or other social structures" (Portes 2000, p.6). This phenomenon can also be observed when using ESN, as benefits like e.g., builds a networked organization [19], were achieved. Therefore, we determined Social Capital as a new capability, which complements the traditional IT capabilities. The benefits of ESN associated with this newly built capability are summarized in Table 3.

In regard to **Personnel Development**, a number of benefits have been identified. ESN provide a platform that gives employees, regardless of their position, a voice in the corporate community. This can be part of a staff empowerment strategy [8,19], where employees are encouraged to assume more personal responsibility. In this regard, ESN provide employees with the necessary features towards more self-organization (e.g., in autonomous teams) to utilize the team members' potentials and skills at the

best. In addition, employee satisfaction is positively influenced as ESN motivate users during their daily tasks [23]. Because activities in the ESN are visible to other users, employees are recognized by the corporate community and, thus, can earn reputation [12] and gain a higher level of confidence [15]. In a second step, employees can benefit from these aspects, e.g., to promote their careers [25]. Finally, by actively participating in the corporate community, employees increase their feeling of "belonging" [14], as they gain more influence in the corporate community [9].

	Individual	Organizational
Social Capital	**Personnel Development:** empowering employees [8,19]; supports employees gaining influence in the corporate community [9]; increases reputation [12]; increases feeling of "belonging" [14]; helps gaining a level of confidence [15]; motivates employees [23]; used to promote careers [25] **Merging of Business and Private Life:** helps to develop interpersonal relationships/friendships in the workplace [15,17,18,19,20,34]; increases flexibility of working hours [6,7]; helps to find employees with similar interests [24]; supports social browsing [25] **Trust-Based Community:** supports on-boarding newly hired employees [9,15,26]; creates trust among employees [28]; strengthens social connections [32]	**Trust-Based Community:** builds a networked organization [19]; creates and sustains a user community [21,23]; supports informal interaction [4] **Common Identity:** creates better understanding of own employees [3]; creates greater overall business understanding [14]; better understanding of the organizational culture [15]; creates a shared background [30] **Disclosure of Hidden Aspects**: identifies key contributors in the corporate network [3]; higher recognition of highly performing employees [8]; increases organizational awareness on formal and informal matters [17]; improves meta-knowledge on "who-knows-whom" [22]

Table 3. Benefits of Enterprise Social Networks in capability Social Capital

A second category of benefits is related to the **Merging of Business and Private Life**, which has also been identified as an outcome of the use of ESN. The boundaries between private and job-related activities become increasingly blurred as ESN link both areas together. They allow for a greater flexibility regarding working hours [6,7], which, in turn, enhances the compatibility of family and career and leads to a better work-life balance. Furthermore, ESN help to develop interpersonal relationships or even friendships at the workplace [15,17,18,19,20,34]. This is also fostered by social browsing [25] where personal information made available by the users in their profiles or private pages are used to identify colleagues with similar interests or hobbies [24].

As regards the multilayered connections that take place within ESN (e.g. formal/informal, peer-to-peer/group-based), most often, the informal, interpersonal interactions [4] promote the creation of a **Trust-Based Community** among the employees [21,23,28]. Using an ESN strengthens social connections [32] and helps to build a networked organization [19] that is characterized by mutual trust and respect. In this way, gains in collaboration as well as in mutual assistance can be achieved because ESN create and sustain a user community [21,23] where employees can work together in an atmosphere of well-being. In case of newly hired employees, ESN are successfully used to support onboarding processes [9,15,26], which aim at a smooth integration of recruits into the organization.

From an organizational perspective, ESN provide means for accomplishing a **Common Identity** among the employees. Benefits leading to a better alignment of corporate values and individual needs also fall into this category. For example, by disseminating business information among all personnel, the ESN can be used to create a greater overall business understanding [14]. Alternatively, activities started in or opinions exchanged via the ESN enable the management to learn about the needs of their employees [3]. In general, ESN can serve as a valuable source to deepen the understanding of the organizational culture [15]. That way, a shared background is created [30], which can be turned into a competitive advantage such as having a workforce pulling together and pursuing a common vision.

The last category of benefits is the **Disclosure of Hidden Aspects** formerly concealed under the surface but now available for analysis by the use of ESN. As such systems keep track of communication relationships, social contacts and other user interactions, there is an increased organizational awareness of both formal and informal matters [17]. Informal relations are of special interest in this context

as they can be used to detect the actual sequence of work or organizational structures where they deviate from the organizational chart. By applying methods of social network analytics, it can be determined "who-knows-whom" [22], which communication channels are used, and how close the collaboration between the users is. That way, the key contributors in a network can be identified [3]. Relying on that information, ESN are also a suitable platform for the recognition of high performing employees [8].

5 Discussion

After presenting the benefits of ESN, we will discuss interesting aspects based on our findings. While all of the benefits have been achieved using ESN, they are widely dispersed and often only appear in single cases. One possible reason for that is that the benefits described in the case studies are subject to the objects of investigation of the particular paper. Additionally, we cannot state if there are benefits that are invariably achieved by implementing an ESN simply by looking at all the case studies we analyzed. Thus, we do not argue that implementing ESN creates benefits per se.

Rather, ESN can provide support for specific categories in a company classifiable to the capabilities of traditional IT as shown in Table 2. However, our analysis also shows that there are three capabilities to which no benefit could be classified to: **Automational, Analytical** and **Sequential** (see section 2.3) (Davenport and Short, 1990). All of them put traditional IT systems in the foreground that execute defined business operations. This is contrary to ESN, as they focus primarily on supporting the execution of single activities and interpersonal relationships (Muller et al., 2009). Thus, we see a need for further research on how ESN can be used effectively and efficiently to support business processes. The use of online social networks used for marketing may serve as an example, in which Social Media is combined with traditional business operations (Berger et al., 2014a). Although none of the case studies identified a benefit classified to the above-mentioned capabilities, there might, e.g., be an automation of certain tasks even if not mentioned in the case studies. For example, an employee is reminded to complete a task at a project milestone, which could be triggered by an ESN instead of a person.

On the other hand, the capability **Social Capital** was identified complementing traditional IT capabilities. The importance of this new capability can be substantiated with the changing nature of IT and the so called "third perspective of IS identity" established by El Sawy (2003). El Sawy (2003) recognizes IS as IT-enabled solutions that comprise people (which are using IT) and IT as the two essential parts of the system. The capabilities of traditional IT are defined in two perspectives, whereas IT is seen as a tool helping users in their work or as a system supporting users to work in an IT-intensive business environment. The third perspective describes the fusion of IT and business environment in which boundaries between work and personal life are blurred. Most of the identified benefits within the IT capability Social Capital, especially the category *merging of business and private life*, reflect this development and make the definition of the new IT capability necessary. In addition, we contribute to the different levels of Social Capital theory (Adler and Kwon, 2002, Leana and Van Buren, 1999): looking at to the so-called ego network (where, at a relationship level, actors derive value from their own social relationships), we see additional benefits that have not been described in previous works on Social Capital. For example, the use of ESN may especially be used to strengthen the individual network position (Holtzblatt et al., 2013) in one's company, e.g., to promote an employee's own career, which often builds on the personal relationships (Bolton, 1980). On the other hand, at the network level, ESN may be used to formalize the network structure, e.g., as it becomes visible "who-knows-whom" (Leonardi, 2014), which will reveal further hidden aspects like the key contributors in the corporate network (Berger et al., 2014b). The advantages of network visibility in the context of ESN have been shown e.g., by Leonardi (2014). Thus, using ESN may contribute to a better understanding and conceptualization of Social Capital theory, too.

An interesting use case that combines Social Capital benefits and capabilities of traditional IT, i.e. **Transactional and Tracking**, is the formalization of processes. While standardized business processes are mostly covered by traditional IT, e.g., in ERP-systems, ESN are of particular interest for flexi-

ble and ad-hoc processes that vary regarding their execution from instance to instance. We see an advantage of ESN especially regarding these processes, as ESN provide a flexible platform, supporting these processes at their execution (Merz et al., 2015), e.g., at supporting discussions on specific problems and gathering the relevant data (Greasley and Wang, 2016) by tracking status updates, messages, or even the changes in a document (Merz et al., 2015). This information is then an integral part of the ESN and can be extracted to generally formalize the process in question. This makes the process more traceable and possibly more controllable, while keeping it flexible. Further, hidden aspects in the process will be revealed, e.g., which informal matters exist (Chin et al., 2015c) at executing a process. Both the formalized processes as well the awareness of "soft-facts" enable to initiate process improvement projects. Consequently, the new opportunities coming along with ESN, e.g., tracking and analyzing informal information flows with the aim of improving formalized processes, generate new challenges for research to provide supporting modelling techniques and methods.

A large number of benefits are organized within the IT capability **Knowledge Management**, which is not surprising since ESN are expected to make a major contribution in this field. This can also be seen in the increasing number of articles relating ESN to knowledge management theory, e.g., (Mäntymäki and Riemer, 2016, Richter et al., 2013b). ESN offer several integrated technologies such as wikis, blogs, social tagging, and chats that provide useful functions to share and manage knowledge. Furthermore, the aspect of community in ESN contributes to encouraging users to share their knowledge and make it accessible to and reusable by the company, which is often cited as a main problem of Knowledge Management as presented by e.g., Rubenstein and Geisler (2003). When users base their decision to share knowledge on a cost-benefit-calculation, they compare their present cost of converting individual knowledge to group-available knowledge, including the fear to make themselves dispensable, with the benefit of profiting from group-available knowledge in future. A frequently used ESN, which is integrated into existing processes and enables collaboration, knowledge exchange is much more dynamic, and the connection between present costs and future benefits becomes much more visible. Additionally, the costs of converting knowledge for the community are lower, e.g., by directly answering questions to solve a problem. Likewise, the access to expertise is much easier since the network either helps to identify the source of knowledge and offers possibilities for direct contact (Han et al., 2015) or keeps the solution of a discussion available, e.g., in forums, with this "tacit" knowledge (Zaffar and Ghazawneh, 2012) reducing searching cost in both cases. The calculation of cost and benefits is also described by Muller et al. (2009) who defined a metric named "Return on Contribution" measuring how much employees get back when providing something to the ESN. Another argument in favor of substantiating the contribution of ESN to Knowledge Management originates from the organizational commitment theory (Wiener, 1982), in which the normative commitment is defined as a sense of obligation to the community. Users participate because they feel they ought to, a feeling that may grow when persons feel indebted to the community because the benefits they receive exceed their own contribution (Bateman et al., 2011, Oestreicher-Singer and Zalmanson, 2013). Therefore, persons asking for a solution, which is then provided by various users in the community (Richter and Riemer, 2009, Riemer and Scifleet, 2012) may feel indebted (maybe only after the second or third time) so that they are encouraged to share their knowledge, too (Qi and Chau, 2016).

Looking at the aforementioned points and the variety of ESN benefits in general, it becomes obvious that many benefits are hardly quantifiable, e.g., the increased creativity of employees (Qi and Chau, 2016). Further, there are benefits that are influenced by various factors, e.g., organizational culture (Gonzalez et al., 2015). These, in addition to the great variety of benefits, make it difficult to establish a **success measurement approach** that covers most aspects. Even though, when comparing our benefits to the current success measurement approaches, e.g. by Richter et al. (2013a), we see that some of the benefits we identified are already covered by them. For example, the benefit *helps to solve problems* is covered by the success measures *number of questions asked*, *number of useful or correct answers*, and *number of answered questions* (Richter et al., 2013a). However, a discrepancy between our list of benefits and the success measures was identified, too. For example, Richter et al. (2013a) describe impacts of ESN that were not identified as benefits in the case studies, e.g., *reduced travel*

costs; on the other hand, we identified benefits that are not covered by current success measurement approaches, e.g., *creates trust among employees* (Richter and Riemer, 2009). While we do not argue that all benefits have to be measured, we still see the need to create new means to measure relevant benefits and, thus, align or expand current success measurement approaches. With our analysis, we hope to provide researchers with a starting point to do so.

From an organizational perspective, it is interesting to note that no advantage was identified on an employee level, which contradicts the view of the business. Obviously, each individual benefit and company always have to be considered separately, for example, if the business strategy favors a strict hierarchy, an ESN may possibly work against it. Apparently, the same holds true for the opposite. No benefit on the organizational side was identified that is contradictory to the individual view. Thus, we are convinced that ESN are an enrichment in the corporate life due to the previously mentioned positive effects, both on an individual and an organizational level. ESN usage may additionally be promoted by the fact that its usability is well-known from private life, e.g., from using Facebook, and because ESN are platforms comprising various integrated web 2.0 technologies such as personal pages and activity streams. Finally, we see ESN as a useful complement to traditional IT, due to their stimulating different aspects previously not stimulated, e.g., hedonic usage at the workplace (Chin et al., 2015c).

6 Conclusion

In this paper, we elaborate on the benefits of Enterprise Social Networks and compare them to the capabilities of traditional IT. In this regard, we perform a qualitative content analysis according to Mayring (2014) with a focus on case studies on ESN. As a result, we identified 99 benefits that were classified to the capabilities of traditional IT and to a new capability named Social Capital. With this research, we claim that ESN have enormous potential to bring about business value, even though hardly quantifiable, as, e.g., a networked organization is built by ESN.

Our research contributes to theory and practice. As a contribution to theory, first, we identify and present the benefits based on the evidence of 37 case studies. Those were classified to the IT capabilities by Davenport and Short (1990). To three IT capabilities, no benefit could be classified to, while five are very well supported with 69 benefits distinguishable in 13 categories of benefits. Second, we derive a new IT capability, Social Capital, covering an additional 25 benefits and resulting from the changing nature and reflecting the present nature of IT hallmarked by the fusion of business and personal life (El Sawy, 2003). Third, we identified several fields for further research, e.g., to expand success measurement approaches on social software (see last paragraph). From a practical perspective, first, our list of benefits and the definition of categories is of additional help to prevent practitioners from false expectations and to stress the added-value of ESN. Second, companies having already implemented an ESN gain further insights into the impacts of ESN and can, thus, facilitate a more targeted use of ESN. Finally, the benefits, especially in the capability Social Capital, give insights on the informal activities and information flows in the company that may help to rearrange the focus of improvement projects.

However, our research is not without limitations. The list of benefits extracted from the 37 case studies is limited. Even though we carefully selected the case studies and all of which passed a review process, we did not question their results. Further, we have not elaborated on the negative impacts of ESN in companies, which - at worst - might compensate the positive effects.

In the course of our research, we came upon possibilities of further research: first, the mentioned limitations present a basis for further research. Second, we identified informal information flows as a possibility to improve business processes. Third, the definition of metrics for our benefits for a further development of success measurement approaches is a promising future research areas. Finally, the determination of influencing factors either enabling or hindering the generation of benefits based on empirical research is of great importance to support the successful implementation and use of ESN.

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2.4 Beitrag 4: Evaluating Business Process Improvement Patterns by Simulation

Adressierte Forschungsfrage	**Forschungsfrage 4:** Welche Auswirkungen (z.B. Zeit, Kosten) haben BPI-Pattern in verschiedenen Szenarien? Was sind fördernde und hindernde Faktoren für die Anwendung von einzelnen BPI-Pattern?
Zielsetzungen	(1) Evaluation von Instanzen der BPI-Pattern (2) Identifikation von fördernden und hindernden Faktoren bei der Anwendung der BPI-Pattern
Forschungsmethode	Evaluation der BPI-Pattern Instanzen in Form eines Simulationsexperiments (Van der Aalst et al., 2010)
Kernergebnisse (Überblick)	(1) Klare Verbesserung der Prozesskennzahlen (Kosten, Zeit) durch Anwendung von drei Pattern-Instanzen (2) Identifikation von 12 fördernden und sechs hindernden Faktoren bei der Anwendung der BPI-Pattern
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Ranking VHB JQ 3	B
Autor(en) und Anteile	Markus Lang 25% **Benjamin Wehner 25%** Thomas Falk 25% Philipp Griesberger 20% Susanne Leist 5%

Tabelle 7: Fact Sheet „Evaluating Business Process Improvement Patterns by Simulation“

EVALUATING BUSINESS PROCESS IMPROVEMENT PATTERNS BY SIMULATION

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Abstract

Existing approaches for business process improvement often lack systematic guidelines to transform a business process into an enhanced state, which we refer to as the "act of improvement". To close this gap, a pattern-based approach has been designed and developed in previous works. In this paper, the usefulness of "Business Process Improvement Patterns" (BPI-Patterns) as a means of improving business processes is analyzed. For this purpose, a simulation experiment is performed in which several BPI-Patterns are applied to evaluate whether their anticipated effects can be confirmed for real-life business processes. From the analysis of the simulation results, i.e. how the application of BPI-Patterns affects the business processes, we investigate enabling as well as hindering factors that influence the implementation of BPI-Patterns. These factors may serve as a means to further specify instances of BPI-Patterns and also contribute to the overall evaluation of the BPI-Pattern approach.

Keywords: Business Process Improvement, Pattern, Evaluation, Simulation.

1 Introduction

Nowadays business process management (BPM) plays a crucial role in the daily routines of organizations (Jansen-Vullers and Netjes, 2006, Kohlbacher, 2013, Smirnov et al., 2012). New emerging technologies, higher competition, and changing customer demands are challenging tasks that organizations have to meet (Boerner et al., 2012). To deal with these challenges, companies need to organize their work routines, the so-called business processes, in an efficient way (Fuglseth and Gronhaug, 1997, Sidorova and Isik, 2010). The concept of BPM leads to an increase of productivity, quality, and innovation (Minonne and Turner, 2012). Many approaches dealing with the improvement of these business processes were introduced (Andersson et al., 2005). However, most of these existing approaches lack the description of what changes are exactly needed within a business process to reach a desired "to-be"-process (Griesberger et al., 2011, Nwabueze, 2012, Rjinders and Boer, 2004, Snee, 2010). We refer to these changing procedures as the "act of improvement".

To bridge the aforementioned gap, a pattern based approach was developed along with generic BPI-Patterns for the improvement of business processes (Falk et al., 2013a). The overall research project follows the design science research (DSR) paradigm, which strives for creating new and innovative solutions, the so-called artifacts, for a specific problem domain (Goes, 2014). Patterns in general propose plans or structures that are abstracted from reality to reach a predefined goal (Paludo et al., 2000).

Thus, similar to patterns from other fields of information systems, e.g. like patterns for software development, BPI-Patterns aim at improving business processes by providing reusable solutions for typical, recurring problems. The key is that these BPI-Patterns describe what exactly has to be done to solve a specific problem in a business process, as they contain instructions how to transform a business process from its "as-is" to a desired "to-be"-state.

After establishing the conceptual ground work of BPI-Patterns and deriving single instances of BPI-Patterns, the crucial task is now to show that the concept of BPI-Patterns is effective and useful. It corresponds to the evaluation being a key component of DSR that assesses the utility of artifacts created for solving problems of the problem domain (Venable and Baskerville, 2012). Therefore, instances of BPI-Patterns are investigated as they comprise the actual instructions that are meant to bring about improvement. In doing so, certain requirements or enablers for their successful application and, at the same time, factors of influence that hinder successful applications of BPI-Patterns may be discovered. Findings from this analysis serve as a basis for the supplementation of the existing BPI-Pattern instances. To show this, a simulation of applying BPI-Patterns on real-life processes (application procedure for specific degree courses at a university's deanery) is performed, which enables statements about their meaningfulness. Essentially, that analysis is based on comparable quantitative results of costs and times. Beforehand, the configuration of a simulation approach that meets the requirements of being used to evaluate BPI-Patterns will be addressed. This examination of the application of BPI-Patterns contributes to the overall evaluation of the BPI-Pattern approach.

The remainder of this paper is organized as follows. In section 2, essential topics and terms are introduced. The overall research methodology is presented in section 3. The proposed simulation methodology for evaluating BPI-Patterns is described in section 4. An actual simulation of applying BPI-Patterns on real-life business processes is shown in section 5, along with a discussion of remarkable results in section 6. Based on the simulation results, inferences for possible revisions of the BPI-Patterns are drawn in section 7. Finally, section 8 concludes the paper.

2 Theoretical Background

2.1 Business Process Improvement

Davenport and Short (1990) define a business process as a "set of logically related tasks performed to achieve a defined business outcome". By systematically reorganizing these related tasks, organizations are able to significantly influence the way of doing their business (Forster, 2006). Different approaches were developed for this task, e.g. business process reengineering (BPR), in which "as-is"-processes are removed to be redeveloped from scratch (Hammer and Champy, 1993). In contrast, the concept of BPI maintains the current "as-is"-processes and focuses on incremental improvements by changing the existing process design to make it more effective, efficient, and adaptable (Harrington, 1991), i.e. transforming a process into a desired "to-be"-process. Transformation steps recurring in several BPI initiatives may constitute a pattern of a successful improvement measure.

2.2 Business Process Improvement Pattern

The concept of patterns as the documentation of proven knowledge that has already worked to solve problems within a specific context is very popular in the field of IS (Buckl et al., 2013). Regarding their reusability aspects, the attraction of using patterns lies in e.g. shorter development times and lower costs of new solutions (Tran et al., 2006), while they also facilitate an efficient transfer of skills and expertise within a specific context (Behnam and Amyot, 2013). Reusing proven knowledge to improve the performance of business processes is also a common approach (Andersson et al., 2005) and several authors have explicitly addressed the topic of BPI-Patterns. A framework for the classification of BPI-Patterns is proposed by Forster (2006) and presented together with some exemplary patterns based on

generic process modification steps. Reijers and Limam Mansar (2005) provide a collection of best practices in business process redesign that are derived from literature and practical experience. They also used the four categories cost, time, quality, and flexibility to assess their effects on process performance. Kim et al. (2007) examined how BPM can be supported by business process change patterns that enhance the flexibility of BPM approaches. A more comprehensive literature review covering different types of BPI-Patterns as well as patterns in other fields of information systems is provided in Falk et al. (2013a).

To formalize the specification of BPI-Patterns and to facilitate their reuse, a description template was developed (Falk et al., 2013a). It basically consists of a problem description, the measures that should be taken to apply the BPI-Pattern, and an assessment of the anticipated effects on cost, time, quality, and flexibility. Figure 1 shows the data model of a BPI-Pattern and the contained attributes together with their mutual relationships. On this basis, several instances of BPI-Patterns were derived and their functioning already demonstrated (Falk et al., 2013b).

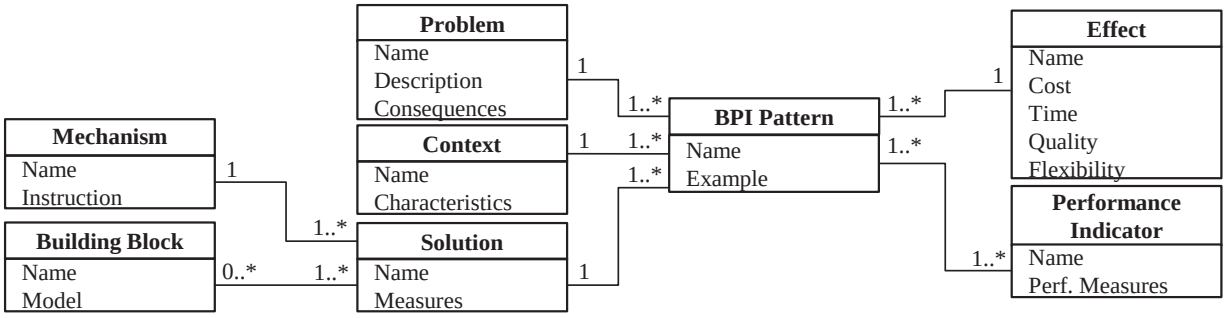

Figure 1. Data Model of a BPI-Pattern (Falk et al., 2013a)

The three BPI-Patterns that are used for simulation purposes in the paper at hand, are described in more detail in section 5.2. Beyond that, other typical examples of BPI-Patterns are:

- "Divide complex processes into smaller sub-processes": An overloaded process flow is straightened out and reorganized into logical segments that are easier to understand and manage. Thus, improvements regarding time, quality, and flexibility are expected because of the reduction of waiting times, decreased error rates due to a clear process design, and well-defined interfaces between the sub-processes, respectively.
- "Combine activities that show overlapping tasks": Similar or closely related activities that are located at various places within a business process or being performed by different people are combined to a single activity producing an equivalent output. Since overhead as e.g. set-up costs or set-up times can be reduced, improvements in the categories cost and time are expected.
- "Dissolve bottlenecks on the critical path of a process": The capacity of each bottleneck activity is adjusted and balanced by e.g. relocating existing resources or deploying additional resources with the result that the throughput of the whole process reaches an optimum. By reducing of waiting queues, especially improvements in terms of cycle time may be achieved.

For the selection of a suitable pattern instance depending on an individual problem situation, a generic procedure for selecting BPI-Patterns has been suggested (see (Falk et al. 2013b). Seeking a suitable BPI-Pattern can be started with a search either for patterns with appropriate problem statements or for patterns which lead to the desired effects. Regardless of how one begins, both of these steps have to be executed consecutively. Next, the context statements of the remaining patterns have to be checked for influencing factors which facilitate or prevent the application of a BPI-Pattern. If, after this step, several patterns remain, they have to be prioritized according to the underlying situation to determine the most suitable one(s), which can ultimately be applied in the BPI project.

3 Research Methodology

Our research on BPI-Patterns follows the design science research methodology (DSRM) by Peffers et al. (2007), which comprises six steps as shown by Figure 2. DSRM-steps 1 to 4 were the subject of previous research papers. The BPI-Patterns were designed on the basis of a literature review, which aimed at defining the core elements needed for their description (see (Falk et al., 2013a)). After defining the structure, single instances of BPI-Patterns were derived from multiple sources and their effects were demonstrated and partly evaluated by means of a case study (see (Falk et al., 2013b)). However, the evaluation of the BPI-Pattern approach is still the subject of ongoing research. Griesberger (2014) showed that within the BPI-Pattern approach several artifact types can be distinguished, namely "model", "instantiation", and "method". He proposed a comprehensive evaluation method taking into account these different artifact types that are part of the BPI-Pattern approach.

Figure 2. Design Science Research Methodology (DSRM) (Peffers et al., 2007)

Our paper contributes to DSRM-step 5 (evaluation) and investigates the effectiveness of BPI-Patterns to improve business processes. In general, there is a multitude of possible DSR evaluation methods (Peffers et al., 2012). However, evaluation is often poorly performed (Pries-Heje et al., 2008), and there is little guidance as to how to actually perform it in a given DSR situation (Ostrowski and Helfert, 2012). The evaluating activity assesses the novelty of the created artifact for the underlying problem domain and compares the objectives of the solution to the actually observed results (Mettler et al., 2014). For this purpose, numerous possible evaluation methods exist (Cleven et al., 2009), while there are characteristics of artifacts favoring the use of specific methods (Peffers et al., 2012).

Furthermore, evaluation methods are classified into naturalistic and artificial forms (Venable et al., 2012). The former are constituted of human practices in real-life environments, while the latter are based on artificial scenarios. A reported problem with naturalistic forms of evaluation (e.g. case studies, subject-based experiments, expert interviews) is that too specific a context plus subjective opinions of individuals may influence the generalizability of the results (Peffers et al., 2012). Even if there are approaches to generalize such results (see e.g. (Lee and Baskerville, 2003)), we favor the use of an artificial form of evaluation. According to Hevner et al. (2004), simulation is a possibility to experimentally execute an artifact by means of artificial data, which is selected for evaluating the artifact under consideration, namely BPI-Pattern instances. Simulation in particular allows for the evaluation of BPI-Patterns in different scenarios, specified by controllable context variables. In combination with a high number of replicable simulation runs, this leads to a solid data pool for further analysis.

4 Business Process Simulation Methodology

Shannon (1998) defines simulation as "*the process of designing a model of a real system and conducting experiments with this model for the purpose of understanding the behavior of the system and/or evaluating various strategies for the operation of the system.*" Further, a simulation provides quantitative information that can be used for analyzing business processes (Hlupic and Robinson, 1998). In doing so, basically, performance measures of "as-is"-processes are compared with those after applying BPI-Patterns on the processes ("to-be") (cf. (Aguilar et al., 1999)). Thus, a simulation enables to record the performance of the simulated issue for a number of alternative process variations, which enables a comparison of these alternatives (Hillier and Lieberman, 2001), e.g. provoked by the application of BPI-Patterns. Simulation is flexible in terms of the investigated objects and demanded issues (van der Aalst and Voorhoeve, 2010). Hence, it is possible to evaluate a variety of objects by many different issues in a simplified manner. The possibility to test designs, organizational structures, etc. without committing resources or disrupting the ongoing operations is an additional advantage (Shannon,

1998). As a result, bottlenecks in information, material and product flows can be identified, which might be helpful to increase the performance of flow rates (Shannon, 1998). To carry out a process simulation experiment, the use of computer software as a tool is recommended (Davis et al., 2007).

There are several approaches to conduct a simulation experiment with a focus on business processes. By means of a representative literature search, the five most-prominent references were found which provide an incremental procedure for this purpose. Table 1 illustrates the condensed steps that were identified in these approaches.

No.	Step \ Author	Davis et al. (2007)	Hlupic and Robinson (1998)	Maria (1997)	Shannon (1998)	van der Aalst and Voorhoeve (2010)
1	*Problem Definition*			X	X	X
2	*Research Question*	X				
3	*Experimental Design*	X	X	X	X	X
4	*Data Collection*		X	X	X	
5	*Simulation Model Development*	X		X	X	X
6	*Model Validation*	X	X	X	X	X
7	*Simulation*	X	X	X	X	X
8	*Analysis and Interpretation*	X	X	X	X	X

Table 1. Overview of Business Process Simulation Methods

To ensure a comprehensive simulation methodology, all of the distinct steps are adopted in the simulation of BPI-Patterns. It starts with the identification of the problem definition (1) and the resulting research question (2). Then, the general setup and the simulation approach are determined and the process is modeled (3). After that, process-related data are collected (4), and integrated into the simulation model (5). This simulation model is validated by performing test-runs (6). Subsequently, the actual simulation is carried out (7) and the results are analyzed and interpreted (8). According to this eight-step-methodology, the simulation of BPI-Patterns is performed and presented in the next section.

5 Simulation

5.1 Application of the Simulation Methodology

The simulation experiment is based on the use of several input parameters, which are listed in Table 2. To achieve realistic results, it includes four processes, directly stemming from the daily work routines of a university's deanery (see section 5.3). In the considered processes, there are four different roles or groups of persons who are in charge of the particular activities, with professors again being associated with one department each (business administration, economics, information systems, real estate management). For determining the average costs per activity, the monthly salary of the performer is taken as a basis. Three BPI-Patterns (see section 5.2 for details), which are applicable to the processes at hand and suitable for simulation, are analyzed in separate simulation runs. Further simulation parameters include the timeframe of 100 or 150 days, with 10 to 30 instances passing the processes each day. The inter-arrival time of single instances is t-distributed whereas the processing time of activities is normally distributed. In accordance with the actual facts, entry conditions at activities are determined as FIFO (first in, first out), meaning that instances with the oldest timestamps are processed first. All simulation runs were conducted using the tool Bonapart (Version 6.1).

As illustrated in Table 3, the simulation scenarios differ regarding the ratio of instances, which are either simple or complex cases, handled by a process. This is expressed by the probability values allocated to exclusive OR-decisions (XOR-Rule) that determine the frequency by which alternative outgoing process paths are passed through. In scenario 1, the ratio is balanced (e.g. 50/50 for decisions with 2 outgoing paths) whereas in scenario 2, the time-consuming activities are performed in 90% of

Attribute		Values (Input Parameters)			
Process	Name	Email Support for Applicants	Application for Degree Courses	Qualification Assessment	Objection
	Roles	Study Coordinator	Mailman	Clerk	Professor (BA, Econ., IS, REM)
	Cost Rate	Low	Medium	High	
BPI-Pattern		Assign Activities to external Parties	Automate Activities based on predefined Rules	Parallelize Activities in sequential Process Flow	
Simulation Parameter	Timeframe	100 days		150 days	
	Instances / Day	10	15	20	30
	Inter-Arrival Time	t-Distribution			
	Processing Time	Normal Distribution			
	Entry Condition	First in, First out (FiFo)			
	Simulation Tool	Bonapart (Version 6.1)			

Table 2. Simulation Overview and Input Parameter

all process runs, the less time-consuming ones only in 10%. For example, considering an application process, in scenario 1 there are 50% international (more time-consuming) and 50% domestic (less time-consuming) applicants, while in scenario 2 the ratio is 90% to 10%. Scenario 3 is the exact opposite of scenario 2: 10 % for the time-consuming activities as opposed to 90 % for the less time consuming-ones. Scenario 4 is based on empirical data for each process as observed in reality. Similarly, probabilities are determined for XOR-decisions with three alternative process paths.

Attribute	Values			Scenario							
	Probability in case of…	2 outgoing paths	3 outgoing paths	1	2	3	4	5	6	7	8
Ratio of different Instances	balanced	50/50	33/33/33	X				X			
	emphasis on complex cases	90/10	90/5/5		X				X		
	emphasis on simple cases	10/90	5/5/90			X				X	
XOR-Rule	based on historical data	(individual)	(individual)				X				X
Personnel Resources	1 Person per Role			X	X	X	X				
	2 Persons per Role							X	X	X	X

Table 3. Characteristics of the eight simulated Scenarios

Another distinguishing characteristic are the personnel resources assigned to a role that leads to different options e.g. concerning the scheduling of work. Scenarios 5 to 8 correspond to the first four scenarios, with the one exception that the number of staff in charge for performing process activities is twice as high. In scenarios 1 to 4, there is only one employee performing a specific activity, whereas in scenarios 5 to 8 there are two employees who can share the workload. In total, 112 different simulation runs (combination of process, BPI-Pattern, and scenario) are carried out, with every simulation run containing up to 3,000 process instances.

5.2 Overview of BPI-Patterns

Basically, in conducting this simulation experiment, activities or control flows of the business processes (see section 5.3) are modified. In compliance with the above-mentioned procedure, we selected the three BPI-Patterns “Assign Activities to external Parties”, “Automate Activities based on predefined Rules” and “Parallelize Activities in sequential Process Flow”. In so doing, we expected these three BPI-Patterns to result in positive effects on one or both of the relevant effect dimensions cost and time, whose evaluation is the main focus of this study. Potential effects on the dimensions quality and flexibility, which are generally also addressed by BPI-Patterns, are not subject of this simulation experiment. Nevertheless, one prerequisite for applying BPI-Patterns was that the two latter dimensions are not affected negatively. The central ideas of the selected BPI-Patterns and the way they affect the structure of business processes, as measured by the simulation, are discussed in the following.

Pattern 1: "Assign Activities to external Parties" suggests relocating activities that depend on input data by external sources and hence reducing the workload in a business process (e.g. entering of form data by an external person in a web interface). The quality of the output supplied by the external party has to be at least an equivalent of the former internally produced output of this activity. This process of outsourcing is expected to result in positive effects on processing costs and time.

The basic principle of **BPI-Pattern 2: "Automate Activities based on predefined Rules"** is that existing manually performed activities are replaced by an automation/IT-system-based component, which makes human input dispensable. The automation of activities is expected to lead to less processing time compared to manual performances of these activities. This especially makes sense if an activity is a frequently recurring standard task and can easily be automated providing constant output.

As the name of **BPI-Pattern 3: "Parallelize Activities in sequential Process Flow"** suggests, its purpose is to restructure the control flow within a business process so that previously sequentially performed activities are performed simultaneously. To enable this, the affected activities have to be independent from each other and corresponding personal resources have to be available. The prevalent effect from this parallelization is a reduction of the overall process cycle time, as former sequentially performed activities are performed simultaneously.

5.3 Overview of the Business Processes

In this section, the four business processes that were investigated in the simulation experiment are presented. All of them take place at a deanery of a German university and are part of the application procedure for specific degree courses. To show their structural characteristics, such as activities, associated roles, decision points, and process flow, detailed process models are provided in the appendix.

The process **"Email Support for Applicants"** is an important part of the application procedure. It contains the three most common types of email inquiries and is exclusively performed by the study coordinators. In detail, inquiries e.g. refer to the assessment of an applicant, contain questions regarding the organization of the application procedure, or refer to the modification of a previously transacted application. While the first two types of inquiries can be answered with a normal email-response, the last type of inquiry requires additional activities in the application tool. For example, a study coordinator may need to upload additional documents to include them in the application file.

The process **"Application for Degree Courses"** covers the handling of incoming application documents (e.g. CV, degree certificates, etc.) and is also exclusively performed by study coordinators. Depending on where an applicant is from, different formal requirements have to be fulfilled. In the case of a foreign applicant, additional documents (e.g. language certificates, etc.) need to be submitted and checked for completeness. If the documents are not complete, the applicant is contacted, if necessary, several times, until his/her documents are complete, in which case the application is marked valid in the online application tool and the documents are placed into an inactive file.

The **"Qualification Assessment"** of an applicant is performed on the basis of the documents handed in during the application and involves study coordinators, clerks, mailmen and a selection committee consisting of professors from different departments at the university. First, the eligibility of an applicant is examined by a member of the selection committee. If the expertise of an applicant is sufficient, his/her country of origin is checked. Domestic applicants receive a note of authorization right away, which is created and posted by the study coordinators. International applicants need to pass an additional formal check, which is carried out by clerks of the registrar's office (e.g. verification of certain language skills). If that formal check is not passed, international applicants are rejected and the process ends with sending a letter of rejection. If the formal check results in the certificates submitted being incomplete, the applicant is accepted on condition that s/he produces the missing certificates until a set deadline. After sending the particular notification the process is completed.

The fourth process handles an eventual **"Objection"** by an applicant whose initial application has been rejected. This is performed by the study coordinators and the professors of the selection committee. A valid objection must meet certain legal requirements (e.g. the objection must have been filed in written). If it is not legally valid in all aspects, a study coordinator contacts the applicant to demand an additional filing. In case of a valid objection, it is scanned and uploaded to make the document available for the committee member in charge. S/he rechecks the initial rejection letter, checks whether the objection is conclusively justified and makes a decision. Afterwards, it is communicated to the applicant in a respective notification created by the study coordinator.

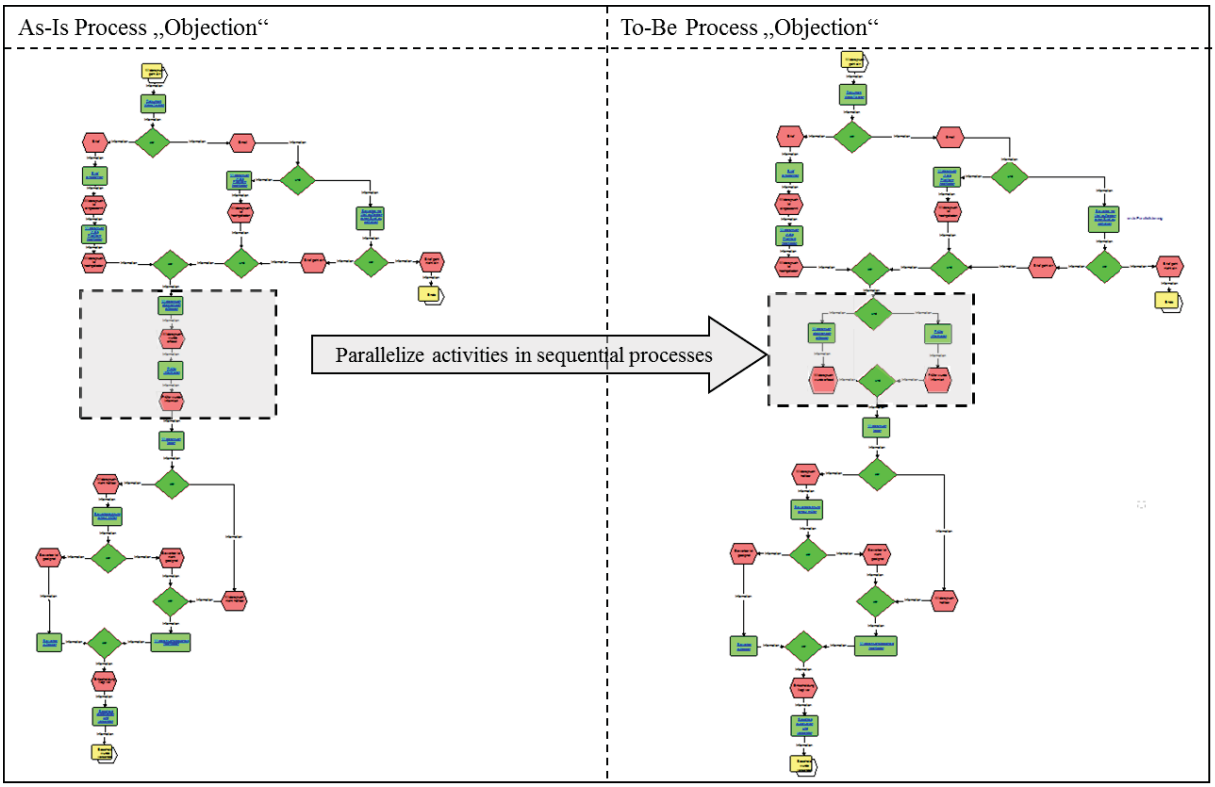

Figure 3. Application of BPI-Pattern "Parallelize Activities in sequential Process Flow"

Figure 3 exemplifies the change that is caused by applying the BPI-Pattern "Parallelize Activities in sequential Process Flow" on the process "Objection", as highlighted in the two versions of the process ("as-is" and "to-be"). The two activities that formerly were performed consecutively are afterwards performed in parallel. In section 6, we present and discuss further findings resulting from carrying out the simulation experiment including all of the four business processes with the selected BPI-Patterns.

6 Results of the Simulation

Table 4 shows the results before and after applying each of the selected BPI-Patterns (columns) on the different processes (rows). For each process, eight different scenarios are simulated. The focus of the investigation is on cycle times, processing times, waiting times, and costs. For these performance indicators, the mean values are calculated and included in the cells of the table. For example, considering the process "E-Mail Support", after applying BPI-Pattern "Assign Activities to external Parties" in scenario 1, the cycle time is 12:18 minutes (min.). As described in section 5.1, the scenarios mainly differ regarding the allocation of personal resources for activities. The reason for the blank cells in the column "Parallelize Activities in sequential Process Flow" is that parallelizing activities is only applicable in scenarios where at least two persons are available for executing parallelized activities.

Process		sc \ ind	Standard				Pattern											
							Assign Activities to external Parties				Automate Activities based on predefined Rules				Parallelize Activities in sequential Process Flow			
			Cycle Time	Processing Time	Waiting Time	Costs	Cycle Time	Processing Time	Waiting Time	Costs	Cycle Time	Processing Time	Waiting Time	Costs	Cycle Time	Processing Time	Waiting Time	Costs
	E-Mail Support for Applicants	1	12:42	04:54	07:32	1.91	**12:18**	04:39	07:21	1.81	06:14	02:55	03:14	0.82				
		2	**19:45**	**07:52**	**11:26**	**3.06**	19:15	07:48	10:59	3.04	**07:22**	**02:02**	**05:15**	**0.39**				
		3	09:32	03:23	05:59	1.32	09:33	03:20	06:02	1.30	10:09	04:02	05:58	1.17				
		4	15:10	05:57	08:57	2.32	14:12	05:32	08:24	2.15	07:56	02:31	05:21	0.58				
		5	10:51	04:54	05:40	3.81	10:05	04:29	05:23	3.49	07:31	02:54	04:26	1.46	10:48	04:57	06:47	3.85
		6	14:15	07:52	05:54	6.13	14:01	07:48	05:48	6.07	07:19	02:01	05:13	0.77	14:11	07:55	08:09	6.16
		7	08:51	03:23	**05:19**	2.64	08:58	03:21	**05:28**	2.61	09:31	04:02	05:20	2.34	08:51	03:23	**06:02**	2.64
		8	11:44	05:43	05:41	4.48	11:14	05:27	05:30	4.24	07:47	02:31	05:14	1.16	11:45	05:49	07:14	4.53
	Application for Degree Courses	1	08:07	03:15	04:37	1.27	08:14	03:19	04:38	1.29	07:44	03:02	04:27	1.18				
		2	25:01	08:45	15:31	3.41	26:22	08:54	16:34	3.47	15:50	06:15	09:04	2.44				
		3	07:56	03:25	04:16	1.33	07:58	03:27	04:15	1.33	07:56	03:25	04:16	1.33				
		4	06:45	02:31	04:00	0.98	07:49	03:28	04:09	0.99	06:48	02:32	04:06	0.98				
		5	06:55	03:11	03:28	2.48	06:49	03:13	03:26	2.51	05:42	02:59	02:34	2.33	06:54	03:11	03:43	2.48
		6	13:51	08:36	04:35	6.70	14:06	08:55	04:30	6.94	10:30	06:13	03:47	4.84	13:56	08:35	06:13	6.68
		7	07:09	03:26	03:29	2.67	07:20	03:32	03:28	2.72	07:11	03:25	03:32	2.67	07:09	03:26	03:42	2.67
		8	**06:09**	02:31	03:26	1.99	**07:10**	03:25	03:28	1.97	06:10	02:33	03:27	1.98	06:08	02:31	03:33	1.96
	Qualification Assessment	1	14:38	07:10	06:55	14.48	14:59	07:51	06:04	10.71	13:48	05:05	07:45	13.84				
		2	**42:56**	20:47	19:08	18.73	**14:35**	08:05	15:05	9.62	15:21	06:18	16:03	14.33				
		3	07:25	04:07	03:02	13.56	12:41	08:24	03:13	16.12	08:50	04:05	04:24	13.51				
		4	08:47	05:16	02:35	13.98	11:33	06:23	04:40	7.10	09:40	04:48	04:27	13.77				
		5	**13:00**	07:18	**04:24**	29.19	13:34	07:52	04:29	23.10	11:57	05:01	06:02	27.68	**09:58**	07:06	**02:40**	28.96
		6	32:37	**21:10**	06:50	**37.74**	16:06	**08:02**	04:20	**15.88**	11:32	06:22	03:55	28.81	29:12	20:40	07:44	37.49
		7	**07:27**	04:07	03:02	27.14	11:58	08:21	02:34	32.55	**09:33**	04:08	05:15	27.10	07:48	04:05	03:34	26.90
		8	**08:04**	05:13	02:31	27.85	11:40	06:25	04:56	14.72	08:11	04:46	03:23	27.56	**11:40**	05:21	05:49	27.82
	Objection	1	**48:51**	18:18	40:49	9.06	**27:07**	12:18	18:29	6.32	30:47	12:40	24:03	6.82				
		2	54:41	17:46	37:17	9.16	34:54	14:33	19:34	7.60	40:04	14:21	26:29	7.85				
		3	36:17	13:24	**29:53**	6.47	17:14	08:25	**08:01**	4.37	27:15	09:45	16:15	5.03				
		4	**48:14**	15:26	36:33	7.51	**43:40**	14:17	28:18	6.99	29:30	13:16	27:49	7.24				
		5	49:57	16:49	41:39	16.96	26:11	12:04	17:06	12.45	30:11	12:28	22:00	13.48	46:19	16:34	45:57	16.05
		6	49:35	17:42	31:07	18.26	34:53	14:33	19:34	15.19	40:04	14:21	26:30	15.70	51:37	17:41	44:52	18.23
		7	**36:52**	13:14	29:42	12.80	16:31	08:24	08:01	8.72	**21:30**	09:49	16:05	10.10	**33:59**	13:17	37:45	12.85
		8	47:07	15:29	35:45	15.02	44:25	14:16	25:43	13.94	31:57	13:31	29:15	14.69	46:46	15:22	44:01	14.96

Key: sc = Scenario, ind = performance indicator; Times in mm:ss; Costs in €

Table 4. Results of the Simulation (highlighted values discussed in the text)

6.1 Pattern 1: Assign Activities to external Parties

The idea of this pattern is to assign a former internal activity to external parties. Thus, positive effects on time and cost dimensions are expected. When, for example, applied to the process "Objection", the activity of scanning the objection, originally performed by the study coordinator, was assigned to the sender. Hence, rejected applicants are asked to file their objection by letter and email simultaneously. As the scanning activity takes about 3 min., average time savings of about 3 min. were expected as a result of the performed simulation runs. Contrary to this expectation, the simulation results show both positive and negative effects on the dimension time. The differences between the "as-is" and the "to-be" processes either are manifested in large or hardly any savings. In scenario 1, for example, an average cycle time of 48:51 min. was measured for the "as-is" process, compared to an average cycle time of 27:07 min. for the "to-be" process option, thus a time saving of 21:44 min. could be achieved. Similar savings could be noticed for the scenarios 2, 3, 5, 6 and 7. Within these scenarios, most of the instances traverse the improved part of the process, where the pattern has been applied. Scenarios 4 and 8 show fewer time savings. So the "to-be" cycle time of scenario 4 of 43:40 min. is only 4:34 min. shorter than the "as-is" cycle time of 48:14 min. Here, as the rejected applicants still send their written objections, the study coordinators again need to scan in these letters.

The application of this BPI-Pattern reveals the biggest savings, considering cycle times, for the process "Qualification Assessment" of about 66%, down from 42:56 min. to 14:35 min. in scenario 2. Further, a great reduction of processing time is possible down from 21:10 min. to 08:02 min. (62%) in scenario 6, which also holds for the costs (from 37.74 € down to 15.88 € per process run). In all scenarios of the process "Objection", the highest possible reduction of the waiting time is 73% (from 29:53 min. down to 08:01 min.).In contrast, other applications of the pattern show negative effects for all performance indicators as well, e.g. an increase of the cycle times in the process "Application for degree courses" from 06:09 min. to 07:10 min. or an increase of waiting times in the process "E-Mail Support for Applicants" from 05:19 min. to 05:28 min.

All results regarding the BPI-Pattern "Assign Activities to external Parties" show divergences between the scenarios where the use of the pattern caused additional work to (re-)integrate the output of outsourced activities. Further analysis revealed that cycle times, processing times and costs are affected in a negative way. Besides, the additional processing times increase the danger of queues building up. The expected savings can only be achieved, if the scope of the rework is less than the savings.

6.2 Pattern 2: Automate Activities based on predefined Rules

The goal of this pattern is to replace manually performed activities by automated ones. As for the previous pattern, positive effects on times and costs are expected as well, especially due to a reduction of processing times of activities being affected by the pattern.

In the process "Objection", the study coordinator has to inform the professors in charge that s/he must review the available documents again. After applying the pattern "Automate Activities based on predefined Rules", the change results in the responsible professor being informed automatically right after the objection document is online. In detail, the activities of selecting the professor in charge and creating an e-mail about the objection are carried out simultaneously. Additional work is not necessary to perform the to-be process. Thus, a reduced cycle time of about 2 min. is expected. A decrease in cycle, processing and waiting times is noticeable in all scenarios in the process "Objection". At its best, a cycle time saving of 15:22 min. (42%) in average is achievable in scenario 7 (from 36:52 min. down to 21:30 min.). This positive effect originates from a reduction of waiting times. Cost savings are equivalent to processing times with a maximum decrease of 25% in scenario 1.

For pattern "Automate Activities based on predefined Rules", greater savings in cycle times are also achievable in the process "E-Mail Support for Applicants" with a decrease from 19:45 min. down to 07:22 min. (62%) in scenario 2. Under these circumstances, also the processing time drops significantly by about 74% (from 07:52 min. down to 02:02 min.) together with the waiting time (54%, from 11:26 min. down to 05:15 min.) and costs (87%, from 3.06 € down to 0.39 €). In contrast to the processes "Objection", "E-Mail Support for Applicants" and "Application for Degree Courses", negative effects appear in the process "Qualification Assessment". In scenario 7, an increase of cycle time from 07:27 min. up to 09:33 min. (28%) is measured. The reason for this is a bottleneck emerging in a subsequent sector of the process because of the automated activity.

Summarizing, the BPI-Pattern "Automate Activities based on predefined Rules" predominantly shows positive effects. The success of applying this BPI-Pattern is tied to similar conditions as in the case of the BPI-Pattern "Assign Activities to external Parties". Thus, if the automation accounts for additional activities (e.g. preparation tasks to transform input in machine-readable format) savings can be mitigated. In all simulation runs, cost savings correspond to the processing time savings.

6.3 Pattern 3: Parallelize Activities in sequential Process Flow

This pattern aims at restructuring process parts consisting of sequential activities that are independent of each other. Thus, the activities can be performed simultaneously (see Figure 3). After applying this pattern, only the more time-intensive path is critical for the cycle time. Since the duration of the short-

er path can be saved, a reduction of the cycle time is expected. As the processing time for the parallelized activities does not change, costs are not expected to change either.

In the as-is process "Objection", the activities of uploading the objection letter and informing the professor in charge is performed sequentially. After applying the BPI-Pattern "Parallelize activities in sequential process flow", these two process steps are performed in parallel. Further changes to the process, e.g. additional coordination work, are not necessary. In scenario 7, a decrease of cycle time from 36:52 min. down to 33:59 min. (8%) occurs. In the worst case (scenario 6), an average process run takes about 4% longer than in the as-is process.

Considering all processes, the best and worst effects can be seen in the process "Qualification Assessment". In scenario 5, the cycle time is reduced by about 23% (from 13:00 min. down to 09:58 min.) and the waiting time decreased by about 39% (from 04:24 min. down to 02:40 min.). In contrary, the cycle time increased by about 45% (from 08:04 min. up to 11:40 min.) in scenario 8. The processes "Application for Degree Courses" and "E-Mail Support for Applicants" show hardly any changes concerning cycle time while the waiting time increased by up to 40% (from 05:19 min. up to 06:02 min.).

In summary, the BPI-Pattern "Parallelize Activities in sequential Process Flow" only marginally affects both processing time and costs. The cycle time is mainly positively affected, whereas the waiting time is often negatively affected as personal resources may not be available at the same time.

7 Implications for BPI-Patterns

This section outlines the insights regarding the factors we gained by executing the simulation, which either concern all patterns or relate to specific patterns. Moreover, it highlights implications for extensions of the pattern descriptions. Table 5 gives an overview of the enabling and hindering factors which were identified for the considered BPI-Patterns in the simulation experiment. Such factors were found both for the process context as well as for the structural characteristics of the process itself. In general, for every process containing alternative process paths (XOR), the effectiveness of each BPI-Pattern depends on the frequency of the instances passing through the particular process path that is affected by the BPI-Pattern. In case this portion is rather low, the positive effect of a pattern is diminished. Moreover, the application of a BPI-Pattern that optimizes solely one specific process path may even lead to negative results regarding the whole process. Therefore, when selecting BPI-Patterns, the user has to carefully take into consideration if the application of a pattern impacts the whole process. As a rule, one should prefer deploying BPI-Patterns at such points within the process where the majority of the process instances are affected.

7.1 Pattern 1: Assign Activities to external Parties

This pattern suggests changing the process in such a way that external parties are in charge of performing several activities. One hindering factor is that in some cases additional coordination work (e.g. quality assurance of external input) is necessary if the pattern is utilized.

Regarding these insights, heuristics can be provided which help to decide under which conditions a pattern is likely to be useful. First, the tradeoff between cost/time savings and additional coordination work caused by the outsourcing has to be considered. Second, it is observed that the best results are achieved when the outsourced activities are either at the beginning or at the end of a particular business process: e.g. data entry carried out by the customer before the start of the actual process. In contrast, the outsourcing of activities in the middle of a process leads to increased waiting times since, in this case, additional interfaces are created, which is a hindering factor. Third, it is noticed that the bigger the process part being outsourced the better the cost-benefit ratio. Fourth, activities that are candidates for outsourcing should be standardized or easily explainable to the external party. Also, they should be the same for all process instances, showing no variants.

	Factor	Enabling	Hindering
Pattern 1: Assign Activities to external Parties (see section 5.2)	Tradeoff: cost/time savings vs. coordination		Additional coordination work (e.g. quality assurance of external input)
	Process structure	Applying the pattern at the beginning or end of the process (less integration effort)	Applying the pattern in the middle of the process (more integration effort)
		Assigning coherent larger process parts to external parties	
	Complexity of reassigned activities	Standardized/easy explainable activities without variants	Complex activities
Pattern 2: Automate Activities based on predefined Rules (see section 5.2)	Machine readable data	Availability of machine readable input	
	Process structure	Applying the pattern at the beginning or end of the process	Applying the pattern in the middle of the process
		Automation of coherent larger process parts	
		Automation of activities which are part of the critical path in the process	
	Resources	Allocation of sufficient resources to the process part following the automated section	No reallocation of resources leads to increasing waiting times overcompensating the savings in processing times
Pattern 3: Parallelize Activities in sequential Process Flow (see section 5.2)	Process structure	Parallelizing activities which have similar processing times	
		Parallelizing activities which are part of the critical path in the process	
	Resources	Availability of autonomous resources, able to work on the same process instance at the very same time (synchronization) in the parallelized process part	Allocation of resources in charge of further activities beyond the parallelized process part, so that the parallelized activities are not performed at the same time

Table 5. Overview of enabling and hindering factors for the applied BPI-Pattern

7.2 Pattern 2: Automate Activities based on predefined Rules

By using this pattern, several activities are automated; hence the savings in regard of processing times and costs are to be expected. The pattern usually accelerates a certain part of the business process because the processing time of automated activities is much shorter compared to the former manual execution. An important factor that enables automation is the availability of machine-readable input. Nevertheless, the automation of only a part of the process may lead to the creation of new bottlenecks subsequent to the automated activities. Since the incoming rate of successive activities increases, sufficient resources have to be provided. Otherwise, waiting queues will occur and, in consequence, waiting times increase. This effect may lead to negative results, e.g. that the emerging waiting times will overcompensate the reduction in processing time and therefore lead to longer cycle times.

As a consequence, the requirements, as described in the element "context" of the BPI-Pattern (see data model in Figure 1), should be extended. An additional requirement for the successful application of the pattern is that the part of the process that follows the automated section has to be capable of keeping pace with the increased throughput. In concrete terms, the subsequent activities need to have sufficient resources (enabling factor) allocated to them. Only that way will the enhancements, being achieved by automating activities, lead to a reduction of overall cycle times.

7.3 Pattern 3: Parallelize Activities in sequential Process Flow

The application of this pattern resolves sequences of independent activities and allows for their parallel execution. However, the simulation shows ambiguous results especially in respect to cycle time and waiting time. These inconclusive findings might be explained by the fact that in the processes at hand the exact routing of the single cases is not determined, i.e. it cannot be guaranteed that the activities

that are supposed to be executed in parallel are indeed performed at the very same time because the staff resources are in charge of more than one activity and thus may possibly not be available at a specific point of time (hindering factor). This problem is related to the fact that people in back office processes are usually free to organize their work. For a successful application of the pattern in terms of reducing cycle time, it is crucial that all parallelized activities related to one instance (e.g. a specific application) are executed simultaneously allowing subsequent activities to start without additional waiting time. Thus, it is necessary that employees are available at the same time and the new process design ensures the synchronization of the parallelized activities by providing explicit routing strategies (e.g. workflow management, just in time system, etc.).

When parallelizing activities, the cycle time of the process always depends on the length of the critical path, i.e. the process path with the longest processing time. For that reason, putting those activities in parallel that have similar processing times is an important enabling factor when aiming for shortening overall cycle times. Otherwise, having a rather short activity in parallel with a much longer activity will in fact lead to buffer time - while one process path is waiting for the completion of the other process path - and the effect on total cycle time will even be only marginal.

8 Conclusion

The purpose of the simulation experiment is to evaluate whether the BPI-Patterns show their anticipated effects when being applied to different business processes and scenarios. In this particular case, we investigated a series of connected business processes covering the application procedure for specific degree courses processed by a university's deanery. The underlying aim was to analyze changes in the manageable effect dimensions "cost" and "time", also providing the basis for selecting applicable BPI-Patterns from a repository. In so doing, three BPI-Patterns complying with these requirements were selected. In addition, a simulation procedure was derived from literature that meets the requirements for being used to simulate business processes. The simulation setup included different parameters (e.g. instances/day, timeframe, etc.) as well as scenarios that determine the control flow of business processes (e.g. conditions for outgoing paths).

After carrying out the simulation, the analysis of the results concentrated on the changes of cost and times of the processes before and after the application of the BPI-Patterns. Our results show that the examined patterns do bring about the intended positive effects in most cases (see Table 4). They also confirm that the underlying assumptions about the patterns' functioning are valid. However, it did also become apparent that the extent to which the effects occur widely varies across different processes and scenarios. We found cases in which particular BPI-Patterns even lead to negative results. These observations are contrary to the effects predicted by the BPI-Pattern. Thus, it is crucial to be aware of both enabling and hindering factors of successful applications (e.g. parallelizing activities with nearly equal processing time). We derived suggestions to specify existing pattern descriptions by adding the identified factors, serving as heuristics for the selection of suitable BPI-Patterns in a given case.

This research is not without limitations. In evaluating the validity of the anticipated effects of a BPI-Pattern, we only focused on cost and time, as these two dimensions are the most suitable ones for our simulation experiment. The two remaining dimensions, quality and flexibility, were not subject of this study. Furthermore, all of the processes lie within one specific sector (university administration), which restricts the generalizability of the simulation results.

In future research, the findings from this paper will be used for a refinement of BPI-Pattern instances, i.e. for the revision of the contents of BPI-Patterns. Along with carrying out further simulation experiments in other contexts, we intend to focus on a potential modification or supplementation of the underlying data model of BPI-Patterns, which, in turn, would affect all of the BPI-Pattern instances. Applying BPI-Patterns in other scenarios will be part of our effort to provide further evidence of the significance und usefulness of BPI-Patterns to be used within a BPI initiative.

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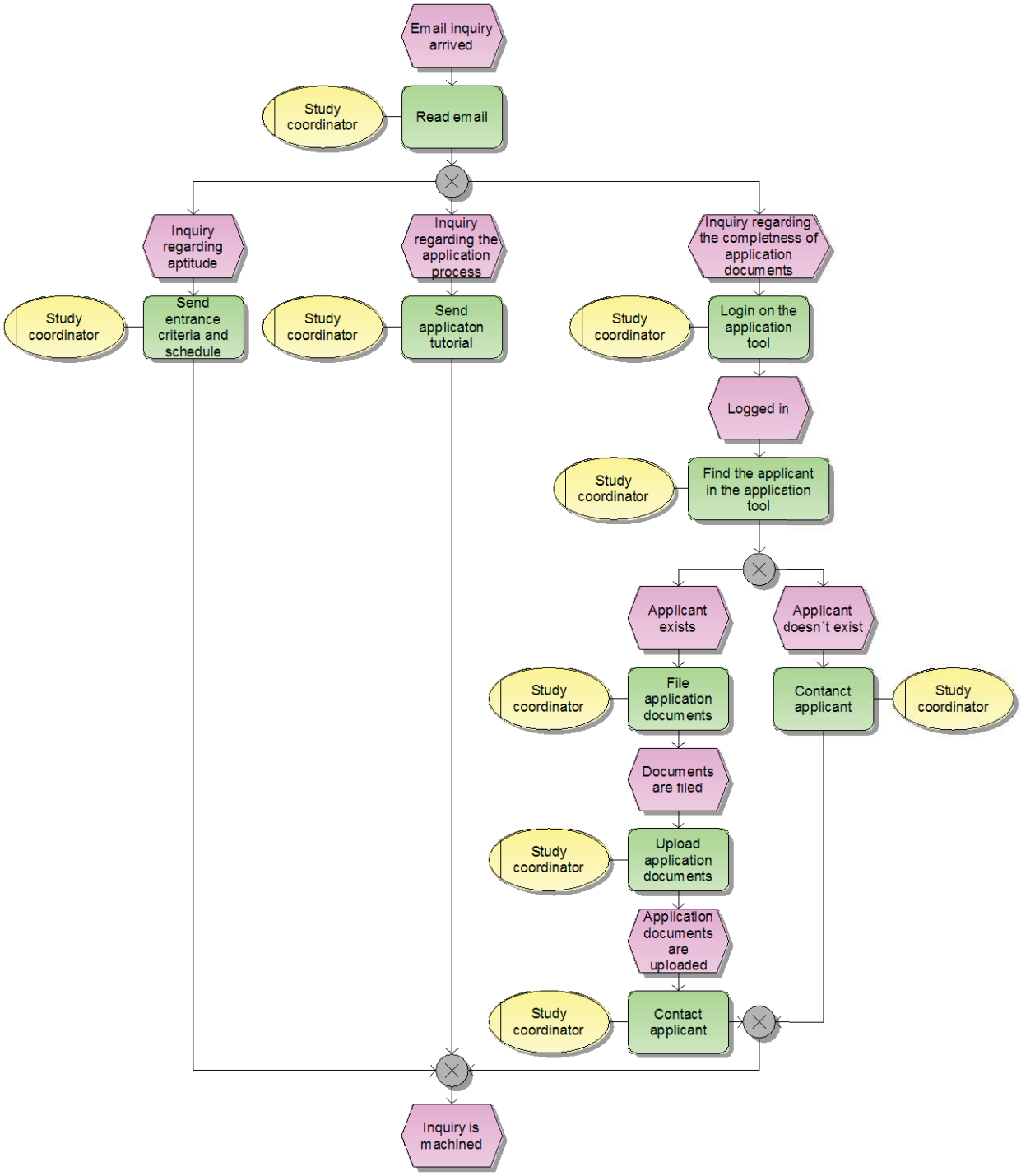
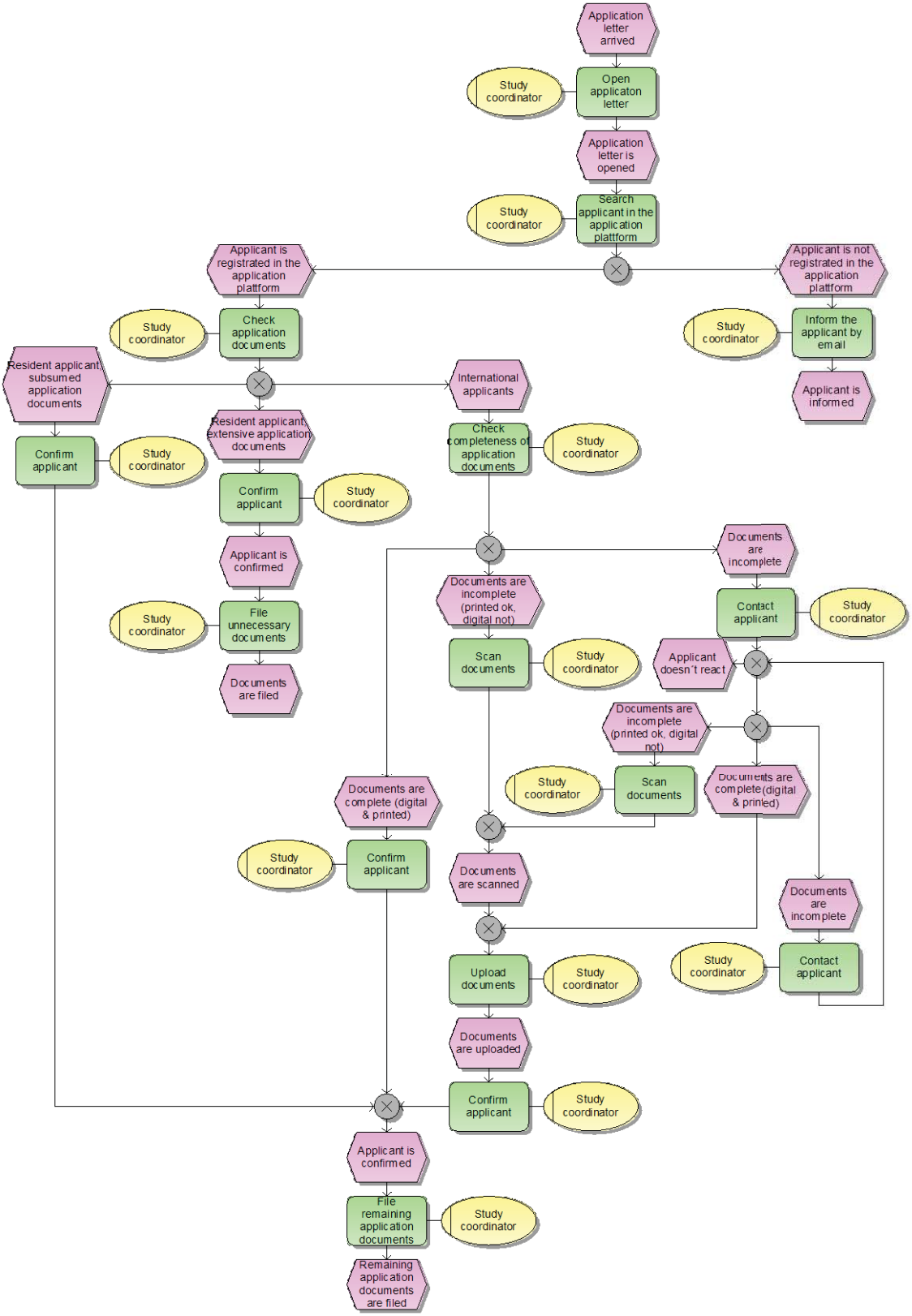
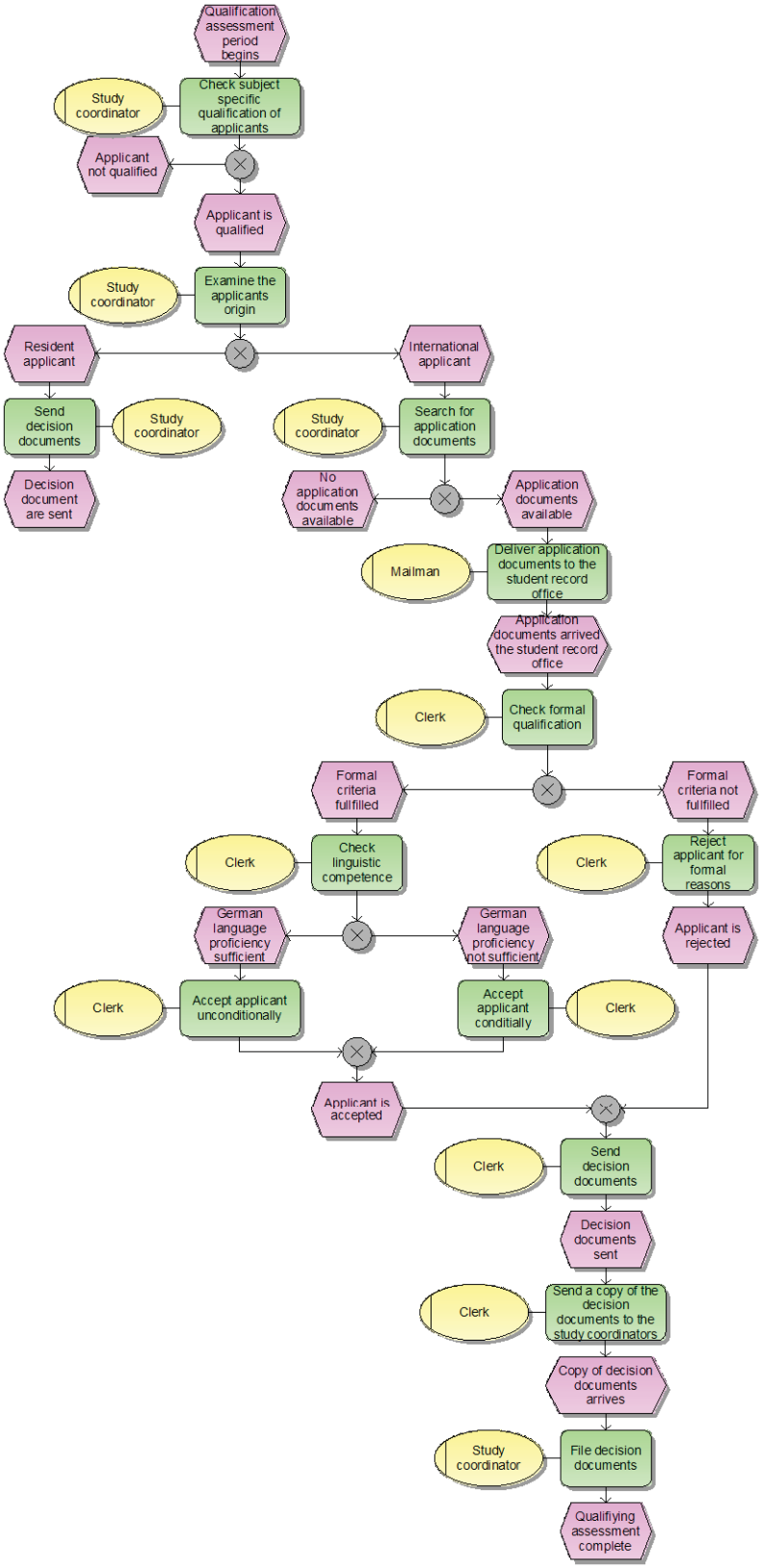
Appendix A: Process Model “Email Support for Applicants”



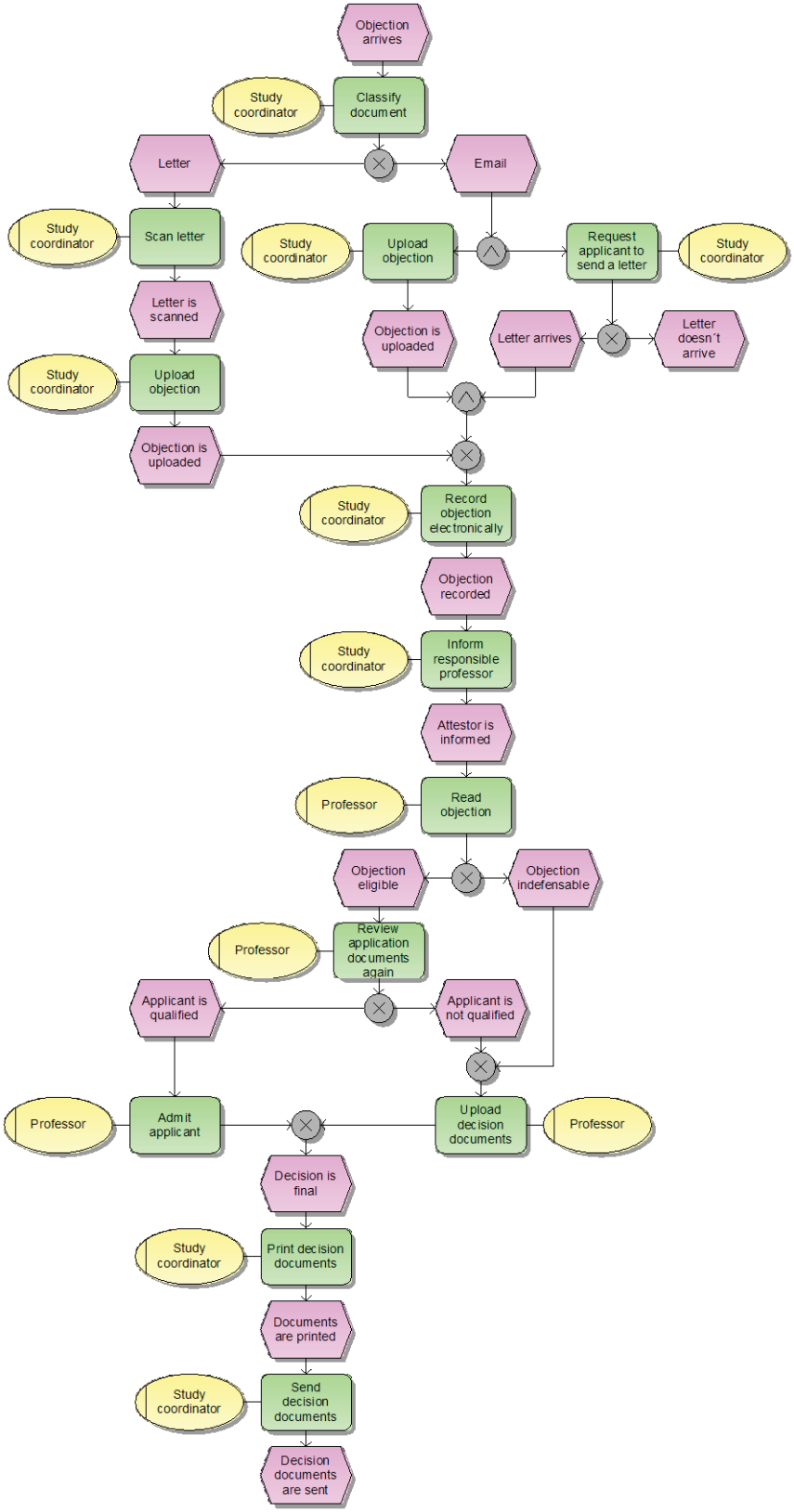
Appendix B: Process Model “Application for Degree Courses”



Appendix C: Process Model “Qualification Assessment”



Appendix D: Process Model “Objection”



2.5 Beitrag 5: Measuring National Culture by Analyzing Business Processes: A Case Study in Germany and India

Adressierte Forschungsfrage	**Forschungsfrage 5:** Wie können kulturelle Eigenschaften anhand von Geschäftsprozessen gemessen werden und wie lassen sich die gewonnenen Erkenntnisse in Prozessverbesserungsinitiativen nutzen?
Zielsetzungen	(1) Entwicklung eines Messansatzes zur Identifikation von kulturellen Eigenschaften in Prozessmodellen (2) Demonstration des Messansatzes
Forschungsmethode	Entwicklung des Messansatzes: Definition von sechs Metriken für die kulturellen Dimensionen *uncertanty avoidance, individualism/collectivism* und *power distance* Demonstration des Ansatzes anhand einer Fallstudie (in Deutschland und Indien)
Kernergebnisse (Überblick)	(1) Berechnung der sechs Metriken für einen beispielhaften Prozess in einer deutschen und einer indischen Firma (2) Deutlich unterschiedliche Werte je Metrik und Dimension erkennbar (3) Evaluation anhand der Studie nach Hofstede (1983), welche identische Tendenzen für die drei Dimensionen zeigt
Publikationsort	13th International Conference on Wirtschaftsinformatik (WI), St. Gallen, Switzerland, 2017
Ranking VHB JQ 3	C
Autor(en) und Anteile	**Benjamin Wehner** **50%** Thomas Falk 20% Susanne Leist 20% Christian Ritter 10%

Tabelle 8: Fact Sheet „Measuring National Culture by Analyzing Business Processes: A Case Study in Germany and India“

Measuring National Culture by Analyzing Business Processes: A Case Study in Germany and India

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Abstract. Nowadays, many companies face problems because of cultural differences, especially in multinational settings. Traditionally, national cultures have so far been identified by questionnaires asking participants about e.g., their values. These invisible elements of culture become manifest in tangible artifacts such as concrete actions or structures, e.g., rituals and organizational charts. Process models serve as a graphical representation of processes precisely describing activities, responsibilities and process flows. Thus, we anticipate that the behavior becoming apparent in process models provides insights into national characteristics. Consequently, the goal of this paper is to develop an approach to measure national culture in process models. Based on Hofstede's (2010) cultural dimensions, we define metrics that can be applied to process models. We demonstrate the use of these metrics by applying them to a process executed both in a German and an Indian company. Our analysis confirms a correspondence of the metrics' results with Hofstede's findings.

Keywords: National Culture, Business Process, Measurement Approach, Case Study

1 Introduction

National cultural characteristics and their influence on collaboration, both within and among companies, is an important research area in times of globalization [1,2]. Neglecting cultural peculiarities may lead to disastrous consequences. A plane crash involving Avianca Airlines in the 1990's, which was, ultimately, caused by a specific cultural behavior of the crew members may serve as a warning example. In this crash, the co-pilot did not challenge a wrong interpretation of the instruments by the flight captain because he came from a country where subordinates are generally afraid of expressing disagreement with superiors [3]. In IS research, problems caused by cultural differences have been addressed, too. For example caused by different communication styles (in Japan and the US) leading to poor information sharing or caused by different norms for decision-making (Mexico and South Korea) [4].

To make a global collaboration setting more beneficial for all parties, it is essential to be aware of all cultural peculiarities and differences of the individual stakeholders, e.g., customers and suppliers in foreign countries [2]. As all of these stakeholders are

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connected by business processes, the analysis of cultural peculiarities in relation to business processes is a promising research area. Schein [5] highlights that "*for purposes of cultural analysis, the organizational processes by which such behavior is made routine"* (p. 26) can be used. Business processes are generally captured by process models in various process modeling notations, all of them aiming at graphically representing the actual process as closely as possible. Thus, we anticipate that different cultural aspects can be identified in these process models, as they reveal the behavior, responsibilities, and the sequence flow of tasks.

To date, research has assessed national culture by the use of questionnaires (e.g., [6,7]), asking respondents about their beliefs and assumptions. As questionnaires are very time-intensive, expensive and the intended behavior is only analyzed, a measurement approach that reflects observable behavior on the basis of the employees' daily routines complements questionnaires with new aspects. For example, details on the hierarchy in a company can be inferred [8] when analyzing who makes decisions in a process model. In this paper, we analyze process models by means of metrics, as metrics are a well-known means to identify influencing factors on processes [9]. We anticipate that an analysis of business processes in terms of culture will provide a company with valuable insights into the cultural attitude of the process participants, e.g., if employees culturally fit to the tasks they perform. This knowledge can then contribute to various phases of the BPM lifecycle: To design a process that is perfectly aligned to the cultural attitude of the process participants, to determine a cultural fit of two companies' processes during mergers and acquisitions [10] or to analyze if culture is the origin of process performance problems, a correlation that has recently been identified [11]. Altogether, the goal of this paper is to develop a measurement approach applied to business process models, which in a first step measures selected national characteristics. The resulting metrics form the basis for discussions about discrepancies between national culture and its manifestation in companies.

The remainder of this paper is organized as follows: in section 2, we provide an overview of culture, business process management and measurement of national culture. Section 3 presents the operationalization of the cultural dimensions, the deduction of metrics, and the process of data collection. In section 4, we apply these metrics to process models of two companies, one from Germany and one from India, and present the results. The insights gained from the application of the metrics are discussed by comparing them to the comprehensive study by Hofstede [6] in section 5. The last section gives a summary of our research, names limitations and proposes options for further research.

2 Conceptional Background

2.1 Culture

Culture is a rather diffuse concept with different meanings depending on the context [12]. A definition often used, as it comprises the general aspects of culture, was evolved

by Schein [5] with culture being referred to as shared values of a group, which can be recognized in actions and structures.

Culture can generally be presented as an iceberg model [13], with both visible and invisible elements. Invisible elements are *Underlying Assumptions* (e.g., ideology, feelings, taken-for-granted beliefs [13,14]) as well as *Espoused Beliefs and Values* (e.g., morale, ethical norms) [1,5], often subsumed by researchers under the term values [14,8]. Invisible elements of culture manifest themselves in tangible *Artifacts* [5], which represent the visible elements such as concrete actions or structures (e.g., behavior, organizational charts) [13]. According to the range of influence, different levels of culture can be defined, e.g., national, organizational, and subgroup culture [1,14]. Each cultural group shares characteristics distinguishing one from another [6].

Basically, the culture in a company is influenced by the deeply embedded national culture as well as the particular organizational culture [10]. However, the organizational culture is always subject to the basic assumptions of the national culture. This has been demonstrated in various cases by Schneider [15], who analyzed human resource practices in multinational companies. In these cases, national characteristics had a stronger influence on work practices than corporate identity. This fact was also confirmed by other surveys (e.g., [16]). Even though there will always be a coherence between organizational and national culture, Hofstede et al. [17] point out that they are also distinctive due to different cultural dimensions (a list of dimensions is presented in [14]).

In this paper, we focus on national culture that is stable over time [2] and difficult to influence as it represents the basic behavior and values of a particular society [1] and has a predominant effect on people as compared to the organizational culture [10,15]. Even though the concrete personal behavior of individuals belonging to a national group may differ, generally valid tendencies can be observed for certain cultural dimensions [6,8].

2.2 Culture and Business Process Management

Culture has been identified as an important aspect of BPM [18,19], too, and the number of publications linking the two topics has indeed increased in recent years. Research in this area can be classified on the basis of two dimensions: the interrelation between culture and BPM and the referenced cultural group. In this respect, the main emphasis lies on organizational culture and its impact on BPM activities or business process performance (cf. [20,21]). Besides, the concept of a distinct *BPM culture* was identified and its values operationalized [22].

The role of national culture in BPM has been much less highlighted in existing research. Authors dealing with this topic analyze the national influence on BPM [23] and the application of BPM concepts in different national contexts [19,24]. Central to BPM is the notion of a business process consisting of a cohesive sequence of functions that create an output by adding value to the input and thus fulfil an organizational task [25]. Business processes represent a socio-technical system in which humans collaborate and carry out the single tasks to achieve the process output [26].

2.3 Measurement of National Culture

So far, national culture in a broader sense has been assessed by means of surveys, asking respondents questions about their feelings, beliefs, morale, or how they would behave in certain situations [6,7]. Well-known examples are a survey by Hofstede [6] with approx. 116,000 respondents in 76 countries and the GLOBE study with 17,300 interviewees in 63 countries [7]. Questions in cultural surveys generally target the two layers of *Underlying Assumptions* and *Espoused Beliefs and Values*. As a result, visible *Artifacts* are not dealt with. An important category of visible *Artifacts* are process models graphically representing business processes using semi-formal modeling techniques. In a process model, the process is decomposed into a set of interrelated activities that are logically and temporally connected. Using semi-formal modeling techniques helps to increase the specificity of the description and to avoid the ambiguity, which, for instance, natural or narrative texts often imply [27]. Therefore, process models precisely describe the interaction among people, technology and organizations with the aim of improving the effectiveness and efficiency of organizations. Whereas to-be process models represent how people should interact from a management or process owner view, our analysis focuses on as-is process models. As we want to capture the real behavior of people and how they execute their tasks and activities, we analyze the process in its current form. Since as-is models describe this behavior, they reflect the culture of individuals in a country, thus being different from models of other nations. This difference is expected to be detectable and can be measured for each national dimension.

3 Measurement Approach

Our approach is based on predefined metrics that are applied on to business process models. The definition of the required metrics comprises three steps: first, we analyze the operationalization of cultural dimensions in general. Second, three national dimensions by Hofstede et al. [8] are presented and then used to deduct metrics to measure them. Finally, we describe the process of data collection, which is the basis for the calculation of the metrics.

3.1 Operationalization of Cultural Dimensions

The best-known classification in national cultural research are the dimensions by Hofstede et al. [8] (cf. [2,14]), which represent the basic behavior and nature of national cultures: Power Distance, Uncertainty Avoidance, Individualism, Masculinity/Femininity, Indulgence, and Long-Term Orientation [8]. Further studies expand these basic dimensions by detailing or extending them, by e.g., assertiveness, performance, and humane orientation [7], time orientation, and locus of control [14]. As Hofstede describes the most popular conceptualization of national culture [28,29], we take his taxonomy as a basis. In this first step, we develop metrics for the dimensions *Power Distance*, *Uncertainty Avoidance* and *Individualism*, as these were identified as fundamentally distinguishable between nations [6] and are very well defined so that it is possible to derive metrics. In the next section, these dimensions are explained in detail.

We follow the approach by Harvey [30] who operationalized the dimension *Uncertainty Avoidance* to assess differences between design documents and actual design practice. He defined particular characteristics of the dimension *Uncertainty Avoidance* and discussed the differences in each characteristic. We transfer and formalize this approach as follows: Generally, each cultural dimension (CD) comprises several characteristics (C) that can be measured. Metrics (M) are defined to measure the extent of each characteristic. Afterwards, the metrics are aggregated (Agg) for each cultural dimension to obtain a tangible value that can further be interpreted and compared. Figure 1 provides an overview of all components of our measurement system (cf. [30]).

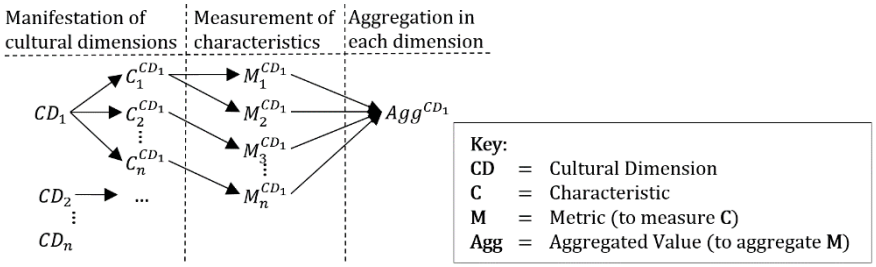

Figure 1. Measurement Approach

To obtain the values for the metrics, the business process models are analyzed. There is a great variety of process modeling notations, the most popular ones being BPMN, EPC and the UML Activity Diagram. Even though different notations exist, most of them offer similar key elements: functions, organizational units, application systems, information objects and connectors [25]. These elements are used to calculate the metrics by analyzing the semantics and the syntax of a process. Elements can be classified with regard to semantics by their element type and by interpreting their labels. Syntax is analyzed to identify sequential, parallel, or alternative process paths (see section 3.3).

3.2 Deduction of Metrics from National Dimensions

The three aforementioned cultural dimensions (CD) by Hofstede et al. [8] are manifested in well-defined characteristics (C). In each dimension, we derived the characteristics analyzing the definitions and descriptions [30]. Furthermore, we analyzed the single items of the questionnaire by Hofstede et al. [8] to stay as close as possible to the original intention of each dimension. As there is also a manual available on how to calculate each dimension on the basis of the questionnaire items, the relevant items in each dimension were selected[1]. Both the definitions and the items in the questionnaire were finally used to derive characteristics that can be developed to metrics, which, in turn, can then be applied to process models. In the following, the deduction of the dimension *Power Distance* is presented in detail and the deduction of the metrics from the other two dimensions is summarized.

[1] The questionnaire and the manual how to use it are available at: http://geerthofstede.com/research-and-vsm/vsm-2013/ (last access: 24.10.2016)

In a cultural group, the power of individuals is not equally distributed. *Power Distance* is defined as the extent of this power and the degree as to which the less powerful accept the existing distribution [6]. In the questionnaire, four questions are asked (item numbers m02, m07, m23, and m26) to calculate the Power Distance Index (PDI) as it is originally named [8]. The questionnaire asks e.g., how important it is for employees to be consulted by their boss in decisions involving their work (m07) and how often subordinates are afraid to contradict their boss (m23). On the basis of the definition and the questionnaire items, two characteristics can be defined: acceptance of unequal distribution of power and unequal distribution of power. With regard to process models, they do not 'betray' any personal feelings, and it is not possible to identify the degree of acceptance of inequality by the less powerful ones in them. Thus, we focus on the extent of unequal distribution of power. The original intention to measure the extent of unequal distribution of power can be identified by looking at single functions, which can be performed by an organizational unit either on a lower or on a higher level. These tasks are checks of results, which is a source of contradiction (m23) and making decisions (m07). If a check is performed by a superior and not by a regular employee, the power is focused on a higher level in that particular case. Thus, the derived metric for a whole process indicates the share of check functions performed by organizational units on a higher level in relation to all check functions performed within the process ($PD_1 = \frac{|CF_{HL}|}{|CF|}$). The assignment of the right to make decisions is the second area for which to show the distribution of power depending on the hierarchy level of organizational units. The metric indicates the share of decision functions that are performed by organizational units on a higher level in relation to all decision functions in the process ($PD_2 = \frac{|DF_{HL}|}{|DF|}$). For both metrics, a high value indicates high *Power Distance*.

Uncertainty Avoidance deals with the unpredictability of situations. It is defined as the extent to which individuals try to avoid uncertain situations by relying on common norms, rituals and practices, e.g., by using standardized documents [6,30]. Additionally, the items m16, m20, m24, and m27 in the questionnaire to calculate the "Uncertainty Avoidance Index" (UAI) are in focus, e.g., the question as to which extent an employee agrees with the statement if one can be a good manager without having precise answers to a question a subordinate may raise (m24). To measure the first characteristic (avoidance of uncertain situations), we explicitly search for functions dealing with quality issues, e.g., the use of a checklist or the four-eyes principle. Quality functions are usually meant to document a current state or to check for a deviation from the outcome, which indeed reduces uncertainty in the specified topic. Thus, if the share of quality functions in relation to all functions is high, a high degree of uncertainty avoidance is measured. In addition, information objects in process models, e.g., checklists, indicate a reduction of uncertainty. The second metric for this characteristic shows the share of quality documents in relation to all documents in a process.

Individualism refers to the intensity of the interdependence of the members of a cultural group and to the extent of people taking care of each other. In individualistic societies, members look after themselves and their direct environment only, while people in collectivistic societies belong to groups. For example, people working in project teams with a high degree of interdependence and a lot of meetings form a collectivistic

group [6]. With regard to the questionnaire, e.g., the item was chosen which asks how important it is for an employee to be surrounded by likeable people in a pleasant working atmosphere (m05). The intensity of interdependence can be identified in a process model by looking at the organizational units of each function. Functions with more than one organizational unit show the interaction among them, e.g., the participants of a meeting. A small share of those functions in relation to all functions indicates a small degree of interdependence and an individualistic attitude. While databases are often used to share information, they also represent a form of individualism if they are not shared among employees. Employees create their own data storage, e.g., a sales person who stores product data on his own device when traveling. The metric measures the share of isolated databases in relation to all databases. A high value indicates that the data is not available to other employees. The degree as to which people take care of each other is not directly measurable, as process models do not show in what way people interact. In each dimension, two metrics were derived on the basis of the definitions and questionnaire items. Thus, our metrics follow the same intention that Hofstede [6] measured with his questionnaire.

3.3 Process of Data Collection

To apply these metrics on process models, their elements have to be analyzed (section 3.1). Figure 2 illustrates an exemplary analysis of a business process model with the cultural values extracted from it. In general, all objects of a process model have to be analyzed either individually or in combination with connected objects. An example is a decision function that can be identified by a subsequent XOR-connector (syntax). Still, the semantics of the function needs to be assessed for final classification to a variable, as also a check function is usually followed by an XOR-connector (see Figure 2). Thus, for each metric, we present a detailed procedure of how to gather the values.

Check functions (CF) are identified by a semantic analysis of two consecutive functions, with the first one producing a result that is checked in the second one. For example, in Figure 2, the quantities and times in the product development list are checked. If this check is performed by an organizational unit of a higher hierarchical level, there will be a value for variable CF_{HL}. Continuing the example, the check of quantities and times is performed by the technical managing director, while, prior to that, the quantities and times were determined by a technician. As a technician is a subordinate of the technical managing director, there is a difference in hierarchy.

Decision functions (DF) are identified by analyzing the syntax and the semantics of the functions and the process flow. Decision functions are followed by alternative process paths indicated by “XOR” or “OR” connectors, e.g., the decision whether a product will be developed or not. Depending on the organizational unit that performs the function, different decision functions can be identified: DF_{HL} indicates a decision made by an organizational unit of a higher hierarchy level than the other organizational units in the process, e.g., a managing director. Quality functions (QF), e.g., the creation of a product specification, can be identified by a semantic analysis of functions. Functions that are performed by only one organizational unit ($F_{OU=1}$) can be identified by a syntactical analysis of the related organizational units that perform a function individually.

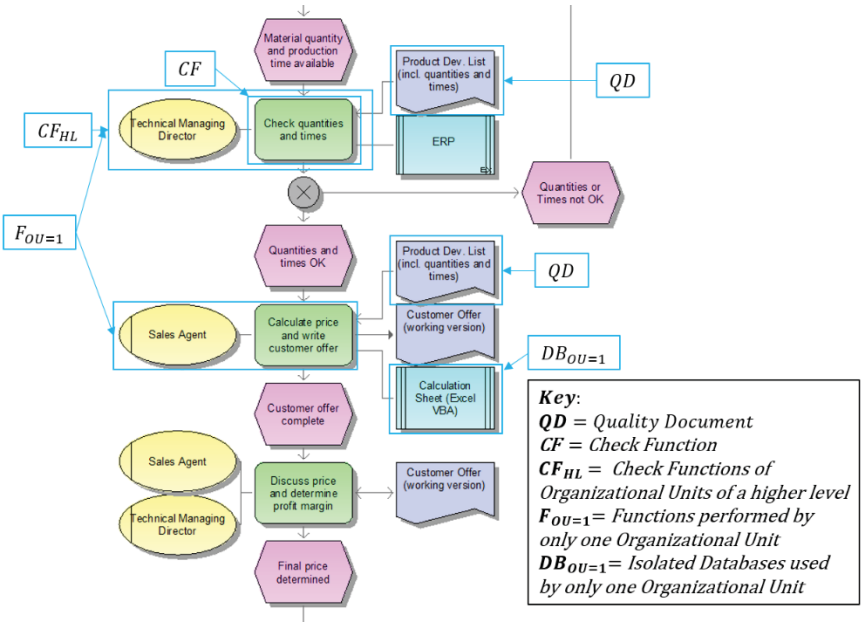

Figure 2. Example of the Data Collection

In addition to functions, information objects are used to measure cultural characteristics. Quality documents (QD) are a subset of all documents (D). They can be identified by selecting those documents that deal with quality issues, e.g., checklists or test reports. Furthermore, isolated databases ($DB_{OU=1}$) can be identified by determining the connection between databases and organizational units. If a database is used by only one organizational unit, it is referred to as an isolated database.

4 Application of Metrics

4.1 Business Processes from Germany and India used for the Application

As cultural values are only meaningful by comparison [8], the metrics derived were applied on business processes of two small and medium-sized enterprises (SMEs) in Germany and India. Both act as suppliers developing and manufacturing similar small electronic components, e.g., transformers, coils, converters.

Out of all business processes, the customer-specific product development process was chosen for the cultural analysis, as both companies develop similar products, which have an analogous complexity and a similar quality required of the output. Due to the high number of products (approx. 350 in each company) that have been developed so far, a high degree of process standardization is available, too, and a similar number of employees performs this process, 11 in the German and 12 in the Indian company. Finally, this process was chosen because it is completely non-automated. Thus, all these

similarities ensure the comparability of the German and Indian process so that the cultural characteristics based on human behavior may be fully concentrated on.

The process models we used for our cultural analysis were created in a prior project using the EPC. Even though they were modeled by one and the same modeler, in accordance with identical modeling guidelines and at a comparable level of detail, it was necessary to understand all the details of the processes and check if they were up-to-date. For this purpose, we conducted personal interviews with both the German and the Indian employees involved in the processes. In addition, we were informed about all documents and information systems during on-site visits. On this basis, we slightly revised the models and assured that our analysis was based on the "as-is" models.

The customer-specific product development process starts with a customer asking for a custom-tailored product in the form of a request or tender sent to the SME. This step is followed by an initial design and a subsequent quotation submitted to the customer. In case the customer places an order, the SME designs the product and builds a prototype, which is sent to the customer. After the approval of the prototype, production is planned and initiated. The final steps comprise invoicing and handling of payments. This process is executed in both companies, with some differences regarding the actual process flows and responsibilities. The individual processes are comprised of 60 functions in the German and 71 in the Indian company. Against this background, the values of the variables were independently assessed by two researchers and their results compared afterwards, being identical in almost all cases, showing only slight differences for the rest. The differences were discussed with a third researcher. If no final decision could be made, the differences were discussed with the two companies until a consensus was found to ensure a maximum degree of objectivity when applying the metrics.

4.2 Results of the Application

The values of the variables to calculate the metrics were collected by way of a semantic and syntactical analysis of the processes for both the SMEs as described in section 3.3. We analyzed all objects of both business processes and classified them to the variables that are needed to calculate the metrics. For example, as shown in Figure 2, the Technical Managing Director performs the function *check quantities and times*, which was classified to CF_{HL}. Table 1 shows the defined metrics including a short description, the absolute numbers gained from the process analysis, and the calculated metrics for the German and the Indian company for each cultural dimension. According to our measurement approach, the values of the individual metrics are aggregated for each cultural dimension as well.

Regarding the cultural dimension *Power Distance*, the aggregated value Agg^{PD} is determined by calculating the average of PD_1 and PD_2. Possible and expected values range from 0 (low) to 1 (high Power Distance) for each metric and thus for the aggregated value, too. In the Indian company, 50% of the check functions and even 72% of the decision functions are performed by higher level organizational units, while in the German company only 29% of the checks and 22% of the decisions are made by their

counterparts. The aggregated value is 0.61 for the Indian and 0.25 for the German company. Based on these values, we can state that the process reflects a higher Power Distance in the Indian than in the German company.

The aggregation for Uncertainty Avoidance is determined by calculating the average AggUA of the two metrics associated with this cultural dimension. For the two metrics, possible values range from 0 (low) to 1 (high Uncertainty Avoidance), which is also valid for the aggregated value. UA1 reveals that the German process has a share of 28% of quality functions, which means that almost one in three of all functions is quality-related. The Indian process shows a lower share of 17%, which equals less than every fifth function. This tendency is also reflected in the share of quality documents (UA2) with 50% in the German and 16% in the Indian company. In summary, the aggregated values of 0.39 in the German and 0.17 in the Indian company reflect a higher avoidance of uncertainty in the German company.

Table 1. Application of the Derived Metrics (*OU=Organizational Unit)

			Absolute Numbers		Calculated Metric	
	Metric	Description	Ger.	India	Germany	India
Power Distance	$PD_1 = \frac{\lvert CF_{HL}\rvert}{\lvert CF\rvert}$	$\frac{\text{Check Functions of OUs* of a higher level}}{\text{Check Functions}}$	$\frac{2}{7}$	$\frac{4}{8}$	0.29	0.50
	$PD_2 = \frac{\lvert DF_{HL}\rvert}{\lvert DF\rvert}$	$\frac{\text{Decision Functions of OUs* of a higher level}}{\text{Decision Functions}}$	$\frac{2}{9}$	$\frac{8}{11}$	0.22	0.72
				Agg^{PD}	0.25	0.61
Uncertainty Avoidance	$UA_1 = \frac{\lvert QF\rvert}{\lvert F\rvert}$	$\frac{\text{Quality Functions}}{\text{Functions}}$	$\frac{17}{60}$	$\frac{12}{71}$	0.28	0.17
	$UA_2 = \frac{\lvert QD\rvert}{\lvert D\rvert}$	$\frac{\text{Quality Documents}}{\text{Documents}}$	$\frac{8}{16}$	$\frac{4}{25}$	0.50	0.16
				Agg^{UA}	0.39	0.17
Individualism	$Ind_1 = \frac{\lvert F_{OU=1}\rvert}{\lvert F\rvert}$	$\frac{\text{Functions performed by only one OU*}}{\text{Functions}}$	$\frac{50}{60}$	$\frac{50}{71}$	0.83	0.70
	$Ind_2 = \frac{\lvert DB_{OU=1}\rvert}{\lvert DB\rvert}$	$\frac{\text{Isolated Databases used by only one OU*}}{\text{Databases}}$	$\frac{1}{2}$	$\frac{1}{3}$	0.50	0.33
				Agg^{Ind}	0.67	0.52

The aggregated value of the dimension *Individualism* is determined by building the average (Agg^{Ind}) of the metrics Ind_1 and Ind_2, with 1 indicating a high degree of Individualism and 0 indicating a high degree of Collectivism. The metric values show that in the German process 83% of all functions are performed individually, which indicates a higher degree of individualism than in the Indian process with value of 70% (Ind_1). In the German company, 50% of all databases and 33% in the Indian subsidiary are only used individually (Ind_2). The aggregation Agg^{Ind} results in a value of 0.67 in the German and 0.52 in the Indian company, indicating that the German company is more individualistic than the Indian company.

In summary, all of the derived metrics were applicable on the modeled processes in both the German and the Indian companies, and a clear tendency for each cultural dimensions was identified.

5 Discussion

As we have demonstrated in the previous section, it is possible to identify and measure cultural dimensions in business process models. We operationalized three of Hofstede et al. [8]'s cultural dimensions in process models by deriving metrics analyzing the use and structure of process model elements. Our analysis of the results (see section 4.2) revealed a clear diversity between the German and the Indian process models regarding our cultural metrics. Even though we cannot interpret the derived values as absolute numbers, a clear tendency of the three cultural dimensions for each of the two process models is obvious. For a better interpretation of our results, we opposed them to the findings of the comprehensive study by Hofstede et al. [8] regarding the three cultural dimensions in the two countries Germany and India (see Table 2). Hofstede et al. [8] use a scale from 0 (low) to 100 (high) to rate their cultural dimensions. In comparison, our metrics' values range from 0 (low) to 1 (high). While this means that we cannot directly compare the two scales, we can compare the values of the two countries against their respective scale to reveal a tendency in each cultural dimensions.

Looking at *Power Distance*, Hofstede states a value of 35 for Germany and 77 for India, indicating that Germany has a lower Power Distance than India [6]. Our analysis of the process models comes to a very similar result as our metrics classified the process models of the German company (0.25) showing a lower Power Distance than the ones of the Indian company (0.61). *Uncertainty Avoidance* has a value of 65 in Germany and 40 in India according to Hofstede, displaying a higher avoidance of uncertainty in Germany. These findings are congruent with our measures: The analyzed process models evidence that there is a higher avoidance of uncertainty in the German company (0.39) than the Indian one (0.17). Hofstede's third cultural dimension rates the degree of *Individualism* in a society. His survey states a value of 67 for Germany and 48 for India, reflecting a higher Individualism for Germany in comparison to India. Our results are in accordance with this tendency as we calculated 0.67 for Germany and 0.52 for India using our metrics.

Table 2. Comparison of Calculated Metrics and Survey Results by Hofstede et al. [8]

	Aggregated metrics			Survey by Hofstede et al. [12]		
	Germany		India	Germany		India
Power Distance	0.25	<	0.61	35	<	77
Uncertainty Avoidance	0.39	>	0.17	65	>	40
Individualism	0.67	>	0.52	67	>	48

We see a contribution of our research to both theory and practice. From a scientific point of view, cultural aspects in BPM have mostly been disregarded [18], even though culture has a direct influence on process performance [20]. Our metrics are a new instrument to measure national culture in process models and thus contribute to this research gap of BPM. Up to now, cultural research has largely relied on surveys, which primarily focus on the layers of *Underlying Assumptions* and *Espoused Beliefs and Values*. In contrast, our proposed metrics focus on the layer of *Artifacts*, thus allowing for

further aspects of cultural research to be investigated. In addition, due to the fact that our metrics are well-defined and the data collection instructions are quick and easy to apply in a real-life context, the extraction of the underlying process variables is very cost-effective as compared to e.g., questionnaires. Since the necessary information is inherent in BPM systems and data collection is in many cases automated, e.g., gathering the as-is process using process mining algorithms, we therefore expect a broad application basis. Our metrics contribute to practice in other areas, too. Looking at BPM in particular, the metrics can be applied to support the different phases of the BPM life cycle:

(1) In the design phase, the process modeler creates a process that has to be aligned to the national cultures of the users involved. For example, they can be applied in - especially international – mergers and acquisitions (M&As) that play a predominant role in times of globalization [31]. There, cultural "collisions" [10] are observed, which are seen as a possible reason why 50 to 60 percent of M&As fail eventually [31,32]. In this regard, our approach helps to assess the national differences in the companies involved by calculating and comparing the metrics of the processes to be merged. Thus, our metrics help to highlight the cultural compatibility and to detect cultural collisions before the actual process harmonization takes place. A high degree of cultural equality between the companies' processes will lower integration costs and help employees to easier adapt to the new, joint processes. Finally, the failure rate of M&As can possibly be reduced. The same reasoning is valid for outsourcing initiatives. A close cultural fit of the insourcer's processes with the ones of the outsourcing company may be seen as an indicator of a seamless integration. Besides the harmonization of two processes, the modelers of a process may calculate our metrics on its own processes and compare the values to benchmarks and reference values. A modeler can then check whether the process they design fits the cultural expectations in advance ensuring a high rate of adoption among the users. In addition, the importance of culturally aligning a business process that involves users from several different countries and cultures is obvious. For example, it is necessary to consider the national culture when designing offshoring processes [10], or when transferring an IT-system to a subsidiary in a foreign country [33].

(2) Our metrics also contribute to the analyze phase of BPM. When a company experiences problems with their process performance, e.g., right after implementing a new process, our metrics help to analyze whether cultural issues are the cause of these shortcomings. In fact, there is empirical evidence, that culture affects the process quality (survey, cf. [20]). Thus, our metrics support a company by indicating whether a business process fits the cultural needs and expectations of all parties involved. For example, when employees from different countries work together, problems due to their different cultural backgrounds may be expected, which affects multinational companies in particular [29]. By comparing the metrics to a benchmark or reference value, possible causes may be identified, which can be further evaluated in an upcoming BPI initiative.

(3) In the improvement phase, the culturally induced causes for a decreasing process performance can be eliminated. In this regard, the descriptions of the metrics help to identify improvement possibilities and, thus, to define measures to align the process to the employees' expectations. Further, the comparison with benchmarks or reference values give further hints in which cultural dimension the roots of the problems may

particularly be. In summary, as described above, we are convinced that our metrics are a new means to make culture a tangible construct from a BPM perspective.

6 Conclusion

In this paper, we present a measurement approach to identify national culture in business process models. We defined six metrics for the national dimensions *Power Distance*, *Uncertainty Avoidance* and *Individualism*. Further, these metrics were applied on to business process models of a German and an Indian company. We demonstrated that our metrics are applicable and that they provide further insights into the cultural characteristics of the two companies. We derived tendencies of the characteristics for the German and Indian companies and compared them to those of Hofstede et al. [8]. By applying our metrics in two companies in Germany and India, we can support the theory that it is possible to measure cultural characteristics in business processes.

The proposed approach for measuring national culture based on business process models contributes to both research and practice. So far, cultural research has mainly relied on surveys to measure underlying assumptions and espoused beliefs and values for identifying national culture. We contribute by presenting a measurement approach to measure culture based on documented actions and behavior, thus providing a transparent, independent and unbiased analysis of the underlying cultural dimensions. For practice, we see several areas of contribution. In the design phase of BPM, our metrics support the modelers e.g., by checking whether the process they design fits the cultural expectations of the involved parties. Our metrics can also support in the process analysis phase, e.g., by potentially identifying cultural problems causing performance issues. Furthermore, the analysis of the national culture in process models can be applied when measuring the cultural fit of two companies, e.g., at mergers and acquisitions.

However, our research is not without limitations. The processes in a company are not only subject to national culture, but also to other influencing factors that affect the process design. In each particular setting, these factors need to be analyzed in detail. Especially the interdependence of organizational culture and national culture – even though distinguishable due to different cultural dimensions [17] – needs to be analyzed. Further, as objects in a process model may be seen as boundary objects, literature from this adjacent field will be considered, too, in our upcoming research [34].

In terms of further research, our approach has to be expanded and evaluated: First, for a better interpretation and evaluation of the resulting values, further applications of the metrics in different companies, business processes, and countries are necessary. Second, we will investigate further characteristics which are capable to operationalize characteristics in the dimensions *Power Distance, Uncertainty Avoidance* and *Individualism*. Third, to expand our approach, we will define metrics for further cultural dimensions like e.g., *Masculinity, Indulgence* and *Long-Term Orientation* [8]. Fourth, it is necessary to apply the metrics to further settings to allow for a better evaluation and to establish a benchmark value for each individual country, process type, and industry. Last, even though process models are a means of quality documentation in companies, their quality and topicality cannot always be ensured. Thus, we will define requirements

to determine which processes our metrics suit best, e.g., to identify the influence of different modeling notations on our metrics.

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2.6 Beitrag 6: Success Measurement of Social Capital in Enterprise Social Networks

Adressierte Forschungsfrage	**Forschungsfrage 6:** Wie kann der Erfolg von Enterprise Social Networks im Kontext von „Social Capital“ gemessen werden und welchen Nutzen bringt ein entsprechender Messansatz?
Zielsetzungen	(1) Entwicklung eines Erfolgsmessansatzes für ESN mit Fokus auf Social Capital (2) Demonstration und Evaluation des Ansatzes
Forschungsmethode	Design Science Research Methodology nach Peffers et al. (2007) zur Entwicklung, Demonstration und Evaluation des Messansatzes
Kernergebnisse (Überblick)	(1) Identifikation von 32 Methoden und Metriken zur Messung der Benefits in der Capability Social Capital (2) Anwendung der Methoden und Metriken auf einen Datenextrakt einer Beratungsfirma (3) Evaluation der Werte anhand eines Interviews mit dem Chief Technology Officer der Firma und Aufzeigen des Nutzens
Publikationsort	26th European Conference on Information Systems (ECIS), Portsmouth, United Kingdom 2018
Ranking VHB JQ 3	B
Autor und Anteil	**Benjamin Wehner 100%**

Tabelle 9: Fact Sheet „Success Measurement of Social Capital in Enterprise Social Networks“

SUCCESS MEASUREMENT OF SOCIAL CAPITAL IN ENTERPRISE SOCIAL NETWORKS

Research paper

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Abstract

Enterprise Social Networks (ESN) are gaining increasing attention both in academia and practice. ESN enable various benefits in a company, which are assessed in success measurement models. A wide range of benefits focusing on social aspects has recently been identified clustered to an IT capability named Social Capital by Wehner et al. (2017a). For example, using the ESN enables employees to gain influence in the corporate community. Those benefits cannot be assessed using existing ESN success measurement models and can, thus, hardly be managed. Hence, the aim of this paper is to develop a measurement model focusing on the latter-named capability.

We instantiate the Design Science approach and develop a measurement model focusing on the capability Social Capital. As a result, we identify 32 methods and metrics. Their applicability is demonstrated on an ESN dataset provided by a company. As a last step, we evaluate the model in an interview with a board member of this company. Conducting this research, we show that our model analyzes ESN success from a different perspective complementing existing success measurement models. Further, our model discloses social aspects used to make decisions to better manage an ESN.

Keywords: Enterprise Social Network, Success Measurement, Social Capital

1 Introduction

A current survey by the McKinsey Global Institute states that, in the companies interviewed, social technologies "are more integrated into their organizations' work than ever before and that the most sophisticated of these tools, message-based platforms, are gaining traction" (Bughin et al., 2017). These platforms are often called Enterprise Social Networks (ESN) and besides instant messaging, typical functionalities are micro-blogging, activity streams, building groups and communities, and managing content (e.g. Wikis) (Chin et al., 2015b). Using ESN provides employees with a more efficient and direct way to access expertise (Han et al., 2015, Liu et al., 2013), facilitates the generation of new ideas (Ding et al., 2015, Mäntymäki and Riemer, 2016), reduces geographical boundaries (Silic et al., 2015, Suh and Bock, 2015, Wiesneth, 2016) and helps to solve problems, for example (Richter and Riemer, 2009, Riemer and Scifleet, 2012, Zhang et al., 2010). Thus, an increasing number of companies are adopting ESN (Bughin, 2015, Thompson, 2015) and researchers have started to investigate ESN from various perspectives in recent years (Viol and Hess, 2016, Wehner et al., 2017b).

However, in some cases, ESN do not fulfil the company's expectations making it question the investment (Li, 2015). Possible reasons are that a company introduces the ESN without any particular use case (Margolis, 2016) or that the so-called "critical mass" of users or content could not be reached, which is a necessary enabler for ESN acceptance in a company (Chin et al., 2015b). In this regard, the question arises which factors determine ESN success (and failure) and how this success can be measured. Traditional Information Systems (IS) measurement models (see e.g., (DeLone and McLean, 1992) and (Gable et al., 2008)) are only partly applicable on ESN, as social software is different from traditional information systems (IS) (Steinhueser et al., 2011). For example, users generate dynamic and rich content voluntarily in social software, while relatively static content is created mostly mandatorily by predefined roles in traditional IS (Steinhueser et al., 2011).

The success of ESN in particular is defined by individual benefits (see examples above), which are assessed using various methods and metrics (Behrendt et al., 2014, Herzog et al., 2013). A comprehensive list of ESN benefits was composed by Wehner et al. (2017a) analyzing 37 ESN case studies. The authors show that ESN enable benefits classified into various IT capabilities, e.g., Knowledge Management, Informational and Geographical. They also define a new IT capability named "Social Capital", which comprises ESN benefits such as "strengthens social connections". Social aspects are not included in current ESN success measurement models (e.g., (Richter et al., 2013)). To overcome this weakness, this paper provides a set of methods and metrics to operationalize the benefits in the IT capability Social Capital. The methods and metrics are used (1) to assess the impact of ESN on social aspects, (2) to better manage the ESN and (3) to make decisions on basis of the analysis, e.g., to form socially familiar project teams. To reach this aim, we apply the Design Science approach to develop the measurement model (Hevner et al., 2004, Peffers et al., 2007). The model is demonstrated analyzing log data provided by a company, which shows meaningful results as evaluated by a board member.

The remainder of this paper is organized as follows: in section two, we give a brief overview of related work in regard to ESN including ESN success and benefits. In section three, our research method is explained in detail. Section four presents the development of the measurement model resulting in a set of methods and metrics. In section five, the methods and metrics are applied to a dataset of a professional services company and the results are presented. In section six, we evaluate and discuss our findings. Finally, the paper is concluded with a short outlook in section seven.

2 Related Work

2.1 Enterprise Social Networks

ESN have been gaining increasing attention both in academia and practice in recent years (Stei et al., 2016, Viol and Hess, 2016, Wehner et al., 2017b). An established definition of ESN was published by Leonardi et al. (2013): ESN are *"web-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing" (p.2).*

As such, ESN combine various social technologies, e.g., microblogging, wikis, social networking and instant messaging. They aim to support employees in their everyday business (Wehner et al., 2017b), for example, to communicate, collaborate, innovate, disseminate and share information, and manage knowledge (Turban et al., 2011). Due to this multifacetedness, various researchers started to analyze ESN from different perspectives (Viol and Hess, 2016). Since 2006, more than 150 articles on ESN have been published (Wehner et al., 2017a). An overview of these articles can be found in three literature reviews that have recently been published (see Wehner et al. (2017b), Viol and Hess (2016) and Stei et al. (2016)), pointing out that there is a strong need for further research on the evaluation and success measurement of ESN on both an individual and an organizational level.

2.2 Success Measurement and Benefits of Enterprise Social Networks

In this section, we first provide an overview of IS success measurement in general to identify how social aspects are covered by them. After that, we elaborate on ESN success measurement and benefits, and, third, we present the necessity to measure the IT capability Social Capital in ESN.

(1) Success in the context of IS can generally be measured by established measurement approaches such as the IS success model by DeLone and McLean (1992) or the IS-Impact Measurement Model by Gable et al. (2008). However, those models are only partly applicable to social software as they strongly differ from traditional information systems, e.g., in traditional information systems, the content is created by predefined roles and data quality is assured by standardized procedures. In social

software, which ESN indeed are, users create all types of content and quality is rated via peer feedback in an unstructured way (Steinhueser et al., 2011). The focus of social software is on sociality and not on functionality (Bouman et al., 2007). Steinhueser et al. (2011) thus develop a measurement model for social software using the two success dimensions *quality* and *impact*. In addition, Herzog et al. (2015) provide a framework to evaluate social software in general, which consists of characteristics in several dimensions, e.g., time (ex ante, ongoing, ex post), perspective (user, platform owner, organization). However, this framework does not provide specific measures to assess the success of ESN. Further, social aspects are disregarded in all of these models.

(2) Success measurement models in the context of ESN are defined as well. Muller et al. (2009) define a metric named "return on contribution" to measure the impact of ESN on an employee's behavior. Lehner and Haas (2011) focus on organizational aspects in the "system of knowledge management". Richter et al. (2013) define an extensive approach comprising two dimensions: individual employees and organizational success. In addition, Herzog et al. (2013) provide a set of methods and metrics for success measurement of ESN. The latter two specify a set of success factors and metrics, which define success on the basis of individual benefits. Looking at ESN benefits in particular, there are four articles focusing on that topic. Kugler and Smolnik (2013) provide a conceptual model to measure the impact of ESN usage on innovative and employee performance and on decision-making, Majumdar et al. (2013) provide a list of 17 benefits gathered by interviews, and Holtzblatt et al. (2013) conduct interviews, analyze log data and perform a survey to assess the benefits within one enterprise. Wehner et al. (2017a) identify a wide range of different benefits spread across the various ESN case studies. The latter article performs a literature analysis of 37 case studies (including the previously mentioned articles) to gather a list of benefits achievable using ESN. As a result, 99 benefits are identified and similar benefits are grouped and assigned to 18 categories in an inductive categorization process. Five of these categories focus on benefits that are related to social aspects: personnel development, merging of business and private life, trust-based community, disclosure of hidden aspects and common identity.

(3) When matching the benefits with methods and metrics in the context of ESN success, three different areas can be identified. (i) Metrics are applied to measure user activity and satisfaction. When introducing an ESN (see e.g., (Riemer et al., 2012)), it is crucial to reach the critical mass of both users and content (Chin et al., 2015b). Thus, metrics in this area are for example "total number of users", "number of content created" (user activity) (Richter et al., 2013) and "user satisfaction with the platform" (user satisfaction) (Herzog et al., 2015). (ii) These benefits are the basis for further business-related effects enabling employees to perform their tasks more accurately, for example, employees helping each other to solve problems (Mäntymäki and Riemer, 2016), or the ESN is used as a platform where new ideas are generated (Ding et al., 2015). Exemplary metrics in this area are "number of useful or correct answers" (Richter et al., 2013) and "number of adjusted ideas" (Herzog et al., 2013), respectively. (iii) Finally, further benefits are identified that refer to the value of an individual member in the network (e.g., "empowering employees" (Silic et al., 2015)), the social relationships of individuals (e.g., "strengthens social connections" (Holtzblatt et al., 2013)) and the corporate network itself (e.g., "creates and sustains a user community" (Mäntymäki and Riemer, 2014)). These benefits are categorized to a newly defined IT capability named "Social Capital" (Wehner et al., 2017a). Social Capital is generally defined as the value of social relationships and networks to achieve the actor's goals (Portes, 2000). Riemer et al. (2015) show that, in an ESN, employees gain Social Capital especially from repeating interactions with other employees and participating in work groups (bridging social capital theory, see (Granovetter, 1978, Granovetter, 1973)).

However, while, in the first two areas of ESN success measurement (*user activity and satisfaction* and *business related effects*), benefits are adequately measured by methods and metrics (see examples above), in the capability Social Capital, benefits are only described (Wehner et al., 2017a). As a consequence, it is difficult to assess the explicit impact of ESN on Social Capital benefits from both an individual and organizational perspective. This makes it difficult to manage the ESN and derive actions for a more targeted ESN use. For example, a homogenous project team that consists of familiar team members can be formed on the basis of ESN data, which leads to better project results as social discrepancies are reduced, or experts for a specific topic can be identified due to their connectivity and

communication logs to colleagues. Therefore, we see a strong need to operationalize the benefits in the IT capability Social Capital by means of methods and metrics, providing, in particular, managers and decision makers with meaningful insights.

3 Research Method

To create a measurement model that operationalizes the benefits in the capability Social Capital, the Design Science approach (see Peffers et al. (2007)) is chosen as a research method. Design Science is a well-known research method used to develop artifacts that address organizational problems (Cleven et al., 2009, Hevner et al., 2004) such as constructs, models, methods and instantiations (Baskerville et al., 2015, March and Smith, 1995). Therefore, it is a suitable approach to structure our research. The Design Science methodology contains six steps (see Figure 1).

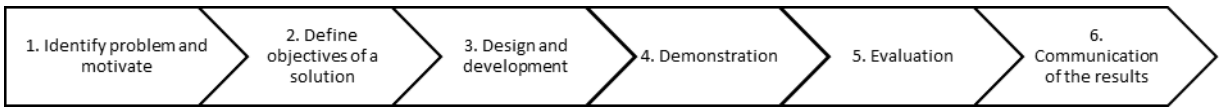


Figure 1. Design Science methodology Peffers et al. (2007)

As a first step, we identify the problem that the capability Social Capital of ESN success can not be assessed and managed, as it is not covered in existing ESN success measurement models (see section 2.2). Thus, the objective is to provide a set of measures to operationlize the benefits in this capability (step two, see section 1). In step three, a measurement model is developed. The benefits of the capability Social Capital are analyzed in detail, as presented in the literature review by Wehner et al. (2017a). Further, to identify the methods and metrics that adequately measure these benefits, we refer to several strands of literature that provide or refer to a range of possible methods and metrics:

(1) IS success measurement (e.g., (DeLone and McLean, 1992, Gable et al., 2008));
(2) social software success measurement (e.g., (Steinhueser et al., 2011));
(3) ESN success measurement (e.g., (Behrendt et al., 2014, Hacker et al., 2017, Herzog et al., 2013, Richter et al., 2013));
(4) the analysis of social networks (SNA) and online social networks (OSN) (e.g., (Berger et al., 2014a, Chelmis and Prasanna, 2011, Kane et al., 2014, Kurka et al., 2015, Luo et al., 2017, Moosavi et al., 2017, Smith et al., 2009)), and, finally,
(5) the analysis of social aspects (e.g., (Burns and Friedman, 2012, Durst et al., 2013, Riemer et al., 2015)).

As a result, a list containing 376 methods and metrics is compiled (e.g., centrality measures, the linear influencing model) including further descriptions and application procedures. Afterwards, the metrics are matched to the benefits using the goal-question-metric approach as described by Caldiera and Rombach (1994). To reduce subjectivity when mapping the methods and metrics to the benefits, we held three discussion panels with three experts in the fields of ESN, SNA and statistical analysis as a first evaluation as proposed by Sonnenberg and vom Brocke (2011). After each panel, the measurement model was adapted until a consensus was found. The results of the complete mapping process are explained in detail in section four. For example, the benefit and goal of ESN to *support employees gaining influence in the corporate community* (Wehner et al., 2017a) dwell on the question of how the influence can be measured for individual employees in regard to a global network perspective (community). Mapping this question to our list of methods and metrics, we choose the indegree centrality – an independent measure of the size of an individual's advice network (Brass and Burkhardt, 1993) – as actors with a high indegree value have greater access to and control over information and can, thus, be identified as influential users (Sasidharan et al., 2012). Further, there are two distinct ways of measuring these benefits: methods and metrics that can be applied to ESN log-data (direct metrics) and that are based on the perception of ESN users (indirect measures), e.g., questions asked in surveys or interviews (for the distinction between direct and indirect measures, see e.g., Coltman et al. (2015)).

In the upcoming demonstration of the measurement approach, the methods and metrics are applied on a data extract of the implemented ESN in a company (step 4, see section 5), before conducting an interview with a board member of the company to evaluate the results both from a theoretical and a practical perspective (step five, see section 5). The results are presented in this paper (step 6).

4 Design and development: Methods and Metrics to measure the IT capability Social Capital

To operationalize the benefits of the IT capability Social Capital, we refer to the categorization as presented by Wehner et al. (2017a): personnel development (PD), merging of business and private life (MBPL), trust-based community (TbC), disclosure of hidden aspects (DhA) and common identity (CI). For each of these categories, the benefits are presented and methods and metrics for their measurement are described. An overview of the measurement model is shown in Table 1.

4.1 Category: Personnel Development

The category personnel development (see **PD** in Table 1) contains benefits that focus on the development of individual employees: *(i) empowering employees, (ii) supports employees gaining influence in the corporate community, (iii) increases reputation, (iv)increases feeling of belonging, (v) helps gaining a level of confidence,* and *(vi) motivates employees*.

(i) ESN are platforms, where employees are able to perform several actions (Richter et al., 2013), e.g., post content and send messages (Chin et al., 2015b). Thus, all registered users obtain a voice in the corporate community, as their actions can be seen throughout the company (*empowering employees*) (Chin et al., 2015a, Silic et al., 2015). To measure this benefit, we identify those employees who actively and publicly interact on the platform. Those active users are often referred to as "posters" who have a high word-of-mouth capability (Wallace et al., 2014). Metrics describing this benefit represent the percentage of active users (Richter et al., 2013) as well as the share of employees who made at least one post in the ESN. *(ii)* Regarding the benefit s*upports employees gaining influence in the corporate community,* Yang and Leskovec (2010) state that the global influence of a node can be measured by the rate of information diffusion through the underlying social network. This influence can be measured based on the indegree centrality (Cha et al., 2010). In directed networks, the indegree centrality is a metric measuring the number of in-coming links of a node, which can be seen as an independent measure of the size of an individual's advice network (Brass and Burkhardt, 1993). Users with a high indegree value have greater access to and control over information and can be identified as influential users (Sasidharan et al., 2012). Further, the Linear Influence Model (LIM) is an indicator modeling the global influence of a node on the rate of information diffusion through the underlying network (Yang and Leskovec, 2010).

ESN affect the social behavior and the personal perception of the employees in four ways. *(iii)* First, in an ESN, the activities of employees are visible to others and employees are recognized by the community giving them the opportunity to earn reputation (*increases reputation)* (Chin et al., 2015b) (Silic et al., 2015). The construct of reputation is assessed by Kügler et al. (2015) by means of a questionnaire including statements such as "Using the system will improve my image within the organization". *(iv)* Second, the sense of being "in the same team" with colleagues, which can be described as an *increased feeling of "belonging"*, is identified as an effect of ESN (Han et al., 2015). Belongingness in general can be assessed by means of seven questions as presented by Gambone and Arbreton (1997). We transferred these questions onto an organizational context leading to seven statements, e.g., "I feel like I belong to my organization", "I feel like my ideas count". *(v)* Third, the ESN helps *gaining a level of confidence*. This benefit is strongly related to self-efficacy, which comprises learning the tasks of a new job and gaining confidence in a particular role (Gonzalez et al., 2015), which can be seen as the degree to which employees feel capable of completing their job tasks successfully. Ten statements are identified by Schwarzer and Jerusalem (2010) named the general self-efficacy scale (GSE). These statements can be used to assess whether the ESN enables a shift towards a more self-confident

	Benefit	Methods and Metrics (References)	*
PD	*Empowering employees*	- Share of active users - Share of users who made at least one post (Revelle et al., 2016, Richter et al., 2013, Wallace et al., 2014)	d
	Supports employees gaining influence in the corporate community	- Indegree centrality - Linear Influence Model (Cha et al., 2010, Sasidharan et al., 2012, Yang and Leskovec, 2010)	d
	Increases reputation	- Three statements as defined by Kügler et al. (2015)	i
	Increases feeling of "belonging"	- Seven statements as defined by Gambone and Arbreton (1997)	i
	Helps gaining a level of confidence	- Ten questions as defined by Schwarzer and Jerusalem (2010)	i
	Motivates employees	- 26 questions as defined by Mak and Sockel (2001)	i
MBPL	*Helps to develop interpersonal relationships in the workplace*	- Evolution of the friendship or interaction network using social network analysis (Kurka et al., 2015)	d
	Increases flexibility of working hours	- Temporal distribution of the employees' interactions - Share of interactions outside of regular working hours (Weiss et al., 2015)	d
	Helps to find employees with similar interests	- Visited profile pages per time period - Number of subscriptions of an employee to groups (Chin et al., 2015b, Zhang et al., 2010)	d
TbC	*Supports on-boarding newly hired employees*	- Number of interactions when on-boarding - Assignments to groups when on-boarding - Number of asked and answered questions when on-boarding (Brandall, 2016, Liu et al., 2013, Richter et al., 2013)	d
	Creates or strengthens trust among employees	- Trust value based on recommender system analysis (Kurka et al., 2015)	d
	Strengthens social connections	- Number of interaction between two neighbors - Average number of characters between two neighbors - Qualitative analysis of exchanged messages between two neighbors (Granovetter, 1978, Jansen, 2006)	d
	Creates and sustains a user community	- Communities based on groups including the number of members - Interest groups based on topic analysis including the number of members - Communities based on the number of mutual friends (Correa et al., 2012, Dey et al., 2017, Moosavi et al., 2017, Newman, 2006)	d
	Builds a networked organization	- Density - Diameter (Burns and Friedman, 2012, Yang and Leskovec, 2015)	d
DhA	*Identifies key contributors in the corporate network*	- (Weighted) Degree, betweenness, eigenvector centrality - Number of reactions held by a node (Berger et al., 2014b, Freeman, 1978, Kane et al., 2014)	d
	Higher recognition of high performing employees	- Number of likes and bookmarks held by a node (Leonardi, 2014)	d
	Improves meta-knowledge on "who-knows-whom"	- Specific questions as conducted by Leonardi (2014)	i
CI	*Creates greater overall business understanding*	- Explanatory information diffusion models on business relevant posts (e.g., status-updates) (Guille, 2013, Han et al., 2015, Newman, 2006)	d
	Creates better understanding of own employees	- Interest groups based on topic analysis including the number of members (Dey et al., 2017, O'Leary, 2016)	d
	Better understanding of the organizational culture	- 16 questions as defined by Grau and Moormann (2014)	i

Table 1. Overview of the measurement approach (d=direct measure, i=indirect measure)*

employee-base, e.g., "I can always manage to solve difficult problems, if I try hard enough". *(vi)* Finally, researchers identified employees to be more motivated in their everyday work (*motivates employees*), when they are informed about organizational aspects and have a chance to contribute to organizational success (Gibbs et al., 2014). Both aspects are well covered in ESN (e.g., being up-to-date due to status updates of colleagues or contributing to innovation threads (Chin et al., 2015b)). To assess employee motivation, various methods are provided in literature depending on the context, e.g., Mak and Sockel (2001) assess employee motivation by a set of 26 questions as for instance "All in all, I am satisfied with my job" or "I would encourage a friend to work for my company".

4.2 Category: Merging of Business and Private Life

The second category focuses on the interaction of employees with colleagues both privately and in a business context (**MBPL**). It contains the benefits *(i) helps to develop interpersonal relationships in the workplace, (ii) increases flexibility of working hours,* and *(iii) helps to find employees with similar interests*.

(i) In several case studies, employees state that the implemented ESN *helps to develop interpersonal relationships in the workplace* (e.g., (Chin et al., 2015c, Gonzalez et al., 2015)). Friendship relationships are described in social network theory as the direct symmetric connection of two users ("befriend with each other") (Smith et al., 2009). Further, the number of exchanged interactions indicates the "strength" of a relationship, i.e., many exchanged messages indicate a strong tie (Kurka et al., 2015, Leonardi, 2014). Looking at ESN in particular, the evolution (comparing two time periods) of the network that is implicitly created by the employees' interaction (interaction network) (Kurka et al., 2015) is analyzed to measure this benefit. *(ii)* The ESN allows employees to interact more easily at more diverse hours (*increases flexibility of working hours*) (Weiss et al., 2015). To measure if employees actually make use of this opportunity, we analyze the point in time the actions of the employees take place on the platform and assess the share of the employees' actions outside their regular working hours. *(iii)* The benefit *helps to find employees with similar interests* is strongly associated with social browsing (Wu et al., 2010), as personal information of employees – including interests – become visible on their private pages (Zhang et al., 2010). We count the number of visits on the profile pages as an indicator. Further, employees are able to actively subscribe to groups of interest, which contain "like-minded individuals" (Chin et al., 2015b). To measure these aspects, group assignments are analyzed.

4.3 Category: Trust-based Community

Due to the interaction of employees in ESN, the category trust-based community (**TbC**) was formed, containing the benefits: *(i) supports on-boarding newly hired employees, (ii) creates or strengthens trust among employees, (iii) strengthens social connections, (iv) creates and sustains a user community* and *(v) builds a networked organization.*

(i) For the *support of on-boarding newly hired employees,* various ways of how to best integrate newly hired employees are established in companies and several checklists can be found containing what should be done during their first week (e.g., explain long-term expectations) and during their first month (e.g., encourage them to socially interact with the team) (Brandall, 2016). Social integration plays a crucial role in this process and the ESN are used to support this process (Liu et al., 2013). This benefit can be measured analyzing the ESN interaction with colleagues after becoming a member of the company. In particular, we focus on the number of interactions or the assignment to groups during on-boarding. Further, as new employees often ask questions regarding corporate belongings, the questions asked by new employees and the answers of colleagues are analyzed.

(ii) The more interactions employees perform among each other, the more familiar they become with each other and trust is built (*creates or strengthens trust among employees*) (Richter and Riemer, 2009). Trust networks are generally described as groups of related users that are considered to have a valuable opinion on specific matters. The truthfulness is further related to a user's proximity to a reference user (Kurka et al., 2015). For example, Walter et al. (2008) propose a recommender system,

which defines trust relationships based on a trust value between two neighbors (linked nodes) in a social network. We calculate this trust value, which is also closely related to the benefit *strengthens social connections. (iii)* The strength of a social tie is described using the intensity, i.e., frequency, between two neighbors in the network, the importance for the users or the extent of transferred resources, e.g., the number of characters of a message (Jansen, 2006). The frequency and the extent of transferred resources can be identified analyzing the interaction between two neighbors and the importance for the employee can be deduced by a qualitative analysis of the interaction (e.g., messages).

(iv) The more people interact on common interests, the more *communities are created and sustained*. Moosavi et al. (2017) define communities as "groups, clusters, subgroups or moduli in various areas, and discovering a community in a social network means recognizing a set of nodes communicating with each other more than other nodes in the network" (p. 2). Dey et al. (2017) state that communities are identified by individuals subscribing to existing interest groups (explicitly belonging to a community) or by a set of individuals knowing each other or having a large number of mutual friends (implicit community). Further, communities are formed by links inferred from user-generated topics or content (Correa et al., 2012). Detecting communities, particularly in online social networks, are performed in various ways, e.g., by modularity-based, structural (e.g., indicated by high density values of subnetworks) or functional community detection (Newman, 2006, Yang and Leskovec, 2015). *(v)* The more people are connected, the more a *networked organization is built*. "Networked organization" can be identified by the degree of cross-linking in the network. In this regard, various metrics are defined that characterize the network, e.g., network density, which enable to compare different social networks (Burns and Friedman, 2012, Smith et al., 2009). For example, the density of a network is calculated with the number of existing ties divided by the number of possible ties (Kane et al., 2014).

4.4 Category: Disclosure of hidden Aspects

The ESN further enables to disclose hidden aspects (**DhA**) covered by the benefits: *(i) identifies key contributors in the corporate network, (ii) higher recognition of high performing employees* and *(iii) improves meta-knowledge on "who-knows-whom"*.

(i) The benefit *identifies key contributors in the corporate network* is related to the position of an employee in the corporate network, which is based on the employee's activity and measured by centrality metrics (Kane et al., 2014). For example, the betweenness centrality measures the number of the shortest paths passing through a node in the network (Freeman, 1978). In the context of ESN, key contributors are seen as value-adding users, who contribute and communicate their knowledge, which is afterwards liked or bookmarked by colleagues (Berger et al., 2014b). Thus, the number of reactions held by a node can be seen as an indicator of key contributors. *(ii)* This benefit is closely related to the benefit *higher recognition of high performing employees*, as the reactions to a post are seen by the entire company. *(iii)* This effect also *improves the meta-knowledge on "who-knows-whom"*, which is created by reading the conversations of employees that are publicly visible in an ESN. Readers remember, for example, who is in contact with someone else in another department (Leonardi, 2014). Leonardi (2014) gathers this data by conducting semi-structured interviews in a company with questions additionally aligned to the specific company. A generic questionnaire could not be identified. To measure this benefit, a set of questions has to be defined.

4.5 Category: Common Identity

This category comprises benefits leading to a better alignment of corporate values and the common identity (**CI**) in the company: *(i) creates greater overall business understanding, (ii) better understanding of the organizational culture* and *(iii) creates better understanding of own employees.*

(i) The ESN is a means to spread business-relevant information all across the company, which *creates a greater overall business understanding* by connecting business areas across geographical regions (Han et al., 2015). Information diffusion across an online social network can directly be extracted from the log data using several models, e.g., explanatory models, which aim at retracing the implicit path taken by a piece of information (Guille, 2013). Applying these algorithms to an ESN, especially on

business-relevant information such as status-updates, will provide insights into the business understanding based on the particular information flow.

(ii) Culture is a diffuse concept depending on its context (Kroeber and Kluckhohn, 1952). Gonzalez et al. (2015) identify employees to obtain a *better understanding of the organizational culture* using the ESN. Various questionnaires to assess organizational culture are elaborated, using e.g., the dimensions "strategic orientation" and "cooperation and teamwork" (Grau and Moormann, 2014). The questions in each dimension can be posed to the employees to find out how – in their opinion – the ESN contributes to a better understanding of the organizational culture and the cultural values. *(iii)* Finally, Richter et al. (2016) provide insights into ESN from a manager's perspective. As in ESN, employees communicate and discuss about various topics, managers can learn about the needs of their employees (*create better understanding of own employees)* (O'Leary, 2016). As previously described, the topic-based community detection (Dey et al., 2017) is applied to provide managers not only with the topics of interest, but also with the employees who form the community. Table 1 gives an overview of the benefits and metrics that can be applied on log-data.

5 Demonstration of the Approach

5.1 Case and Data Collection

The demonstration of our measurement approach takes place in a professional services company in the following referred to as SerCom. SerCom, founded in 2010, has 130 internal and external (e.g., freelancers) employees and strives for a leading position in custom consulting services and solutions in the field of Data Warehousing and Business Intelligence. The company's employees are based in five different European subsidiaries. As the employees are additionally based at customer sites across the globe during projects, e.g., in the US, it has become increasingly difficult for the company's employees to stay connected and keep current on organizational information. In 2015, management decided to introduce an ESN to provide a platform for the employees to connect to each other and to make the employees' voice heard at a management level. In mid-2015, the employees were informed about the tool Yammer and 93% of all employees registered within the first three months. By October 2017, 120 registered users performed all kinds of interactions. As the goals of introducing Yammer foremost focus on – but are not limited to – social aspects (e.g., networking and integrating employees across subsidiaries), SerCom is a suitable candidate to demonstrate our approach.

The dataset we are analyzing is a full data excerpt of the tool Yammer from March 2016 through September 2017, stored in several csv-files. For each employee, we have additionally been provided with their subsidiary, department, job role, hierarchy level, and date of registration (and deletion, if the employee left the company in the meantime). The data excerpt contains, amongst others, conversations between employees, group conversations, public postings, posts in groups, attachments, tagging of users, and the timestamp of each interaction. Even though the data was anonymized before the analysis, the data can be linked to the additional employee information (e.g., department) using a unique user id. In total, the data excerpt comprises 670 posts and messages of the given timeframe.

5.2 Applying the Methods and Metrics to the Case

In this section, the direct metrics, which are based on log-data (see Table 1), are applied, and interesting results of this analysis are presented. In addition to a statistical analysis, the structural analysis of the network is performed and visualized in the tool Gephi. The results are structured according to the categories as presented in section 4. Further, as the dataset was anonymized beforehand, random names are assigned to the nodes in the network to better describe the data and to make the results understandable. Applying the indirect metrics at SerCom is part of our future research agenda.

From a general network perspective, 120 nodes, i.e., employees, exist in the network. Looking at the interaction network (see Figure 2), it becomes obvious that even if most of the employees registered in the ESN, only a limited number of employees perform interactions in the ESN. Employees without

any interaction are shown in the outer area of the network in Figure 2, left side. A statistical analysis of the overall network shows therefore very low values in regard to average degree values, for example. In the following, we will refer to the relevant sub-networks (see for example Figure 2, right side).

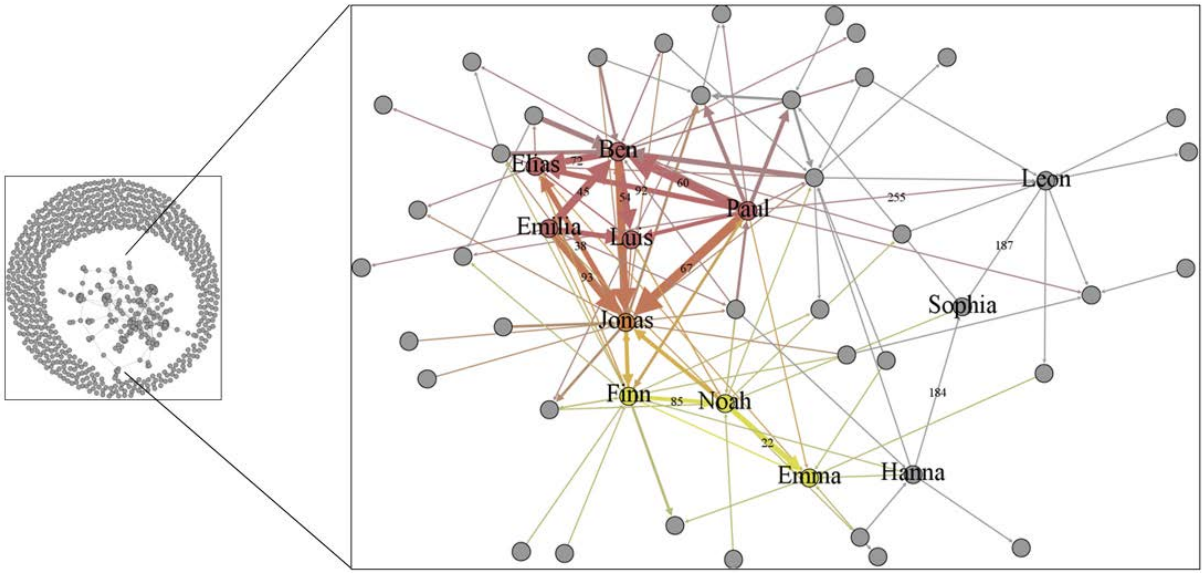


Figure 2. Interaction Network of SerCom (sub-network)

Looking at the category **Personnel Development (PD)**, the share of active users at SerCom is 18% (22 employees) and 75% of all posts (500 out of 670) are allocated to these users. Additionally, 47% of the employees (56) made at least one post (*empowering employees*). From a temporal point of view, the posting behavior after the registration in Yammer is analyzed. All active users started interacting on the platform right after registration and continued to interact throughout the given timeframe. For all employees, no case could be identified where active users stopped being active and passive users started being active. Regarding this benefit, we clearly see that some employees use the ESN as a voice in the corporate community. The *influence in the corporate community* is analyzed modelling the directed interaction network (Smith et al., 2009) and calculating the weighted indegree centrality. Out of the 120 employees in the network, we identify seven employees with much higher values than the rest. Figure 2 shows the directed interaction (sub-)network with the thickness indicating the frequency of the interactions and the values on the ties indicating the average number of characters of the messages of two neighbors. On the basis of the weighted indegree values, the top three nodes with the highest influence are (in descending order): Ben (weighted indegree value: 35), Jonas (34), and Elias (16). In conclusion, on the one hand, looking at the single resulting values, it is difficult to rate them. For example, is a share of 18% of active users a sufficiently high value? This value has to be further interpreted by decision makers or they have to be continuously monitored over time to see its trend. On the other hand, influential users are directly identified, which is a valuable information as these employees are often involved in the formation of opinions, for example.

In the category **Merging of Business and Private Life (MBPL)** the evolution of the interaction network is analyzed (*helps to develop interpersonal relationships at the workplace*). We split the provided timeframe in two periods with ten and nine months and 370 and 300 interactions, respectively. Table 3 shows the undirected interaction networks in both time periods for the previously mentioned employees as an example. When comparing the two networks, little difference regarding the individual network size is identified with 26 nodes in period 1 and 24 nodes in period 2 and an increased interaction between the nodes (thicker edged). This shows that hardly any new relationships were built between the given periods even though the employee base increased by about 40%. In regard to the benefit *increases flexibility of working hours*, we analyze the timestamps in the dataset. The distribution is a bell-shaped curve with a small peak from 7 – 8 a.m. and the main peak from 12 – 1 p.m. Further,

83% of all interactions on the platform took place between 7 a.m. and 6 p.m., which is in line with the regular working hours at SerCom. Even though the ESN enables to interact outside of the regular working hours, employees at SerCom make only sparse use of this possibility. To analyze the benefit *helps to find employees with similar interests*, the group assignments of the employees are evaluated. There are ten groups in total, which focus on both business and private matters. The business-related groups are deduced from the organizational structure, e.g., groups such as "Product Development", "Professional Services" and "ICT", while private groups have widespread topics and participants throughout the company, e.g., in the group "Radio", employees discuss music, while in the group "Friends of CCO" widespread topics are discussed. In total, 45 employees are assigned to at least one group and 25% of all interactions take place in groups. In conclusion, we see that groups play an important role at SerCom's ESN and employees team up in groups based on both similar interests and deduced from the organization structure. This is in line with the strategic goal of SerCom to connect the employees across organizational boundaries (interest groups). Very few new relationships have been built in the ESN, especially between subsidiaries. This is an interesting finding as regards the planning of actions to better connect the subsidiaries.

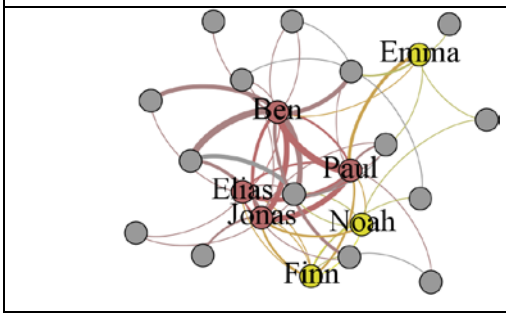
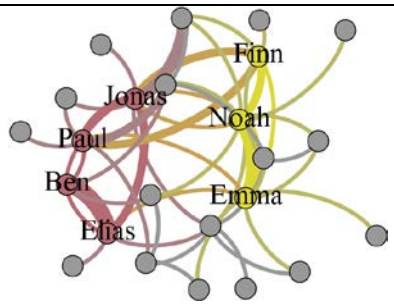
Period 1: 01.03.2016 – 31.12.2016 (10month)	Period 2: 01.01.2017 – 01.09.2017 (9 month)
	

Table 2. Comparison of the undirected interaction networks in both time periods

Looking at the benefit *supports on-boarding newly hired employees* in the category **Trust-based Community (TbC)**, the three defined metrics (number of interaction, assignment to groups and asked/answered questions when on-boarding) show marginally low values. Still, we identified the group "Professional Services Trainee Program", which is supposed to bring trainees and mentors together. However, this group is also sparsely used and, thus, there is no evidence that the ESN helps with the on-boarding processes. In regard to *strengthened social connections*, we analyze the number of interactions between two neighbors (thickness of the edges, see Figure 2) and the average number of characters between two neighbors (numbers on the edges). On average, messages and posts in SerCom's Yammer have 190 characters. When correlating the frequency with the average number of characters, we see that frequent interactions among two neighbors have a smaller number of characters (e.g., Ben and Luis with 54 characters on average), while neighbors with few interactions have a higher number of characters (e.g., Paul and Leon with 255 characters on average). Analyzing the messages in detail, neighbors interacting frequently often leave out opening and farewell set phrases, indicating a stronger relationship. Comparing the two different periods (see Table 2), an increasing number of interactions with a smaller average number of characters indicate that the connections became stronger. The *created and sustained communities* are identified in several ways. The communities based on groups are explained beforehand (e.g., "Product Development"). In addition, a structural and topic based analysis is performed. In terms of the structural analysis, the density of the sub-network is calculated and compared. As a result, we see two structural communities, which are marked in red and yellow in Figure 2. In addition, a qualitative analysis of the messages on the platform is performed and the identified topics are used to cluster distinguishable topic-based groups. The topics are very widespread, both regarding business and private topics. However, two topics have a higher occurrence than the rest: technical solutions and fun posts. Technical solutions are mostly discussed in the group "Product Development", which also shows a large overlap in the structural analysis (red community in

Figure 2), while the fun posts are widespread across the employees. Regarding the overall network structure (*builds a networked organization*), the network density is very low (0.113; possible values range from 0 to 1), with a high number of components (portions of the network disconnected from each other) and a diameter value of 5 (possible values range from 1 to 49 looking at the largest coherent subnetwork). In conclusion, we see that the employees are networked very sparsely, even if there are several communities e.g., based on technical aspects with an expert user group and based on private matters with a heterogeneous user group. This gives managers insights into the topics that are important to their employees and how they work together, which may help to form project teams socially familiar leading to better project results.

In the category **Disclosure of hidden Aspects (DhA)**, we *identify the key contributors* applying the betweenness, degree and eigenvector centrality. As a result, Jonas, Ben and Finn are identified as the key contributors with high values regarding all metrics. These employees also have high response rates to their mutual comments and are *highly recognized employees* in the company. Those employees can be seen as possible trust persons to be asked about relevant topics. In the category **Common Identity (CI),** we apply an explanatory model (Guille, 2013) and analyze the messages to identify how information spreads, which is supposed to *create a greater business understanding*. In particular, we focus on business relevant information such as status updates on negotiations with customers and news from customers and the respective industry. Those messages cover 10%, however, their impact on the general understanding of the business can hardly be estimated as the dataset does not provide information on the reading behavior of the employees.

6 Evaluation and Discussion

After presenting the application of the metrics on the dataset, we now revert to its evaluation. For this purpose, we conducted a semi-structured interview with a board member (BM) of SerCom in October 2017. The interview lasted two hours and was structured as follows: first, the measurement model including the categories, benefits and (direct) metrics was presented and afterwards evaluated by the BM. Second, since at the time the interview took place we had already applied the metrics, we were able to present and discuss the resulting values. Further, we discussed the usefulness of the methods and metrics and as to which extent the measurement approach can be used to better manage the implemented ESN (evaluation of the added value). The complete interview was conducted by two researchers, recorded, transcribed and finally reduced to the most important statements for the evaluation. Finally, in this section, we discuss our contribution to ESN success measurement in general.

(1) The BM of SerCom holds a PhD and has published in the field of IS, in particular data management and data analytics, since 2000. Due to his research background and his practical experience as a board member for several years, he is a suitable candidate to evaluate our approach. After presenting each benefit and the corresponding methods and metrics, the BM was asked to rate the validity of the approach – in particular the benefits completeness and usefulness for the intended purpose, which are both common criteria to evaluate DS artifacts (Hevner et al., 2004, March and Smith, 1995). Completeness refers to the extent to which the proposed methods and metrics cover all aspects of a particular benefit (Eval1) whereas usefulness describes how good the core characteristics of a benefit are reflected by the methods and metrics (Eval2). Both criteria are rated for each individual benefit using a Likert-scale ranging from 1 (low) to 5 (high). Eval1 shows an arithmetic mean of 4.25 and a standard deviation of 0.72; Eval2 4.35 and 0.98, respectively. Both criteria indicate a good quality of our model. Only one outlier was identified: the benefit *higher recognition of high performing employees* is measured by the number of reactions held by a node. In the course of the interview, the BM explained that in the current metric, we do not address the fact that *high performing* employees are recognized. As an example, he showed us a fun post with many likes included in the current metric. In future research, we will address this issue referring to business-relevant posts only.

(2) Afterwards, we presented the resulting values to him and discussed how they could be used to better manage the ESN. For example, in regard to the measured benefit *empowering employees* and the strategic goal of SerCom “to make the employees’ voices heard at a management level” (see section

5.1), the approach can be used in three ways: first, it enables to assess if the strategic goals using the ESN are achieved. During the interview, we identified large gaps between the resulting values and the values expected by the BM, e.g., in the case of active users, a discrepancy was detected. We presented a rate of only 22% of active users, while he had been expecting a rate of about 50%. Second, the benefits and metrics are a basis to define adequate actions to be taken, e.g., actions to increase the number of active users. As a consequence, the BM thought about changing the internal communication strategy – in particular to promote Yammer more intensively and documents that all employees are required to have will be made available in Yammer. Third, the metrics can be used as part of an ongoing success measurement to see if the implemented actions are effective over time.

(3) In comparison to existing ESN success measurement approaches (e.g., Richter et al. (2013)), the approach is a meaningful complement, which analyzes ESN success from an additional perspective, i.e., Social Capital, which has only recently been identified (see Wehner et al. (2017a)). Social integration at the workplace is becoming more and more important for employees, especially when looking at the so-called Generation Y (Aksoy et al., 2013). With our approach, we provide a means to make social effects of ESN assessable and manageable. Its applicability is demonstrated and evaluated for the direct metrics (see Table 1), the demonstration and evaluation of the indirect metrics, are on our future research agenda. Even though the methods and metrics have been applied in a single case study only, they are applicable in any company analyzing ESN log-data, which include employees, their interactions, messages and group affiliations.

7 Conclusion

The aim of this paper is to operationalize the IT capability Social Capital in ESN on the basis of individual benefits to assess and better manage the social effects resulting from ESN usage (see Wehner et al. (2017a)). Therefore, we applied the Design Science approach (Peffers et al., 2007). Each benefit was presented and methods and metrics were identified. To demonstrate the applicability of the measurement model, we analyzed a dataset provided by our cooperating partner. In addition, we performed a semi-structured interview with a board member of the partner company to evaluate the measurement approach and its applicability.

Our research contributes to both theory and practice. As a contribution to theory, we first developed a measurement approach to measure the IT capability Social Capital as identified by Wehner et al. (2017a). Second, we identified methods and metrics to be used in future research to perform a multidimensional analysis of ESN data combining social and business-related aspects. Third, we identified several fields for further research, e.g., we see a strong need to develop a success measurement tool, which enables to monitor ESN success continuously. Fourth, from a practical perspective the measurement approach can be applied in all companies that use an ESN. Fifth, we show the applicability of the measurement approach drawing on a dataset of a company. Finally, as presented on the basis of the interview, the approach enables making decisions, e.g., to adapt the strategy regarding internal communication structures.

Our research is not without limitations. As we applied the measurement items in one company only, our results are not generalizable. Further, we only assessed the values that can be calculated using the dataset (direct metrics). Seven benefits could not be assessed, as they are based on indirect metrics. The evaluation shows that, for at least one benefit, new metrics have to be defined. In the course of our research, we came upon objects of further research. First, the mentioned limitations present a basis for further research, e.g., we will apply established scale development procedures to conduct the survey at SerCom to gather data measuring the indirect measures. Second, we will assess the dataset provided from a multidimensional perspective. Third, we will collect requirements and develop a tool, to automatize the calculation of the metrics. Fourth, as the measures are currently based on existing literature, we are planning workshops with experts to further evaluate our model with additional evaluation criteria and, if necessary, define additional measures to better cover the ESN benefits and increase the quality of the approach.

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3 Potentiale von Enterprise Social Networks zur Geschäftsprozessverbesserung

Nach der Vorstellung der wissenschaftlichen Beiträge wird in diesem Kapitel diskutiert inwiefern sich Synergien zwischen BPM und ESN im Hinblick auf die effiziente Gestaltung der Organisation realisieren lassen. Dies ist vor allem deshalb interessant, da in den Prozessmodellen strukturiert die Abfolge der zu erbringenden Prozessleistung sowie die Zuteilung von Verantwortlichkeiten und die Beschreibung der benötigten Informationsobjekte festgelegt werden, wohingegen in ESN die Mitarbeiter losgelöst von Strukturen und speziellen Anforderungen interagieren können (siehe Kapitel 1.1). Besonders interessant ist dabei, dass man durch ESN einige Benefits erzielen kann, die sich positiv auf Prozesse auswirken können. Auf Basis der erarbeiteten Beiträge (siehe Kapitel 2) werden im Folgenden verschiedene Bereiche an der Schnittstelle zwischen BPM und ESN beschrieben: (1) die Nutzenpotentiale von ESN in den einzelnen Phasen des BPM Lebenszyklus und (2) die Unterstützung von ESN bei der Ausführung von Prozessen.

3.1 Nutzenpotentiale von Enterprise Social Networks in den Phasen des BPM Lebenszyklus

Während in den meisten Fallstudien überwiegend ESN im Unternehmen implementiert wurden, um zum Beispiel die Vernetzung der Mitarbeiter zu fördern und Informationen schneller auszutauschen (O'Leary, 2016), ist der gezielte Einsatz von ESN in den Phasen des BPM-Lebenszyklus (z.B. (Dumas et al., 2013)) ein vielversprechendes Forschungsfeld, das bislang keine Beachtung fand. Dabei ist naheliegend, dass die sehr wissensintensive Arbeit in den Phasen des BPM-Lebenszyklus durch die Funktionalitäten von ESN (z.B. *Tagging, Instant Messaging, Micro-Blogging* (Chin et al., 2015a)) unterstützt werden kann. Um einige Möglichkeiten aufzuzeigen, wird der BPM-Lebenszyklus nach Dumas et al. (2013) – bestehend aus den sechs Phasen *process identification, process discovery, process analysis, process redesign, process implementation* und *process monitoring and controlling* – mit den spezifischen Anforderungen je Phase beschrieben und anschließend mögliche Nutzenpotentiale durch die Verwendung von ESN-Funktionalitäten erläutert (siehe auch Hoyer (2016)).

In der Phase *process identifacation* werden die Probleme bzw. die Handlungsbedarfe aus dem operativen Betrieb gesammelt und für die relevanten Prozesse identifiziert. Anschließend werden diese in Verbindung zueinander gesetzt (Prozessschnittstellen), sodass eine neue bzw. überarbeitete Prozessarchitektur dargestellt werden kann (Dumas et al., 2013). In dieser Phase können beispielsweise die Handlungsbedarfe über Diskussionsgruppen oder Foren (Kurz, 2011, Turban et al., 2011) in ESN direkt aufgedeckt bzw. gesammelt werden. Um auf die Probleme aufmerksam zu machen, können anschließend weitere relevante Personen verlinkt (*social tagging* (Chin et al., 2015a)) und somit informiert werden, sodass diese ebenfalls mitdiskutieren können. So erhält

man ein umfassendes Bild zu einzelnen Problemen und Handlungsbedarfen, zusammen mit der entsprechenden Personengruppe. Zur Dokumentation können anschließend Wikis (siehe (Turban et al., 2011)) verwendet werden (Kurz, 2011), mit dem Vorteil, dass sich ändernde Bedarfe direkt überarbeiten lassen und somit immer aktuelle Informationen zur Verfügung stehen. Für die Zuordnung der Handlungsbedarfe zu den entsprechenden Prozessen können die Prozessverantwortlichen über die im ESN implementierte „Suchen"-Funktion (*enterprise search* (Chin et al., 2015a)) identifiziert und verlinkt werden. Die Dringlichkeit der Handlungsbedarfe kann dann von der betroffenen Personengruppe bewertet bzw. mit dem Verantwortlichen diskutiert werden (*rating and review* (Chin et al., 2015a)). Nachdem die Prozessarchitektur erarbeitet wurde, kann diese abschließend über das ESN auch publiziert werden, zum Beispiel in Form von *Micro-Blog* Beiträgen (Chin et al., 2015a), um den Mitarbeitern zu zeigen, dass ihre Anliegen berücksichtigt wurden, was die Wertschätzung für ihren Beitrag zur Lösung von Problemen wiederspiegelt.

In der Phase *process discovery* werden die relevanten Geschäftsprozesse im „Ist-Zustand" modelliert. Das Aufgabenspektrum umfasst sowohl die Modellierung selbst als auch die Qualitätssicherung, wobei hier verschiedene Kriterien wie zum Beispiel Vollständigkeit und Richtigkeit der Prozessmodelle geprüft werden (Dumas et al., 2013). Da ESN keine Werkzeuge bzw. Funktionalitäten zur Modellierung der Prozesse zur Verfügung stellen, geschweige denn den Funktionsumfang professioneller Modellierungstools (wie z.B. das ARIS Toolset) haben, kann die Kernaktivität in dieser Phase – die Modellierung – nicht direkt in ESN durchgeführt werden. Nachdem die Prozessmodelle jedoch außerhalb des ESN erstellt wurden, können diese dort gespeichert (*content management system* (Chin et al., 2015a)) (Kurz, 2011) und den Prozessbeteiligten über Gruppen oder Verlinkungen (*groups and communities, social tagging* (Chin et al., 2015a)) präsentiert werden. Fehlende Informationen oder Fehler im Prozessmodell können anschließend von den Prozessbeteiligten annotiert bzw. diskutiert werden. Im Vergleich zu traditionellen Review-Methoden für Prozessmodelle (zum Beispiel Workshops, Interviews, Annotationen per E-Mail (Dumas et al., 2013)) entsteht für den Prozessverantwortlichen dadurch der Vorteil, dass die Anmerkungen der Beteiligten zum Prozessmodell gesammelt, dauerhaft, personenbezogen und nachvollziehbar im ESN zur Verfügung stehen. Des Weiteren können zusätzliche Attribute wie die Verständlichkeit der erstellten Modelle im ESN über Rating-Verfahren (*rating and reviews* (Chin et al., 2015a)) erhoben werden, wodurch insgesamt eine hohe Qualität der Ist-Modelle sichergestellt werden soll.

In der Phase *process analysis* werden Probleme bzw. Schwachstellen im Ist-Prozess identifiziert, dokumentiert und wenn möglich mittels Performancekennzahlen quantifiziert. Die Probleme und Schwachstellen werden anschließend priorisiert, zum Beispiel nach dem Aufwand zur Lösung eines Problems oder nach den zu erwarteten Effekten (Dumas et al., 2013). Zur Identifikation der Probleme und Schwachstellen können – wie in den vorherigen Phasen – die erstellten Gruppen

und Foren im ESN (*groups and communities* (Chin et al., 2015a)) wiederverwendet werden, in denen den Mitarbeitern die Möglichkeit gegeben wird, diese im Ist-Prozess zu beschreiben (Kurz, 2011). Die Erhebung der Prozessleistung sowie die Priorisierung der Probleme und Schwachstellen müssen anschließend von den Prozessverantwortlichen oder entsprechenden Projektteams durchgeführt werden, da den Prozessbeteiligten oftmals das nötige Know-How und die Weitsicht auf den gesamten Prozessablauf fehlt und jeder möglichst seine eigenen Probleme zu lösen versucht (Kurz, 2011, McAfee, 2006). Jedoch können Bewertungsfunktionen (*ratings and reviews* (Chin et al., 2015a)) zusätzlich genutzt werden, um einen Überblick zu bekommen, welche Probleme von den Prozessbeteiligten als wichtig bzw. deren Lösung als arbeitserleichternd empfunden wird.

In der Phase *process redesign* werden Vorschläge zur Verbesserung des Prozesses eruiert. Da in diesem Schritt oftmals mehrere Möglichkeiten für die Verbesserung erarbeitet werden, müssen die Alternativen zum Beispiel durch Abschätzung der Performancekennzahlen (siehe Beitrag 4, Kapitel 2.4) verglichen werden. Der Prozess wird anschließend durch eine Kombination verschiedener Verbesserungsalternativen überarbeitet, wodurch ein verbesserter Soll-Prozess definiert wird (Dumas et al., 2013). Ähnlich zu Phase *process discovery* ist das Kernergebnis dieser Phase – die Modellierung der Soll-Prozesse – direkt im ESN nicht möglich, da die Werkzeuge und Funktionalitäten dazu fehlen. Die genannten vorbereitenden Tätigkeiten werden jedoch sehr umfangreich von ESN unterstützt. Über Gruppen, Communities und Foren (*groups and communities* (Chin et al., 2015a)) können die Prozessbeteiligten die Prozessverbesserungsvorschläge – von Kurz (2011) Prozessinnovationen genannt – erhoben, diskutiert und auch bewertet werden, nachdem diese im Content Management System im ESN bereitgestellt wurden (*reviews and ratings, content management system* (Chin et al., 2015a)). Dabei entsteht der Vorteil, dass die Mitarbeiter, die in Zukunft den überarbeiteten Prozess ausführen, mit ihrem Detailwissen auf wichtige, zu beachtenden Aspekte beim Prozessdesign hinweisen können (Kurz, 2011). Mit Hilfe dieser Informationen kann anschließend die beste Alternative – je nachdem welche Kriterien für die Verbesserung eine entscheidende Rolle spielen – ausgewählt werden, welche den Soll-Prozess darstellt. Abzuwägen ist hier zum Beispiel zwischen den Aspekten Wirtschaftlichkeit und Mitarbeiterzufriedenheit (Kurz, 2011).

In der Phase *process implementation* werden die notwendigen Maßnahmen geplant, um einen reibungslosen Übergang vom ursprünglichen Ist-Prozess zum verbesserten Soll-Prozess zu gewährleisten. Die Maßnahmen lassen sich auf zwei wesentliche Aspekte aufgliedern. Auf der einen Seite müssen die Prozessbeteiligten dahingehend vorbereitet werden, dass sie ihre Arbeitsweise an den neuen Anforderungen des Soll-Prozesses ausrichten (organizational change management). Dies umfasst sowohl die Information der Prozessbeteiligten über die Änderungen und die Erstellung eines Zeitplans, der beinhaltet, ab wann die Umstellung auf den Soll-Prozess erfolgt, welche

Übergangsregelungen möglicherweise in Kraft treten und wann Schulungen für die Prozessbeteiligten erfolgen. Auf der anderen Seite müssen IT-Systeme entworfen bzw. diese so überarbeitet werden, dass sie den Soll-Prozess optimal unterstützen (process automation) (Dumas et al., 2013). Bezüglich des organizational change management kann zunächst im ESN eine Gruppe erstellt bzw. aus den vorherigen Phasen weitergeführt werden, welcher die Prozessbeteiligten beitreten, um dort Fragen zu stellen und über relevante Aspekte informiert zu werden (*groups and communities* (Chin et al., 2015a)) (Kurz, 2011). Ebenfalls kann der Prozessverantwortliche diese Gruppe im Sinne eines *Micro-Blogs* nutzen, um über den Fortschritt im Projekt zu berichten, zum Beispiel wenn der Änderungsplan oder andere Teilergebnisse vorliegen oder es zu Verzögerungen kommt. Die nötigen Schulungen können auch direkt im ESN in Form von Web-based Trainings abgehalten werden (*training and learning* (Turban et al., 2011)), sodass der Prozessverantwortliche direkt über den Lernfortschritt der Mitarbeiter in Kenntnis gesetzt wird. Bezüglich der process automation ist es sinnvoll, die am Projekt beteiligten IT-Mitarbeiter in die erstellte Gruppe aufzunehmen. Während die (Weiter-)Entwicklung der IT-Systeme unabhängig vom ESN abläuft, können die IT-Mitarbeiter jedoch zum Beispiel schnell auf technische Probleme reagieren, wenn diese in der Gruppe gepostet werden. Dieser Effekt wird zusätzlich verstärkt, wenn diese von den Prozessbeteiligten im Falle von Problemen getaggt werden (*social tagging* (Chin et al., 2015a)). Die IT-Mitarbeiter können ihrerseits die Gruppe nutzen, um das IT-System betreffende Informationen den Prozessbeteiligten darzulegen, zum Beispiel im Falle von zu erwartenden Performanceproblemen, Updates oder wenn das IT-System nach einem Ausfall wieder zur Verfügung steht.

In der Phase *process monitoring and controlling* werden Daten für den implementierten Soll-Prozess gesammelt, analysiert und aufbereitet. Die Sammlung der Prozessdaten richtet sich nach den zuvor festgelegten Messgrößen, welche bewerten, ob sich die Prozessleistung verbessert hat und wie sich diese längerfristig entwickelt. Bei weiteren Problemen und Schwachstellen oder auch wenn die gesteckten Ziele nicht erreicht wurden, wird anschließend der Lebenszyklus für einen Prozess wiederholt. Der kontinuierliche Durchlauf des Zyklus ermöglicht es außerdem, den Prozess an die sich stetig ändernden Rahmenbedingungen anzupassen (Dumas et al., 2013). Für die Erhebung der Daten kann das ESN nicht verwendet werden, da dafür spezielle Software bzw. die prozessausführende Umgebung notwendig ist. Jedoch kann die zuvor etablierte Gruppe im ESN genutzt werden, um sich über den Prozess und die Veränderungen auszutauschen. So erhalten die Prozessverantwortlichen Feedback über die Veränderungen und ob zum Beispiel durch das neue Prozessdesign andere Probleme aufgetreten sind. Ebenfalls kann über das ESN die Zufriedenheit der Mitarbeiter mit dem Design des Soll-Prozesses erhoben werden (*reviews and ratings* (Chin et al., 2015a)). Das Feedback kann nun wiederum in der Phase *process discovery* – im nächsten Durchlauf des Lebenszyklus – verwendet werden. Sollten die Prozesse durch Betrachtung der Kennzahlen nachweislich verbessert worden sein, kann die Gruppe im ESN von den Prozessverantwortlichen genutzt werden, um die Erfolge an die Mitarbeiter weiterzugeben

und sich bei ihnen für das Engagement zu bedanken. Schließlich kann auch der Abschlussbericht des Projektes über das ESN publiziert werden.

Zusammenfassend ist festzuhalten, dass über alle Phasen hinweg im ESN eine zielgerichtete Ansprache der für einen Prozess relevanten Personengruppe möglich ist. Dadurch wird der Aus-tausch der Mitarbeiter gefördert, unabhängig davon, ob diese in derselben oder unterschiedlichen Abteilungen verankert sind. Des Weiteren kann das ESN über alle Phasen hinweg als Plattform gesehen werden, auf der schnell die richtigen Ansprechpartner für einen Prozess gefunden, das kollektive Wissen der Prozessbeteiligten im täglichen Umgang mit den Prozessen eingeholt und sämtliche Informationen beim Durchlaufen des BPM Lebenszyklus an einer zentralen Stelle ab-gelegt werden können.

3.2 Unterstützung von Enterprise Social Networks bei der Ausführung von Prozessen

Während ESN in den Phasen des BPM Lebenszyklus unterstützend wirken können, ist ebenfalls zu erwarten, dass sich die identifizierten, sehr breit gefächerten ESN Benefits (siehe Beitrag 3, Kapitel 2.3) positiv auf die Ausführung von einzelnen Prozessen auswirken. Beispielsweise beschreiben Merz et al. (2015), dass sich durch die Nutzung des ESN, vor allem durch die Speicherung und Kommentierung von Dokumenten und die direkte Delegierung von Aufgaben über das ESN, die Flexibilität für eine Reihe von Prozessen erhöht hat. Als Beispiel wird der Bewerbungsprozess genannt, der nun zu großen Teilen durch das ESN unterstützt wird. Ein weiterer Vorteil ist dabei, dass die relevanten Informationen, in diesem Fall die Kommentare und Aufgabenverteilungen, in Echtzeit zur Verfügung stehen (Han et al., 2015, Silic et al., 2015), wodurch Wartezeiten verkürzt werden.

Weitere positive Auswirkungen von ESN sind für informations- und wissensintensive Prozesse zu erwarten. Für Innovationsprozesse stellt das ESN eine Plattform dar, in der Mitarbeiter aus verschiedensten Bereichen (Chin et al., 2015b) ihre Ideen teilen (Greasley und Wang, 2016) und auch direkt diskutieren und bewerten können (Mäntymäki und Riemer, 2014, Wiesneth, 2016). Als Ergebnis kann man somit auf die innovativen Fähigkeiten der gesamten Belegschaft zugreifen (collective intelligence) (Holtzblatt et al., 2013), wodurch die Innovationskraft des gesamten Unternehmens gesteigert wird (Ding et al., 2015, Gibbs et al., 2014, Qi und Chau, 2016), was sich letztendlich in Form von innovativen Produkten und Dienstleistungen auszahlt (Leonardi, 2014). Prozesse im Wissensmanagement profitieren davon, dass in ESN das Wissen leichter geteilt werden kann (Han et al., 2015), das anschließend auch dauerhaft dem Unternehmen im ESN zur Verfügung steht (Zaffar und Ghazawneh, 2012) und man Experten einfacher identifizieren kann (Liu et al., 2013, Riemer et al., 2015).

Darauf aufbauend stellt sich die Frage, welche Eigenschaften ein Prozess generell vorweisen muss, um möglichst von der Nutzung des ESN durch die Mitarbeiter zu profitieren. Ein möglicher Ansatzpunkt ist hier zum Beispiel der Automatisierungsgrad von Prozessen. Wenn diese zu großen Teilen automatisch ablaufen und kein oder nur wenig menschliches Eingreifen erforderlich ist, ist anzunehmen, dass das ESN nur wenige Vorteile bringen wird. Neben dem Automatisierungsgrad und dem Grad der Wissensintensität könnte auch der Grad der Formalisierung von Prozessen (Genchev et al., 2011) eine Rolle spielen. Prozesse, die nicht formal dokumentiert sind, „ad hoc" ablaufen (siehe (Kolár, 2014)) und den Prozessbeteiligten viele Freiheiten bieten, können von ESN durch die Kombination verschiedener Funktionalitäten unterstützt werden, zum Beispiel durch die Ablage von und das gemeinsame Arbeiten an Dokumenten (Chin et al., 2015a), die direkte Kommunikation der Beteiligten (Merz et al., 2015) und die gegenseitige Hilfe der Mitarbeiter zur Lösung von Problemen (Chin et al., 2015b, Mäntymäki und Riemer, 2016). Wenn diese Art von Prozessen im ESN vermehrt beobachtet werden, können die Log-Daten des ESN zusätzlich genutzt werden, um den Prozessablauf mit den beteiligten Personen und benötigten Informationen als Quelle zur Modellierung bzw. Formalisierung der Prozesse zu verwenden (Greasley und Wang, 2016, Merz et al., 2015).

Generell kann festgehalten werden, dass die Anwendungsfälle und Funktionalitäten von ESN durchaus das Potential aufweisen, das BPM und auch einzelne Prozesse zu unterstützen. Dies ist besonders vor dem Hintergrund interessant, da in ESN die Mitarbeiter losgelöst von formalen Vorschriften interagieren können (Stei et al., 2016, Viol und Hess, 2016), während BPM im evolutionären Sinne das Ziel verfolgt, durch ständiges Durchlaufen des Lebenszyklus inkrementell die Vorschriften für die Mitarbeiter so abzuändern, bis der Prozess möglichst nahe am Optimum ist (Dumas et al., 2013). Durch die erläuterten Potentiale in diesem Kapitel ist durchaus davon auszugehen, dass der kombinierte Einsatz von ESN und BPM durch die Vorteile, die beide Bereiche in Kombination mit sich bringen, einen positiven Beitrag zur effizienten Gestaltung der Organisation leisten.

4 Schlussbetrachtung und Fazit

4.1 Zusammenfassung der Forschungsergebnisse

Die Zusammenfassung der Forschungsergebnisse erfolgt zunächst für jede der sechs wissenschaftlichen Publikationen separat. Anschließend werden die Erkenntnisse nochmals für die Themengebiete BPM und ESN aggregiert dargestellt.

Das Ziel des **ersten Beitrags** „BPM Adoption in Small and Medium-sized Companies in Bavaria" lässt sich in drei Bereiche gliedern: (1) Erhebung des Status Quo der Adaption von BPM Maß-

nahmen in bayerischen Unternehmen; (2) Identifikation von fördernden Faktoren bei erfolgreicher Adaption und von hindernden Faktoren bei erfolgloser Adaption von BPM Maßnahmen; (3) Ableitung von weiterem Forschungsbedarf mit Fokus auf BPM-Methoden und -Techniken für KMU; Empfehlungen für KMU zur zielgerichteten Adaption von BPM-Maßnahmen. Die besondere Herausforderung dieser Zielsetzung liegt darin, auf der einen Seite sowohl die fördernden und hindernden Faktoren zu identifizieren (qualitativ) und auf der anderen Seite den Status Quo auf Basis einer breiten Erhebung aufzuzeigen (quantitativ). Zur Erreichung der Ziele wird ein Mixed Method Approach in Form von Fallstudien (im speziellen Interviews und BPM Initiativen) und eine Umfrage angewendet (Gable, 1994).

Als Ergebnisse, welche auf Basis von 10 Fallstudien und 114 Teilnehmern an der Umfrage erarbeitet wurden, werden in diesem Artikel die adaptierten BPM-Maßnahmen zunächst anhand verschiedener Kriterien vorgestellt: (1) BPM und strategische Verankerung, (2) Zielsetzungen, Dokumentation, Qualität und Kompetenzen im Bereich BPM; (3) Prozesssteuerung und –verbesserung. Eine generelle Bewertung der einzelnen KMU zeigt, dass diese die beschriebenen BPM-Maßnahmen entweder zu einem sehr hohen oder aber zu einem sehr geringen Anteil umsetzen. Für Firmen, die einen sehr niedrigen Umsetzungsgrad vorweisen, konnten die Ursachen identifiziert werden, wodurch es möglich war, Vorschläge zur Weiterentwicklung des BPM sowohl im wissenschaftlichen als auch praktischen Kontext zu definieren.

Die Zielsetzung des **zweiten Beitrags** „Enterprise social networks: A literature review and research agenda“ lässt ich in drei Bereiche unterteilen: (1) Identifikation von Literatur mit Schwerpunkt auf ESN; (2) Analyse der Artikel mit Hinblick auf adressierte Themenfelder; (3) Identifikation von Forschungslücken und Definition einer Forschungsagenda. Zur Erreichung dieser Zielsetzungen wird die Methodik des Literature Review nach Webster und Watson (2002) angewendet. Dadurch wird sichergestellt, die relevante Literatur möglichst vollständig zu identifizieren, welche im Anschluss einer qualitativen Inhaltsanalyse nach Mayring (2014) zur Identifikation der Themenfelder unterzogen wird. Zur übersichtlichen Strukturierung der Themenfelder wird zusätzlich ein Framework entwickelt, das die Beiträge mit Blick auf verschiedene Kriterien unterscheidet. Auf der einen Seite wird zwischen dem Fortschritt hinsichtlich der Implementierung im Unternehmen differenziert, im Speziellen ob der Artikel Inhalte vor, während oder nach der Einführung des ESN beschreibt. Auf der anderen Seite wird untersucht, welchen Schwerpunkt der Artikel setzt, im Detail, ob der Mitarbeiter, die Technologie oder das Unternehmen im Fokus ist.

Als Ergebnis wurden 106 Artikel für die weitere Analyse identifiziert. Eine Einordnung in das Framework zeigt zunächst, dass die meisten Artikel (21) die Auswirkungen des ESN im Unternehmenskontext beleuchten, wohingegen sich lediglich drei Artikel mit dem Mitarbeiter während der Einführung beschäftigen. Bei der detaillierten Analyse wurde festgestellt, dass in den 106

Artikeln insgesamt 70 unterschiedliche Themenfelder behandelt werden (ein Artikel kann mehrere Themenfelder umfassen). Die am häufigsten adressierten Themenfelder sind der Einfluss von ESN auf das Wissensmanagement (17 Artikel) und das Nutzerverhalten in ESN (16 Artikel). Durch die Analyse werden ebenfalls Forschungslücken identifiziert, sodass insgesamt 43 Forschungsfragen definiert wurden. Beispielsweise wird die Frage nach möglichen Benefits und deren Strukturierung gestellt (Ausganspunkt für Beitrag 3, siehe Kapitel 2.3).

Die Zielsetzung des **dritten Beitrags** „What Benefits do They Bring? A Case Study Analysis on Enterprise Social Networks" umfasst zwei Bereiche: (1) Identifikation von Benefits, die durch ESN erzielt werden können; (2) Abgleich der Benefits mit traditionellen IT Capabilities, um den Mehrwert von ESN gegenüber traditioneller IT aufzuzeigen. Zur Erreichung der Zielsetzung wird die im vorherigen Beitrag identifizierte Literatur (siehe Beitrag 2, Kapitel 2.2) im Detail analysiert. Insbesondere werden mit Hilfe der qualitative Inhaltsanalyse nach Mayring (2014) die Benefits hinsichtlich thematisch klar abzugrenzender Kategorien geclustert, welche im Anschluss den traditionellen IT-Capabilitites nach Davenport und Short (1990) zugeordnet werden.

In der Literatur wurden 37 ESN Fallstudien identifiziert, die nachweislich Benefits durch die ESN Nutzung erzielen konnten. Die Benefits sind sehr heterogen, sodass eine Anzahl von 99 Benefits aufgelistet werden kann. 69 von diesen können den traditionellen IT Capabilities zugewiesen werden, im Speziellen den Capabilities *transactional, geographical, informational, knowledge management, tracking* und *disintermediation*. Für 25 Benefits wurde eine neue IT Capability definiert, *Social Capital*, wobei die Benefits in dieser Capability durch den Wert des Mitarbeiters im unternehmerischen Netzwerk und die Interaktion und Vernetzung mit Kollegen charakterisiert werden (Portes, 2000). Dadurch konnte gezeigt werden, dass moderne Anwendungssysteme – wie ESN – zusätzliche Aspekte der Mitarbeiterbedürfnisse abdecken. Die fünf verbleibenden Benefits sind sehr generisch und können daher nicht einzelnen IT Capabilities zugeordnet werden.

Die Zielsetzung des **vierten Beitrags** „Evaluating Business Process Improvement Patterns by Simulation" lässt sich in zwei Bereiche unterteilen: (1) Evaluation von Instanzen der BPI-Pattern; (2) Identifikation von fördernden und hindernden Faktoren bei der Anwendung der BPI-Pattern. Zur Erreichung der Zielsetzung wird für die Evaluation einzelner BPI-Pattern die Prozesssimulation (z.B. (Van der Aalst et al., 2010)) in Form eines Experimentes eingesetzt. Hierzu werden Prozesse im Ist-Zustand modelliert und die für die Simulation notwendigen Daten erhoben. Anschließend werden durch die Anwendung von BPI-Pattern die Prozesse transformiert in einen Soll-Zustand, welche dann unter Anpassung der Kontextvariablen (z.B. Anzahl der Mitarbeiter, Wahrscheinlichkeiten bei XOR-Splits) verschiedene Simulationsszenarien ergeben. Insgesamt werden für das Experiment vier Prozesse (*Email support for applicants, application for degree courses, qualification assessment, objection*) modelliert und die notwendigen Daten zur Simula-

tion (z.B. Bearbeitungszeiten) erhoben. Auf jeden Prozess werden drei BPI-Pattern (*assign activities to external parties, automate activities based on predefined rules, parallelize activities in sequential process flow*) angewendet, welche dann in acht unterschiedlichen Szenarien simuliert werden. Analysiert wird im Anschluss die Veränderung der Durchlauf-, Bearbeitungs- und Wartezeiten sowie der Prozesskosten der Soll-Zustände mit dem ursprünglichen Ist-Zustand.

Als Ergebnis wird im Anschluss für jedes der drei angewendeten BPI-Pattern zunächst aufgezeigt, dass je nach Szenario die Verbesserungen deutlicher oder marginaler ausfallen. Nur in vereinzelten Fällen kommt es zu Verschlechterungen im Bezug auf die Prozesszeiten und -kosten. Die Analyse der Prozessstrukturen und Szenarien zeigt anschließend, welche Faktoren fördernd oder hindernd hinsichtlich der Prozessleistung wirken. Diese werden abschließend für jedes der BPI-Pattern beschrieben und aufgelistet.

Die Zielsetzung des **fünften Beitrags** „Measuring National Culture by Analyzing Business Processes: A Case Study in Germany and India“ lässt sich in zwei Bereiche unterteilen: (1) Entwicklung eines Messansatzes zur Identifikation von kulturellen Eigenschaften in Prozessmodellen; (2) Demonstration des Messansatzes. Zur Erreichung der Zielsetzung wird zunächst ein Messansatz entwickelt, in dem kulturelle Dimensionen in Form von Metriken als Messgrößen operationalisiert werden, welche dann je Dimension wiederum aggregiert werden. Für die explizite Anwendung des Messansatzes findet zunächst eine Eingrenzung auf nationale Dimensionen statt, da diese im Zeitverlauf als sehr beständig angesehen werden und bei diesen Unterschiede zu erwarten sind (Hofstede, 1998, Schein, 2004). Im Speziellen werden sechs Metriken für die kulturellen Dimensionen *uncertanty avoidance, individualism/collectivism* und *power distance* definiert. Anschließend wird beschrieben, welche Daten zur Anwendung der Metriken benötigt werden. Zur Demonstration des Ansatzes wird im Weiteren eine Fallstudie durchgeführt, in der der kundenspezifische Produktentwicklungsprozess in zwei Firmen mit Sitz in Deutschland und Indien, die ähnliche Komponenten fertigen, modelliert wird. Die Modelle dienen als Grundlage zur Erhebung der Daten für die Metriken.

Die Anwendung der Metriken und die Aggregation je Dimension zeigen klar unterscheidbare Werte für den indischen und deutschen Prozess. Da Hofstede (1983) ebenfalls Werte für die Länder Deutschland und Indien in den genannten Dimensionen bereitstellt, können die Tendenzen je Dimension verglichen werden. Zum Beispiel zeigt die Anwendung der Metriken für die Dimension *power distance* einen wesentlich geringeren Wert für den deutschen als den indischen Prozess, wobei auch die Studie von Hofstede (1983) dieselbe Tendenz zeigt. Anschließend wird auf Basis der Erkenntnisse diskutiert, welchen Nutzen der Messansatz in den Phasen der BPM-Lebenszyklen bringen könnte. Zum Beispiel können die Metriken genutzt werden, um einen kulturellen Konflikt zwischen dem Prozessdesign und den kulturspezifischen Erwartungen der Mitarbeiter auszuschließen.

Die Zielsetzung des **sechsten Beitrags** „Success Measurement of Social Capital in Enterprise Social Networks“ lässt sich in zwei Bereiche unterteilen: (1) Entwicklung eines Erfolgsmessansatzes für ESN mit Fokus auf Social Capital; (2) Demonstration und Evaluation des Ansatzes. Zur Erreichung der Zielsetzungen wird die Design Science Research Mothodology (DSRM) nach Peffers et al. (2007) angewendet, welche sechs strukturierte und aufeinander aufbauende Schritte zur Entwicklung von IT-Artefakten bereitstellt. Während in der ersten und zweiten Phase die Problemstellung erarbeitet und die Ziele für das Artefakt motiviert und spezifiziert werden, hat die Entwicklung des Erfolgsmessansatzes (Phase 3) eine zentrale Bedeutung. Anschließend folgen die Phasen zur Demonstration, welche anhand eines Datensatzes einer Partnerfirma durchgeführt wird, und zur Evaluation, in der ein Experte interviewt wird.

Bei der Entwicklung des Messansatzes haben die Ergebnisse aus Beitrag 3 (siehe Kapitel 2.3) eine zentrale Bedeutung, da in diesem die Benefits der IT Capability Social Capital identifiziert werden. Diese definieren den Erfolg in dieser Capability und werden daher mittels bereits existierender Methoden und Metriken, die in der Literatur identifiziert wurden, in Workshops mit Experten den Benefits zugeordnet. Der Fokus liegt hier darauf, alle inhaltlichen Aspekte jedes einzelnen Benefits vollständig und zielgerichtet mittels Methoden und Metriken abzudecken. Als Ergebnis können für die Benefits der Capability Social Capital insgesamt 32 Methoden und Metriken identifiziert werden, welche in der darauffolgenden Fallstudie demonstriert werden. Für die Demonstration des Messansatzes wird zunächst ein kompletter Datenextrakt des Tools Microsoft Yammer, das in einer IT-Beratung eingesetzt wird, aufbereitet und im Anschluss werden die Metriken angewendet. Um die Güte des Messansatzes und die Ergebnisse bei der Anwendung bewerten zu können (Evaluation), wird dann ein Interview mit dem Chief Technology Officer der Firma geführt. Der Messansatz wird in Bezug auf die Güte in den beiden Kriterien Vollständigkeit und Zielgerichtetheit als überwiegend positiv bewertet und als hilfreich bezüglich der Erfolgsmessung angesehen. Schließlich werden weitere Einsatzpotentiale des Messansatzes, zum Beispiel zur Entscheidungsfindung, diskutiert.

4.2 Beitrag für Wissenschaft und Praxis

Durch die Forschungsergebnisse in dieser Dissertation profitieren sowohl die Wissenschaft als auch die Praxis, insbesondere im Kontext der beiden thematischen Schwerpunkte BPM und ESN.

Zunächst zeigt die Erhebung zur Umsetzung von BPM-Maßnahmen in KMU den aktuellen Stand der Adaption auf, besonders welche von diesen erfolgreich umgesetzt werden und welche Probleme bereiten. Zum Beispiel sind einige Probleme darauf zurückzuführen, dass bestehenden BPM -Methoden und -Techniken nicht auf die spezifischen Strukturen und Eigenschaften von KMU angepasst sind. Dadurch können anschließend Empfehlungen abgegeben werden, wie diese anzupassen, zu erweitern oder neu zu entwickeln sind. Des Weiteren wurden Ursachen identifiziert,

wodurch eine Adaption von BPM-Maßnahmen in KMU erschwert oder gar verhindert wird, wie zum Beispiel fehlende Kenntnisse bezüglich der Prozessmodellierung. Um den Unternehmen hier eine Hilfestellung zu geben und diesen Problemen entgegenzuwirken, werden zusätzlich Hinweise für KMU gegeben, wie einzelne Probleme behoben werden können, um das BPM zielgerichtet in der eigenen Firma zu verankern und einzusetzen (Braunnagel et al., 2016). Auch wurden durch die Evaluation von einzelnen BPI-Pattern wichtige Erkenntnisse erlangt. Durch das Simulationsexperiment konnte gezeigt werden, dass die Anwendung von BPI-Pattern überwiegend positive Effekte auf die Prozesse in Bezug auf Kosten und Zeiten erzielen. Da die BPI-Pattern jedoch auch in wenigen Fällen zu negativen Resultaten führten, wurden die einzelnen Szenarien hinsichtlich fördernder und hindernder Faktoren untersucht, sodass das BPI-Pattern-Datenmodell nun um diese Faktoren erweitert werden kann. Ebenfalls wurden für die angewendeten BPI-Pattern diese Faktoren detailliert beschrieben. Dies ermöglicht es den Unternehmen anhand der eigenen Rahmenbedingungen besser abschätzen zu können, ob der Einsatz eines BPI-Pattern erfolgversprechend ist, wobei dadurch der Prozess der BPI-Pattern-Selektion maßgeblich unterstützt wird. Aufgrund der Evaluation wird außerdem für die Praxis nachgewiesen, dass der Einsatz von BPI-Pattern für das eigene Unternehmen wirkungsvolle vordefinierte Muster zur Verbesserung zur Verfügung stellt (Lang et al., 2015). Die Entwicklung von Metriken zur Erhebung kultureller Aspekte anhand von Prozessmodellen bietet Vorteile gegenüber existierenden Lösungen. Bisher wurde die nationale Kultur überwiegend mittels Fragebögen und Interviews erhoben. Metriken, die auf Prozessmodelle angewendet werden, spiegeln jedoch die kulturellen Eigenschaften auf Basis von dokumentierten Handlungen der Mitarbeiter wieder, wodurch die kulturellen Eigenschaften unverfälscht und transparent offengelegt werden. In der Praxis können die Metriken in verschiedenen Phasen des BPM-Lebenszyklus angewendet werden, zum Beispiel während des Prozessdesigns und der Prozessanalyse. Ebenfalls können im Falle von Unternehmensakquisitionen die Prozesse, die zusammengeführt werden sollen, auf ihre kulturelle Kompatibilität geprüft werden (Wehner et al., 2017b).

Die Literaturübersicht zum Themengebiet Enterprise Social Networks unterstützt die Wissenschaft in zweierlei Hinsicht. Durch die Entwicklung des Frameworks zur Strukturierung der Beiträge und die detaillierte Inhaltsanalyse ist es Forschern möglich die Beiträge in den Themengebieten von Interesse direkt und schnell zu identifizieren. Zusätzlich wurden relevante Forschungsfragen definiert, die Anhaltspunkte für die weitere Forschung im Bereich ESN bieten. Für die Praxis ist das schnelle Auffinden der Artikel ebenfalls von Belang, da Unternehmen unter den vielen identifizierten Fallstudien auf Lösungsansätze für bestehende Probleme zurückgreifen können (Wehner et al., 2017c). Die Analyse der ESN-Literatur hinsichtlich zu erreichender Benefits bietet zudem einige Vorteile. Zunächst wird aufgezeigt, welche Benefits durch die Nutzung von ESN erreichbar sind. Der Abgleich mit den IT Capabilities nach Davenport und Short (1990) zeigt, dass vor allem fünf der acht IT Capabilities stark durch ESN unterstützt werden. Zusätzlich

wurde eine neue IT Capability identifiziert: Social Capital. Diese bietet Ansatzpunkte für weitere Forschung, zum Beispiel für den darauf aufbauenden Beitrag zur Erfolgsmessung der Dimension Social Capital (siehe Kapitel 2.6, Beitrag 6). Durch die Auflistung der ESN Benefits bekommen Praktiker einen Überblick, was sie im eigenen Unternehmen durch die Einführung des ESN erwarten bzw. sich nicht erhoffen dürfen. Unternehmen, die bereits ein ESN verwenden, bekommen einen Überblick, welche Benefits sie durch die Nutzung noch erreichen können, wenn sie dieses noch zielgerichteter einsetzen (Wehner et al., 2017a). Aufbauend auf den Benefits der IT Capability Social Capital wird anschließend ein Erfolgsmesskonzept für diese Capability definiert. In diesem Konzept werden die einzelnen Benefits operationalisiert, demonstriert und evaluiert. Dieses kann nun dafür verwendet werden, um die sozialen Auswirkungen durch die ESN-Nutzung zu bewerten, um diese zielgerichteter zu steuern. Die praktische Relevanz und der Mehrwert des Konzeptes wurden in einem Interview bestätigt, sodass unterstützen zum Beispiel die Ergebnisse bei der Anwendung des Messkonzeptes die Entscheidungsfindung. Anschließend werden auch für die Erfolgsmessung mit Fokus auf soziale Aspekte in ESN weitere Forschungsfelder identifiziert und beschrieben (Wehner, 2018).

Während sich die sechs Beiträge, die in dieser Dissertation vorgestellt werden, entweder schwerpunktmäßig mit dem Thema BPM oder ESN auseinandersetzen, wurde in Kapitel 3 vorgestellt, dass auch durch deren kombinierten Einsatz, im Speziellen durch die Nutzung des ESN in den Phasen des BPM-Lebenszyklus oder aber durch die Anwendung des ESN zur Unterstützung bei der Ausführung von Prozessen, weitere Nutzenpotentiale zu erwarten sind. An der Schnittstelle zwischen BPM und ESN besteht jedoch noch weiterer Forschungsbedarf.

4.3 Kritische Würdigung

Die in dieser Dissertation vorgestellten Forschungsergebnisse sollen im Folgenden jedoch auch kritisch hinterfragt werden, was in Form von Limitationen erfolgt.

Bei der Erhebung der Umsetzung von BPM-Maßnahmen in KMU haben sich zehn Firmen für die Interviews und Durchführung der BPM-Initiativen bereit erklärt. Diese haben sich jedoch womöglich nur für die Zusammenarbeit bereit erklärt, weil sie bereits Interesse an BPM hatten. Daher kann nicht ausgeschlossen werden, dass diese nicht repräsentativ für die Gesamtheit der KMU stehen. Des Weiteren wurden bei der Interpretation der Ergebnisse aus den BPM-Initiativen die fördernden und hindernden Faktoren auf Basis der Mitschriften und Tonaufnahmen identifiziert. Obwohl dieser Vorgang von zwei Wissenschaftlern durchgeführt wurde, könnten die Ergebnisse dennoch subjektiv falsch interpretiert worden sein (Braunnagel et al., 2016).

Bei der Erarbeitung der Literaturübersicht im Bereich ESN wurden die Artikel nur bis einschließlich 2015 identifiziert, sodass neuartige Literatur ab 2016 nicht mehr berücksichtigt wurde. Vor

allem in einem Forschungsgebiet in dem jährlich eine Vielzahl neuer Artikel veröffentlicht wird, ist es nötig, diese auch weiterhin in das bestehende Framework einzuordnen und die Themenfelder zu identifizieren, um auf dem aktuellen Stand zu bleiben. Des Weiteren kann nicht ausgeschlossen werden, dass im Selektionsprozess unbeabsichtigt relevante Artikel aussortiert wurden, auch wenn dieser Vorgang von zwei Wissenschaftlern durchgeführt wurde (Wehner et al., 2017c). Die anschließende Analyse zur Identifikation von ESN Benefits und deren Zuordnung zu den IT Capabilities (Beitrag 3) unterliegt der Restriktion, dass nur Benefits identifiziert werden konnten, die in den Fallstudien beschrieben wurden. Die Vollständigkeit der Liste an Benefits ist daher in Frage zu stellen. Auch sind einige Benefits nur in einzelnen Fallstudien beschrieben, sodass nicht gewährleistet ist, dass diese auch auf andere Unternehmen übertragbar sind. Negative Auswirkungen durch die Nutzung von ESN wurden ebenfalls nicht analysiert, die – im schlimmsten Fall – die Benefits vollständig kompensieren könnten (Wehner et al., 2017a).

Bei der Evaluation von BPI-Pattern durch die Simulation wurden aktuell nur die Auswirkungen auf Kosten und Zeiten berücksichtigt. Die von Falk et al. (2013a) beschriebenen Dimensionen Qualität und Flexibilität standen nicht im Fokus, sodass nicht sichergestellt werden kann, dass durch die Anwendung der simulierten BPI-Pattern negative Folgen in diesen beiden Dimensionen auftreten. Des Weiteren wurden Prozesse aus nur einem Sektor (universitäres Umfeld) simuliert, was die Generalisierbarkeit der Ergebnisse zu Teilen in Frage stellt (Lang et al., 2015).

Bei der Anwendung der Metriken zur Erhebung der Kultur in Prozessmodellen ist zu beachten, dass Prozesse – neben der nationalen Kultur – weiteren Einflüssen unterliegen oder aber dass deren Zielsetzungen klar entgegen einer Ausrichtung auf die kulturellen Interessen zielen, zum Bespiel bei Kostenreduktionen. Zusätzlich wurden aktuell nur drei Dimensionen in Bezug auf die nationale Kultur operationalisiert. Weitere Dimensionen der nationalen Kultur oder aber auch Dimensionen der Organisationskultur könnten abweichende Ergebnisse zeigen (Wehner et al., 2017b).

Zur Messung des Erfolgs von ESN in der IT Capability Social Capital liegen vor allem für die Phase der Evaluation im DSRM Limitationen vor. Die Evaluation durch ein einzelnes Interview spiegelt im Besonderen die subjektive Meinung des Interviewpartners wieder und gibt deshalb nur einen ersten Einblick in die Güte des Messansatzes. Eine breite Evaluation fehlt jedoch noch. Zusätzlich wurden aktuell nur Metriken eingesetzt, die auf den bereitgestellten Datensatz angewendet werden konnten (direct metrics). Metriken, die auf die Wahrnehmung der Mitarbeiter durch die ESN-Nutzung abzielen (indirect measures) wurden noch nicht erhoben, sodass nicht alle Kategorien an Benefits vollständig bewertet wurden (Wehner, 2018).

4.4 Ausblick

Nach der Beschreibung der Limitationen werden in diesem Kapitel weitere interessante Forschungsfelder aufgezeigt.

Im Bereich des BPM stellen die Ergebnisse der Dissertation eine Grundlage für weitere Forschungsfragen bereit. Zunächst zeigt die Erhebung des aktuellen Standes von BPM-Maßnahmen in KMU Probleme und Lücken in Bezug auf BPM-Methoden und -Techniken auf, die auf die Besonderheiten vom KMU zurückzuführen sind. Zum Beispiel zeigen die Ergebnisse, dass KMU die bestehenden BPM-Ansätze als zu komplex einstufen, sodass hier ein Bedarf an für KMU ausgerichtete Ansätze und spezielle Schulungen sichtbar wird. Des Weiteren wurde die Umfrage ausschließlich in Bayern durchgeführt, um die Inhalte der Fallstudien in einer strukturähnlichen Region abzufragen. Eine Ausweitung der Umfrage auf andere (Bundes-)Länder wird weitere Einblicke in die strukturellen Unterschiede zeigen (Braunnagel et al., 2016).

Nachdem einzelne BPI-Pattern (Lang et al., 2015) evaluiert wurden, ist im nächsten Schritt auf konzeptioneller Ebene eine Erweiterung des Datenmodells um fördernde und hindernde Faktor sinnvoll, um dem Nutzer eine noch bessere Entscheidungsgrundlage zu liefern. Weiterhin ist die Implementierung des Ansatzes in Form einer Softwarelösung notwendig. Diese soll die Erfassung und Verwaltung von BPI-Pattern erleichtern und den Auswahlprozess von passgenauen BPI-Pattern für das jeweilige Problem bzw. die jeweiligen Anforderungen unterstützen. Abschließend sind die Effekte bei der Anwendung von BPI-Pattern über einen längeren Zeitraum zu betrachten, um die Vorteile gegenüber anderen Methoden in BPM-Initiativen besser bemessen zu können (Lang et al., 2015).

Nach der Definition und Anwendung der Metriken zur Erhebung kultureller Eigenschaften auf Basis von Geschäftsprozessen müssen diese im Folgenden evaluiert werden. Hierzu können diese in weiteren Unternehmen und Ländern und auf andere Geschäftsprozesse angewendet werden, wobei beachtet werden muss, dass die dokumentierten Prozesse noch zu definierende Qualitätskriterien erfüllen müssen. Zusätzlich ist interessant, wie weitere Dimensionen kultureller Ausprägungen in Geschäftsprozessen gemessen werden können. Auf nationaler Ebene wären diese zum Beispiel Maskulinität bzw. Femininität (Hofstede, 1983) und die Langzeitorientierung (House et al., 2004). Auch kann das Messkonzept zur Erhebung von Werten der Organisationskultur herangezogen werden (Wehner et al., 2017b).

Im Bereich ESN gibt der Beitrag zur Übersicht der Literatur eine Vielzahl weiterer möglicher Forschungsbereiche wieder. Durch die Identifizierung der Forschungslücken und der darauf aufbauenden Forschungsagenda werden drei Bereiche für weiteren Forschungsbedarf beschrieben: der erste Bereich bezieht sich auf den individuellen ESN-Nutzer, zum Beispiel wie sich durch die

ESN-Nutzung die Beziehungen zwischen Mitarbeitern/innen verändern und welche negativen Effekte (z.B. Suchtverhalten) das ESN mit sich bringt; der zweite Bereich umfasst technische Fragestellungen hinsichtlich der Gestaltung des ESN, zum Beispiel wie die optimale Zusammensetzung von ESN-Funktionalitäten für verschiedene Nutzergruppen gestaltet werden kann und wie sich bestehende ESN-Softwarelösungen unterscheiden; der dritte Bereich befasst sich mit den Auswirkungen, Nutzungsmöglichkeiten und Anforderungen an das Unternehmen, zum Beispiel welche kulturellen Ausprägungen in einer Organisation fördernd oder hindernd bei der ESN-Einführung wirken, wie sich die Unternehmensgröße auf die ESN-Nutzung auswirkt und wie sich die Innovationsprozesse ändern müssen, um die Vorteile von ESN optimal nutzen zu können (Wehner et al., 2017c).

Im zweiten Beitrag zu ESN wurden die Benefits durch die ESN-Nutzung und der Abgleich mit den IT Capabilities nach Davenport und Short (1990) präsentiert. Dies dient als Grundlage, um im nächsten Schritt die Einflussfaktoren zu identifizieren, welche sich fördernd oder hindernd auf die Erreichung der Benefits auswirken. Zusätzlich bietet eine Umfrage interessante Einblicke, in welchem Umfang die Benefits in Unternehmen erzielt werden, wodurch ebenfalls ermöglicht wird, die Nutzergruppe hinsichtlich der erreichten Benefits zu strukturieren, zum Beispiel, ob Mitarbeiter im Home-Office das ESN intensiver nutzen und sich damit besser in den unternehmerischen Alltag einbringen als Mitarbeiter, die im Büro persönlich mit Kollegen/innen interagieren (Wehner et al., 2017a).

Damit ein Nachweis für die Erreichung von Benefits erbracht werden kann, wurden Methoden und Metriken in der IT Capability Social Capital vorgestellt und in einer Fallstudie angewendet (Beitrag 6). Um die Güte des Ansatzes und die adäquate Abbildung der Benefits in Form der Messgrößen zu bewerten, ist es notwendig, diese in weiteren Diskussionsrunden mit Experten zu evaluieren und gegebenenfalls zu erweitern. Schließlich ist es erforderlich die Praxistauglichkeit in einem breiteren Umfeld unter Beweis zu stellen, das Messkonzept in Firmen verschiedener Branchen anzuwenden und die Ergebnisse auf ihre Aussagekräftigkeit zur Bewertung des Erfolgs zu überprüfen. Dabei soll der Fokus auf den Messgrößen liegen, die bisher nicht erhoben wurden, da sie auf den Wahrnehmungen der Mitarbeiter beruhen und nicht über die Log-Daten gemessen werden können (indirect measures). Um den Vorgang der Datenanalyse zu beschleunigen bzw. zu automatisieren, ist eine Softwarelösung hilfreich, die die Ergebnisse in Form eines Dashboards aufzeigt.

Literaturverzeichnis

Hinweis: Die hier angegebene Literatur wird in den Kapiteln 1, 3 und 4 referenziert. In Kapitel 2 wird je Forschungsbeitrag die referenzierte Literatur im Anschluss an den Beitrag gelistet.

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