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Examining and Comparing the Critical Success Factors Between Business Process Management and Business Process Automation

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ABSTRACT

Organizations constantly seek for means of improving their business processes to remain competitive. Recently, much effort has been devoted to business process automation (BPA) projects. However, it has been unclear how these projects differ from traditional business process management (BPM) projects and which critical success factors (CSFs) play a crucial role. This study comparatively assesses how CSFs change for BPA with respect to BPM. Using a survey sample of 139 BPM and BPA experts, the study shows that top management support as a CSF warrants attention for BPM than BPA, while the importance of choosing project methodology significantly differs for BPM and BPA. The comparison between lightweight and heavyweight BPA types indicates that the top management support is relatively less critical for lightweight BPA. The explorative and fsQCA analyses provide insights about the patterns for industries with different IT strategic roles, expert perspectives, and among CSFs. Overall, the findings may help project managers assess the role of key CSFs better based on project focus.

KEYWORDS

Business Process Automation, Business Process Management, Critical Success Factors, Heavyweight BPA, Lightweight BPA

INTRODUCTION

Business Process Automation (BPA) promises a plethora of opportunities to organizations such as cost reductions, improved operational efficiency, reduced errors, enhanced allocation of the workforce, and higher reliability and quality in business processes. The growing market of process automation solutions shows that companies are increasingly investing in BPA projects [1]. BPA solutions are offered

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by vendors with a variety of names such as BPM suite, BPM system, BPM platform, or BPA tool (e.g., Srivastava et al., 2020, 2021). These market solutions provide the IT systems for automating tasks and processes in the organizations, without much focus on analyzing, improving, and governing business processes. BPA is seen as an important factor to survive in a competitive market (Mevius et al., 2013). However, in the literature, BPA and the factors affecting its implementation have not been investigated separately from the broad discipline of Business Process Management (BPM) (Buh et al., 2015). BPM provides a holistic set of principles, methods, and tools to organizations to manage processes from end to end, covering the identification, definition, analysis, redesign, implementation, monitoring, and lastly, continuous improvement of processes (Dumas et al., 2018; van der Aalst et al., 2016). While process automation is a typical and core endeavor as part of the implementation phase of the BPM life cycle, it is not necessarily performed in all BPM projects (van der Aalst et al., 2016). An organization can also refer to a BPM initiative as a project that has mainly or solely process automation in its focus (de Bruin & Doebeli, 2015). BPA projects may have a different context than typical BPM projects; thus, the factors for their successful execution may differ (vom Brocke et al., 2016).Capitalizing on the increasing availability of advanced digitalization opportunities, e.g., Artificial Intelligence (AI), Industry 4.0, and Internet of Things (IoT), BPA projects are even more prevalent in organizations (Baier et al., 2022; Collins et al., 2021). However, organizations cannot obtain value from BPA if they do not define and analyze the processes they want to automate (Meidan et al., 2017). In summary, BPM and BPA are interrelated since a BPM project would typically involve BPA, though not in its core, and a BPA project would implement at least part of BPM activities, though not explicitly. This interrelated nature warrants not only the relevance of exploiting project management practices from each other for BPM and BPA but also the need for analyzing specific practices for their success separately.

Critical Success Factors (CSFs) are the conditions that can influence the successful performance of a project during its conduct (Bai & Sarkis, 2013). CSFs help to observe the areas that require specific attention and manage the project better. The identification of CSFs and their evaluation in diverse organizational settings have been a focus of interest in the BPM literature (Buh et al., 2015). Current studies have mostly identified a holistic and generic set of CSFs to support BPM projects (Gabryelczyk & Roztocki, 2018; Rizk et al., 2020; Rosemann & vom Brocke, 2015; Trkman, 2010; vom Brocke et al., 2016). How applicable these CSFs are to BPA projects, however, has remained rather unexplored. Analysis of CSFs related to enterprise systems that include process automation features, such as ERP, is a related line of research. However, those studies have mostly approached the topic from a broad IT adoption or BPM view (Al-Mudimigh, 2007; Alibabaei et al., 2009; Chang et al., 2010).

The goal of this study is firstly to examine how key BPM CSFs compare to and differ for the success of BPA projects and secondly, to investigate how the type of BPA projects can alter the importance of CSFs. To this end, we distinguish between two types of automation, heavyweight and lightweight BPA. Heavyweight BPA refers to traditional systems that run on functional and data layers in the IT architecture, whereas lightweight BPA accesses other systems through presentation layer (Willcocks et al., 2015). Heavyweight BPA provide enterprise-wide automation solutions that helps organizations align multiple business processes, such as Enterprise Resource Planning (ERP) (Penttinen et al., 2018). Through lightweight BPA, organizations can transform their back offices and improve service quality by automating tedious tasks in specific processes through rapid development, such as Robotic Process Automation (RPA) (Collins et al., 2021). Organizations make a selection among these two BPA types and perform similar project activities as they develop one, since the goal is to automate processes in both types (Penttinen et al., 2018). However, heavyweight and lightweight BPA projects may have different CSFs due to the differences in their complexity, methodology, cost, and typical duration (Bygstad, 2017). The understanding of the relevance of CSFs to BPA types is not well-developed in the current literature.

To achieve our goal, we apply a three-step approach in this study. First, we derive CSFs from the BPM literature, which were then refined with expert interviews. Afterward, an online expert survey was designed, and data was collected from 139 experts from 20 different industries working on BPM and BPA. The survey data was analyzed to compare the perceived importance of CSFs by experts across BPM and BPA projects and between heavyweight and lightweight BPA projects.

We find that the importance of top management support and implementation methodology differs between BPM and BPA projects. The analysis also shows that business-IT alignment has different importance for heavy and lightweight BPA projects. Contrary to our expectations, we did not find a significant difference in the importance of goal communication and training and empowerment of project employees between BPM and BPA while these CSFs were generally perceived to be of high importance.

The results of the study are twofold. On the one hand, we gain an understanding of important CSFs specific to BPA by relying on the established set of CSFs in the more mature BPM literature. Moreover, the comparison of heavy- and lightweight BPA shows which factors differ or concur in both BPA types. At a practical level, the comparison of CSFs for BPM and BPA can help project managers and other stakeholders take the right action to promote project success specifically for BPA projects or BPA-related activities in BPM projects while reducing associated costs and efforts.

The study is structured as follows. In section 2, we discuss the literature on BPM, BPA, and critical success factors, and based on this literature, set out our research objectives and develop our hypotheses. Section 3 introduces the research methodology that we used to evaluate our hypotheses, including the survey design and data collection. In Section 4, we present the results that include descriptive analysis and the test of hypotheses. We further compare CSFs for industries with different IT strategic role and for expert perspective and explore CSF patterns with fuzzy set Qualitative Comparative Analysis (fsQCA) to provide additional insights on our findings. Section 5 includes a conclusion along with the discussion of the implications of our study for research and practice, and limitations and future work directions.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

In this section, we first present an overview of the literature and provide background information on the concepts of BPM and BPA, and the relevance and importance of CSFs for them. We then proceed with developing our hypotheses regarding specific CSFs for BPM and BPA projects.

Business Process Management and Business Process Automation

BPM covers the planning, analyzing, designing, monitoring, and optimizing of an organization's processes with an end-to-end perspective (Rosemann & vom Brocke, 2015; Trkman, 2010; vom Brocke et al., 2016). It combines the knowledge from management, information technology (IT), and engineering disciplines to continuously improve business processes (van der Aalst et al., 2016). BPM as a management approach investigates the factors related to the adoption and success of BPM (de Bruin & Doebeli, 2015), achieving process orientation (Leyer et al., 2020), and, as a result, improving performance in the organizations (vom Brocke & Rosemann, 2015).

BPM is typically implemented as a lifecycle, which includes all activities related to understanding, defining, analyzing, implementing, and monitoring business processes (Dumas et al., 2018). The technological component, the development of Information Technology (IT) solutions to automate business processes, is an essential element of the BPM lifecycle as part of process implementation (Rosemann & vom Brocke, 2015). However, the success and adoption of BPM are heavily contextual, and, thus, its implementation may vary based on the situational factors (Gabryelczyk & Roztocki, 2018; Zelt et al., 2019). Based on the situation, the focus of a BPM project may or may not be on process automation, or it may not involve any kind of systems development for the automation of processes (van der Aalst et al., 2016). On the contrary, some BPM projects may have process automation at their

core (vom Brocke et al., 2016), or they can solely refer to the development of information systems for process automation (de Bruin & Doebeli, 2015).

Process automation is a long-studied topic on its own. Process automation systems support process stakeholders in performing their processes-related tasks (Dumas et al., 2018). Thus, an IT system for process automation is specifically geared towards executing processes and tasks. Implementing process automation technologies can be an extensive and costly initiative for organizations since they are typically complex systems that require heavy infrastructure and integration with other IT systems (Dumas et al., 2005). Nonetheless, with the advent of emerging technologies (e.g., robotic process automation), process automation is deemed less expensive and brings a quick and high return on investments (Ronanki & Davenport, 2018). As a result, many organizations have begun to invest in the automation of workflows with the aim to improve their processes while reducing costs (Rizk et al., 2020). Thus, organizations start BPM initiatives to change the way they govern their organizational processes, while those initiatives are mostly driven by the strategic use of process automation technologies as the technological aspect (Letts & Tran, 2020). Acknowledging the importance of implementing BPM for organizations, there has been an ongoing line of research on identifying and analyzing BPM critical success factors (CSF) (e.g., Syed et al. (2018)). However, the success factors related to the implementation of process automation technologies (e.g., the development of ERP systems) have been mostly worked on separately from the BPM perspective (Žabjek et al., 2009). The adoption of even general-purpose IT, the systems not specifically focused on process automation, are shown to impact BPM practices (Lee et al., 2012). Nevertheless, most of the studies on the success factors of BPM implementation have studied BPM in its entirety rather than considering its separate elements and activities such as process implementation (Buh et al., 2015). This implies that the CSFs considered specifically for BPM implementation warrant a critical assessment when linked to BPA. Surprisingly, the extant BPM and BPA literature is unclear on the extent to which the CSFs of BPM also apply for BPA. Therefore, we define our first research objective:

RO 1: Identify influential BPM critical success factors and compare their importance between BPM and BPA projects.

BPA projects focus on implementing process automation technologies to execute processes in the digital environment within an organization for the purpose of improving efficiency and reliability (Meidan et al., 2017). Initial process automation projects date back to the 1990s, which uses the concept of workflow management (WFM) systems built based on the definition of a process to be automated (van der Aalst et al., 2016). Later, they have been followed by more advanced BPM systems (BPMSs) that can execute processes based on explicit process models (Meidan et al., 2017). Nowadays, process automation technologies are available in the market with various names such as process automation tool, BPM suite, BPM system, and BPM platform. Process automation is also achieved through domain-specific systems such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), or Supply Chain Management (SCM) systems (Dumas et al., 2018). All these systems are categorized under the name of "Process-Aware Information Systems (PAIS)", which are extensive technologies that aim to execute business processes from end to end while possibly also connecting other systems and technologies (van der Aalst et al., 2016). Typically, such systems are categorized as heavyweight technologies (Bygstad, 2017).

In contrast to the heavyweight technologies, recently, lightweight technological applications have seen prevalent use in organizations in the last decade (Bygstad, 2017). Lightweight technology refers to business applications that do not require the development of invasive solutions, can be implemented outside IT departments, and can run as independent applications on end-user devices (Bygstad & Iden, 2017). Heavyweight BPA solutions, such as ERP, CRM, and BPMS, require the development of extensive back-end solutions that run in centralized or distributed technological infrastructure (Bygstad, 2017). In contrast, lightweight BPA targets the automation of individual tasks in a process

with a technology non-intrusive to other systems. A typical example of lightweight BPA is Robotic Process Automation (RPA), which is used to automate repetitive tasks in business processes by operating on the user interface of other systems (van der Aalst et al., 2018).

The three-tier architecture model is used to highlight the difference between the heavy and lightweight BPA, which is composed of the layers of presentation, functional, and data. Heavyweight BPA solutions implement the last two architectural layers, data and functional, whereas lightweight BPA refers to software running on the presentation layer (front-end) (Bygstad, 2017). From a practical standpoint, the deployment of software on the presentation layer is easier to implement, requires less specialized skills, and has a shorter time-to-market. On the other hand, the development and deployment of software on the application and data layer is more time-consuming, requires special knowledge, and is consequently more expensive. However, software deployed on the presentational layer can handle a lower amount of transactional data (Osmundsen et al., 2019; Penttinen et al., 2018). Lightweight BPA can interact with multiple systems to automate processes that are highly rule-based, standardized, mature, and highly repetitive (Ivančić et al., 2019). Lightweight BPA solutions can be deployed as quickly as six weeks in organizations (Syed et al., 2020).

While the characterization of these two BPA types is well articulated in the literature, our understanding of the relevance of CSFs to BPA types is somewhat underdeveloped. Just as BPM and BPA projects are not distinguished, the implementation of different automation types is also not considered differently in the context of BPM. Consequently, it is of interest to examine if the two BPA projects should be treated differently. Especially, the existing BPM and BPA literature does not examine if the relevance of CSFs weighs equally for both heavy and lightweight BPA. Thus, as the second research objective of the study, we aim to examine whether the CSFs identified for BPM and BPA further matter in the context of heavyweight and lightweight IT.

RO 2: Analyze how the importance of critical success factors differs between heavyweight and lightweight BPA projects.

Hypothesis Development

CSFs are the factors that require particular attention to ensure high performance, leading to project success (Boynton & Zmud, 1984). The concept of CSF is context-dependent, meaning that CSFs would differ for diverse contexts and organizational situations (Boynton & Zmud, 1984; Syed et al., 2018). However, CSFs are examined mostly with a holistic BPM perspective (Alibabaei et al., 2009; do Amaral Castro et al., 2019) and occasionally specifically for BPM systems implementation (Ravesteyn & Batenburg, 2010). CSF-related studies have been conducted in the BPM field on a particular step of BPM life cycle but not specifically in relation to BPA. An example is the success factors identified for business process modeling projects (Bandara et al., 2021). Since process modeling is an activity focused on the step of defining processes in the BPM life cycle (Dumas et al., 2018), the findings of this study are not directly applicable to higher level BPM initiatives. Similarly, the study of process mining project success factors relates to BPM initiatives, but process mining, as for process modeling, is directed to process definition step through process discovery from data (Mamudu et al., 2022). The study of success factors for explorative process change through digitalization is also insightful for BPM initiatives, while it mainly provides insights for innovation management and not necessarily covers process automation (Baier et al., 2022). This overview justifies the need for our inquiry into whether CSFs, which have an extensive and mature presence in the BPM context, are also relevant and applicable for BPA projects and different automation types. Understanding the differences in CSFs would help organizations understand different success factors relevant for BPM project types and manage the projects accordingly.

CSFs have also been investigated in the context of other related enterprise information systems, such as ERP systems. Such systems are closely related to process automation since one of the main

goals of implementing them is automating and integrating business processes (Jarrar et al., 2000). Focusing on this goal, many CSF studies about enterprise systems investigated them in the context of BPM (e.g., Al-Mudimigh, 2007). In our study, we consider this research line relevant to our research in the context of BPM and BPA. Enterprise systems also provide additional functionalities such as financial and cost accounting and computer integrated manufacturing (Žabjek et al., 2009). Therefore, other line of research has investigated CSFs related to these systems from a broad IT adoption view (e.g., Chang et al., 2010). We recognize this as a separate line of research and exclude from our CSF analysis. Recently, a related body of knowledge has developed on the analysis of CSFs for data analytics (DA) and business intelligence (BI) (e.g., (Adrian et al., 2017; Al-Sai et al., 2020; Miller, 2018)) projects. Implementation of DA and BI technologies is strongly related to BPM since they heavily rely on data produced during the execution of business processes through BPA systems to generate business insights (Miller, 2018). These technologies differ from BPA since they are developed as decision-support tools aimed to be primarily used by higher management and offering algorithmic data analysis as the main feature.

In the context of our study, we identified a list of CSFs through a rigorous literature review in combination with expert interviews. Specifically, we first identified major studies that address CSFs in the BPM literature. To identify the most relevant CSF studies, we used a set of keywords on Google Scholar library. The set of key words included: business process management and success factors, business process management system and success factors, process automation and success factors. Our keyword search provided ten key studies that have extensively discussed CSFs in the BPM context. We investigated the listed CSFs in these studies and their degree of importance as found in the empirical and other review studies (e.g., Gabryelczyk & Roztocki, 2018; Ravesteyn & Batenburg, 2010) and identified the most frequently cited and influential CSFs. We report the choice of relevant CSFs and their informing sources in Appendix Part 2. Among them, since we are interested in examining which BPM CSFs apply for BPA, we identified those CSFs that are also relevant for process automation. For this purpose, we referred to the explanation of CSFs in the related articles.

To validate the initial set of CSFs, we performed semi-structured interviews with six experts from five different industries. We chose experts that have at least five years of combined experience in BPM and BPA. The interview protocol included questions to justify the importance of the CSFs and to identify for which project and automation type they are most relevant. Three interviewees added communication as a CSF, which were not retrieved from the initial literature review. Thus, we added this to our list of relevant CSFs. The first three CSFs were confirmed to be applicable for both BPM and BPA projects, whereas the other two, business-IT alignment and training, were found relevant for only automation. Our final set covers a limited but highly impactful and frequent CSFs from the literature also confirmed by practitioners. In this way, we put our efforts on comparing BPM and BPA CSFs on empirically confirmed and influential CSFs as an initial investigation into the topic. Below, we explain the CSFs and present our hypotheses about their difference with respect to project and automation types in conformance with our research objectives.

Top Management Support

Several studies have identified top management support through all phases of BPM projects as an essential factor promoting project success (e.g. Bai & Sarkis, 2013; do Amaral Castro et al., 2019; Trkman, 2010). The top management is often argued to support a BPM project primarily in two ways. First, it is responsible for supporting the decision-making process and mediate between disputing parties (Bai & Sarkis, 2013; Hernaus et al., 2016). Second, to meet the project milestones, the upper management needs to have extensive knowledge of the current project situation and be ready to allocate necessary resources (Bruin & Rosemann, 2006; Ravesteyn & Batenburg, 2010; Syed et al., 2018).

Although the selected literature pointed out the relevance of management support, a potential difference in the relevance between BPM and BPA projects has not been discussed so far. Since BPM projects incorporate an organization's broader process landscape, typically involve more stakeholders,

and generally last longer (Alotaibi & Liu, 2017), it can be expected that BPM initiatives need a higher level of management support than BPA initiatives. In other words, BPA leverage more software tools and techniques to accomplish repetitive tasks (Ivančić et al., 2019) compared to BPM - which is broader in terms of managing end-to-end processes, including relevant human aspects (Cewe et al., 2018). This might suggest that the top management is likely to perceive BPA as more of a technical pursuit when compared to BPM, which in turn reduces their level of focus in BPA. Hence, we hypothesize that:

H1: Experts with BPM project focus assign higher importance to Top Management Support than experts with BPA project focus.

Goal Communication

Communication in IT projects refers to the delivered information between the project management and the affected people (de Carvalho, 2014). The expression and communication of project goals and milestones have been identified as important in both BPM (Alibabaei et al., 2009; Ohtonen & Lainema, 2011) and project management fields (de Carvalho, 2014).

As BPM and BPA projects transform existing processes, employees might fear losing their current status, autonomy, or job (Syed et al., 2018). Consequently, the absence of good communication can result in project failure. When users are not made sufficiently aware of an automation system through proper communication, they have issues with the credibility of the system and do not trust it (Shin et al., 2022). Hence, it is important that the project's goal and the resulting changes are communicated transparently, and trust is established (Chong & Rosemann, 2010). Goal communication is identified to be among the most critical CSFs throughout BPM projects (Buh et al., 2015; Syed et al., 2018). This makes sense since BPM projects are complex and include diverse teams, and, thus, communicating the project goals and progress transparently is essential to ensure the trust and commitment of the stakeholders. On the other hand, since process automation aims to eliminate manual intervention in business processes as much as possible, the focus of "automation" in BPA projects can even lead to a more severe resistance due to the association of automation with job cuts (Schmitz et al., 2019). To avoid employee resistance, it can be expected that a BPA project's goal needs to be communicated more regularly while simultaneously be more transparent than traditional BPM projects. Based on this argument, we formulate the next hypothesis as:

H2: Experts with BPA focus assign higher importance to goal communication than experts with BPM project focus.

Project Methodology

Due to the increasing complexity of software projects, many companies transitioned from a waterfall to an agile or hybrid project methodology in recent years (Gubinelli et al., 2019). The main goal is to make long-term project goals more tangible and less bureaucratic while promoting values such as flexibility, adaptability, and leanness (Thiemich & Puhlmann, 2013).

Given the increasing number of projects executed in an agile way, it is crucial that the desired agility finds appropriate resonance within an organization (Conforto et al., 2016; Tsoy & Staples, 2020). Schmiedel et al. (2015) suggest a three-folded BPM-culture model to evaluate the fit between project methodology and organizational culture, which consists of the BPM culture, the cultural context, and the culture fit. BPM culture is defined as the "to-be culture" and the cultural context as the organization's "as-is culture". The target of the project manager and the team members is to find a way that aligns these two dimensions with each other. Nevertheless, it is challenging to adapt a BPM project to agile methods and techniques due to the typical lifecycle approach of BPM activities and the complexity and broadness of business processes (Aysolmaz et al., 2018).

In comparison to BPM, practices of developing process automation, e.g., by using the technologies of workflow systems or BPMS, are rather new (van der Aalst et al., 2016). Although the development of BPA applications is different than typical software development since it is mainly driven by process models but not code (Aysolmaz et al., 2018), the applicability of agile values and the adaptability of development practices are high (Rizk et al., 2020; Thiemich & Puhlmann, 2013). However, an organization's culture must be adaptable and embrace the values going along with the agile methodology. Consequently, we posit that:

H3: Experts with BPA project focus assign higher importance to the project methodology than experts with BPM project focus.

Business-IT Alignment

The alignment between business and IT has become more relevant in the last years and is one of the main challenges many organizations have to deal with (Rahimi et al., 2016; Syed et al., 2018). The level of alignment is dependent on several factors, such as the cultural relationship and the trust established between business and IT. The reason for the lack of trust lies in the fact that IT decisions are often driven by business executives who do not have the technical insights (Rahimi et al., 2016). On the other hand, IT executives lack the business understanding for certain initiatives. The aim of business-IT alignment is to build mutual trust, promoting project success through the creation of a good relationship between business and IT. Prior studies have discussed the importance of business-IT alignment in the BPM context (Alotaibi & Liu, 2017; Bruin & Rosemann, 2006; do Amaral Castro et al., 2019; Gabryelczyk & Roztocki, 2018; Hertiš & Jurič; vom Brocke & Rosemann, 2015). We assert that the level of IT-business alignment might differ across the type of BPA projects. That is, in lightweight BPA projects, business users can quickly adapt the automated processes with the use of a graphical user interface and avoid additional required specifications to be executed by the IT (Penttinen et al., 2018). Consequently, the role of IT function is somewhat marginalized, as the business side is somewhat independent to address their IT needs. In contrast, heavyweight BPA projects require a stronger IT involvement due to the software deployment on the data layer, which requires IT experts (Osmundsen et al., 2019). Hence, we posit that:

H4: Experts with heavyweight BPA project focus assign higher importance to Business-IT alignment than experts with lightweight BPA focus.

Training & Empowerment

This CSF incorporates the training of employees on professional background, social skills, and expertise about project and process management. It is critical for project success that knowledge gaps are identified, and appropriate training and empowerment measures are undertaken (de Oliveira Dias et al., 2018). Training and empowerment of employees allow independent decision making, resulting in faster case handling (Trkman, 2010). People's understanding and knowledge of an automation system is shown to impact their cognitive processing of the system, which changes their motivation and behavior against the system (Shin, 2022). Employees should accordingly possess a certain level of knowledge to properly assess and commit to the development of a process automation system, even when they are not directly involved in its development. Thus, organizations should fund and support employee training and empowerment to increase the likelihood of project success.

Due to the marginalization of the IT role in lightweight projects and the differences in ownership and development culture, it seems reasonable that the form and intensity of training and empowerment initiatives differ between the two regimes (Osmundsen et al., 2019). On the one hand, heavyweight BPA projects often involve entire IT departments and specialized software developers. On the other hand, lightweight BPA is non-invasive and often driven and designed by business people with

minor involvement of IT. As technology and the underlying processes between the development team and customers differ, it can be argued that lightweight projects might require fewer training and empowerment initiatives than heavyweight does (Bygstad, 2017). Thus, finally, we hypothesize:

H5: Experts with heavyweight BPA project focus assign higher importance to training & empowerment than experts with lightweight BPA focus.

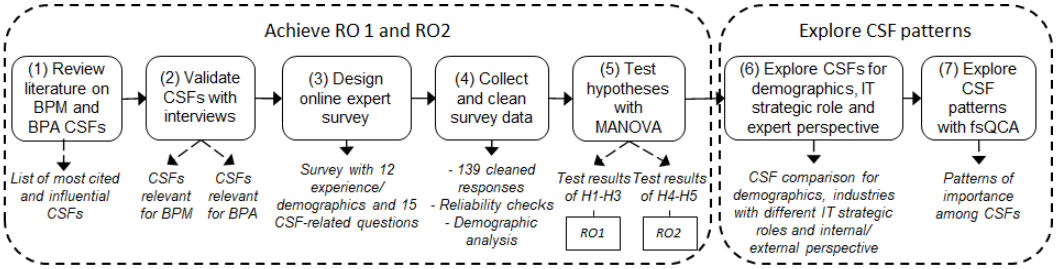
RESEARCH METHODOLOGY

Figure 1 summarizes our overall research process. Steps 1 to 5 are designed to directly fulfill the research objectives RO1 and RO2 whereas the rest of the steps aim to explore relations about CSFs to develop further insights. As explained in the above section, in step 1, we performed a literature review to identify most cited and influential CSFs in the BPM context, and in step 2, we validated the CSFs and their relevance for project and automation type. We then designed an online expert survey, which we describe in this section. In step 4, we collected data using the designed survey, cleaned and checked the reliability of the collected data.

Step 5 includes the testing of hypotheses using the collected data. We address specifically RO1 through hypotheses 1 to 3 since these hypotheses focus on the comparison of CSFs between BPM and BPA projects. Hypotheses 4 and 5 target RO2 by focusing on the type of BPA project, namely heavyweight and lightweight. In steps 6 and 7, we perform exploratory analysis on the importance of CSFs to improve our understanding on the topic. Specifically, step 6 includes the comparison of the importance of CSFs for key demographics, industries with different strategic role of IT, and for internal and external perspective of employees and consultants. In step 7, we use fuzzy set Qualitative Comparative Analysis (fsQCA) to explore patterns among CSFs, i.e., if certain CSFs being evaluated as important or not leading to higher importance of a specific CSF. We report the results of steps 4 to 7 under subsections of the Results section.

An online expert survey was conducted to collect the data for the study. The survey was divided into two parts as presented in Appendix. In the first part, general questions were presented to assess the respondents' BPM/BPA experience and demographic characteristics such as age, gender, education, nationality, industry, job designation, and the current project role. The second and the main part of the survey is devoted to assessing the experts' opinions about the identified CSFs and their perceived importance on project success. From the aforementioned hypotheses, questions related to every particular CSF are formulated based on the analyzed literature. The perceived importance of each CSF is measured through three measurement items, or questions, based on the literature, as presented in Part 2 of Appendix. After the formulation of the questions, the survey draft was sent to interviewed experts to incorporate their feedback in the final design. The survey was implemented on Qualtrics, an online survey platform. The respondents were directed to related questions based on the

Figure 1.
Overview of research process



experience they indicated on the indicated project type (BPM, BPA, and both) and automation type (heavyweight and lightweight BPA). Thus, each respondent was asked to respond to the questions only for the experiences that they reported. To make sure that the respondents understand these concepts properly and report themselves in the right experience category, we explained these concepts clearly and provided examples for each. For example, if the respondents' experience relied heavily on BPM-related activities such as process analysis, modeling, and redesign, they were suggested to choose BPM. If the respondents focused mostly on process automation projects, either lightweight or backend automation, this would require the choice of BPA. The independent groups in this survey are identified based on the indicated experience of the respondents. The groups for project type are the respondents that have experience on "only BPM", "only BPA", and "BPM and BPA". The groups for automation type are "only heavyweight BPA", "only lightweight BPA", and "both heavy and lightweight BPA".

Likert scale of 1 (strongly disagree) to 5 (strongly agree) was used to measure the dependent variable: the importance of each CSF for project success as perceived by the respondents. To be able to capture the perceptions of respondents on these CSFs properly, we presented three questions per CSF, as listed in Part 2 of Appendix, and in our statistical analysis, evaluated the reliability of the answers among those questions. For each CSF, we calculated one value of our dependent variable, the importance of CSF for project success, by adding up the scores of three questions related to the CSF.

To answer our research objectives, it is crucial to reach out to people who have experience in the area of BPM or BPA. We recruited the participants using professional networks and social networks such as XING. Convenience sampling is applied to reach the participants. We strived to reach experts from diverse domains, nationalities, gender, and roles to incorporate diverse views.

RESULTS

Respondent Profile and Item Reliability

In total, 145 respondents finished the questionnaire. After removing the respondents where no consent is given or no BPM or BPA experience was indicated, 139 responses are left for further analysis. 97 of the respondents (69.8%) were male and 42 (30.2%) were female. 21 different nationalities were represented by the respondents, most of them being from European countries (95.7%), divided into 46% from Austria, 16.5% from Germany, and 37.5% from other countries. There is a broad variety also with regard to industry, since participants worked in 20 different industries, with an overproportioned representation of banking (22%) and consumer products (13%).

The age of the respondents varied between 21 to 54, and 80% of the participants are younger than 35 years. Only 17% of the respondents have less than 3 years of experience, 50% have 3 to 6 years, and the rest have more than 7 years of experience. 38.1% of the participants had an internal perspective as employed in the organization the project is performed, 48.9% had an external view working as a consultant, and 12.9% reported to have both views.

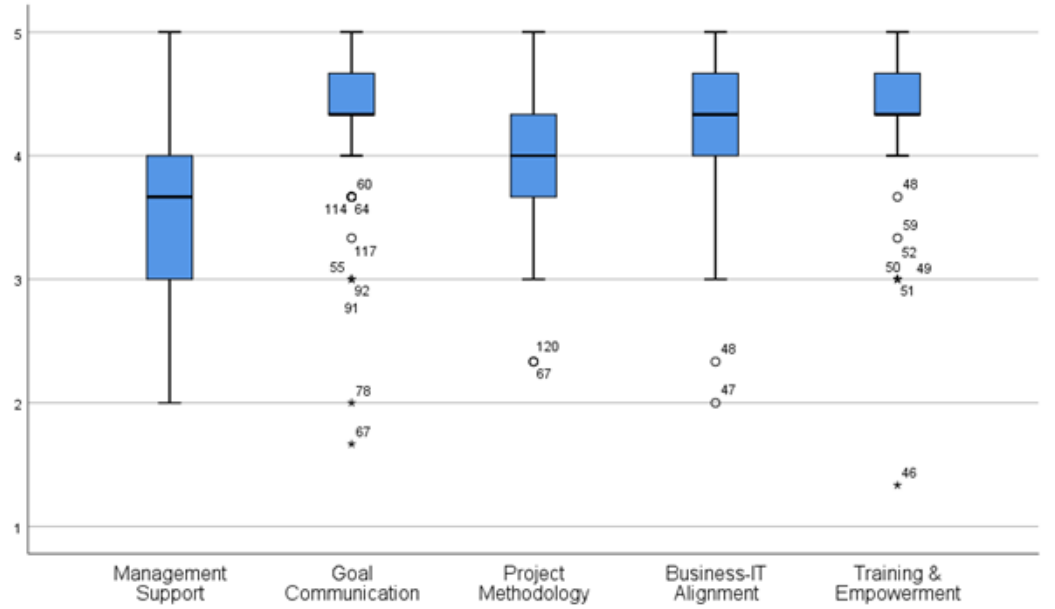
Since we measured each dependent variable, the importance of 5 CSFs, with three items, we calculated the Cronbach's alpha value to evaluate the reliability of each scale. Only one of the variables, project methodology, had a low but still acceptable value of 0.62 (Ursachi et al., 2015), while the rest varied between 0.716 and 0.809.

Figure 2 shows the perception of all respondents for each CSF. The importance of all CSFs was evaluated high (the lowest having a mean of 3.8), which confirms our selection of important and relevant CSFs from the literature.

Test of Hypotheses

We tested H1, H2, and H3, how the first three CSFs differ with respect to project type, with a one-way MANOVA. We first checked the assumptions of MANOVA. Since the samples are sufficiently large (greater than equal to 30, only with one exception of heavyweight BPA sample being 29) and balanced,

Figure 2.
The importance of each CSF (over a scale of 1-strongly disagree to 5-strongly agree)



we assume that the multivariate normality assumption holds. Then, to check any multivariate outliers, we calculated the Mahalanobis distance for the dependent variables and tested their significance through chi-square tests. We found and removed from the data set three outliers for project type-related dependent variables and one outlier for automation-type related dependent variables. We confirmed the linearity between each pair of the dependent variables by visually checking the scatter plots. To check if there are any multicollinearity issues, we calculated the Pearson correlation coefficients among variables. We confirmed that there are no issues since the highest coefficient was observed to be .21. We checked Box's test of equality of covariance matrices. Since we observed insignificant results, we assume the covariance matrices of the dependent variables are equal for different groups in our data set. Since we performed two repeated tests (as described below), we used a Bonferronni adjusted p-value of 0.025.

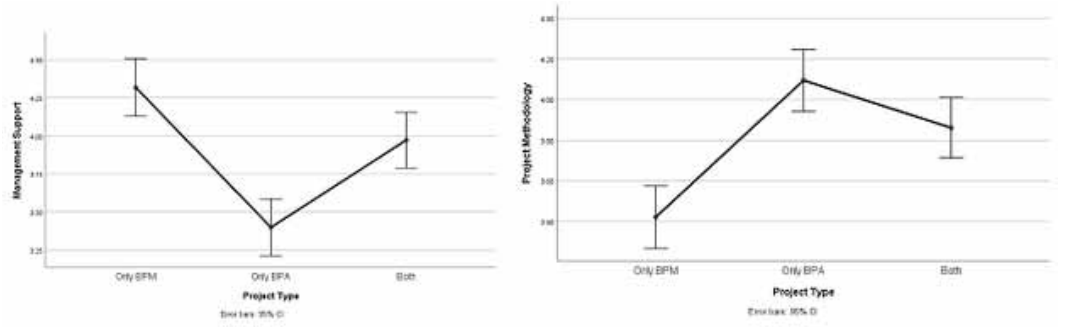
We tested H1 to H3, how the first three CSFs differ with respect to the project type, with a one-way MANOVA tested against the Bonferronni adjusted p-value of 0.025. As seen in Table *1*, the difference between project types is significant for CSF1 Management Support and CSF3 Project Methodology, whereas it is not significantly different for CSF2 Goal Communication. The value of importance assigned by respondents for CSF1 and CSF3 are shown in Figure 3. The mean score for the top management support CSF increased by 0.91 (over 5-point Likert scale) when participants worked at a BPM initiative, and the score lay in between when they worked in both types of projects. A similar observation can be made for the project methodology CSF, for which the mean importance given is 0.65 points higher for BPA projects.

We tested H4 and H5, how the last two CSFs differ with respect to automation type, with a one-way MANOVA tested against the Bonferronni adjusted p-value of 0.025. As seen in Table 2, the difference between automation types is significant for CSF4 Business-IT alignment but not for CSF5 Training & Empowerment. The value of importance assigned by respondents for CSF4 is shown in Figure 4. The importance given to the business-IT alignment CSF is 0.62 points higher

Table 1.
Test of hypotheses for the difference of CSF importance per project type

Hypothesis	CSF	Only BPM (n=44)		Only BPA (n=45)		Both (n=46)		p-value	Support	Partial Eta Sqrd
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.			
H1	CSF1 Top management support	4.3	0.64	3.39	0.60	3.94	0.69	.000	Yes	0.26
H2	CSF2 Goal communication	4.49	0.40	4.43	0.47	4.33	0.41	.210	No	-
H3	CSF3 Project methodology	3.45	.54	4.1	0.52	3.90	0.57	.000	Yes	0.23

Figure 3.
The importance of CSF1 and CSF3 compared for project types (over a scale of 1-strongly disagree to 5-strongly agree)



for heavyweight BPA projects (over 5-point Likert scale), and the score lay in between when they worked in both types of projects.

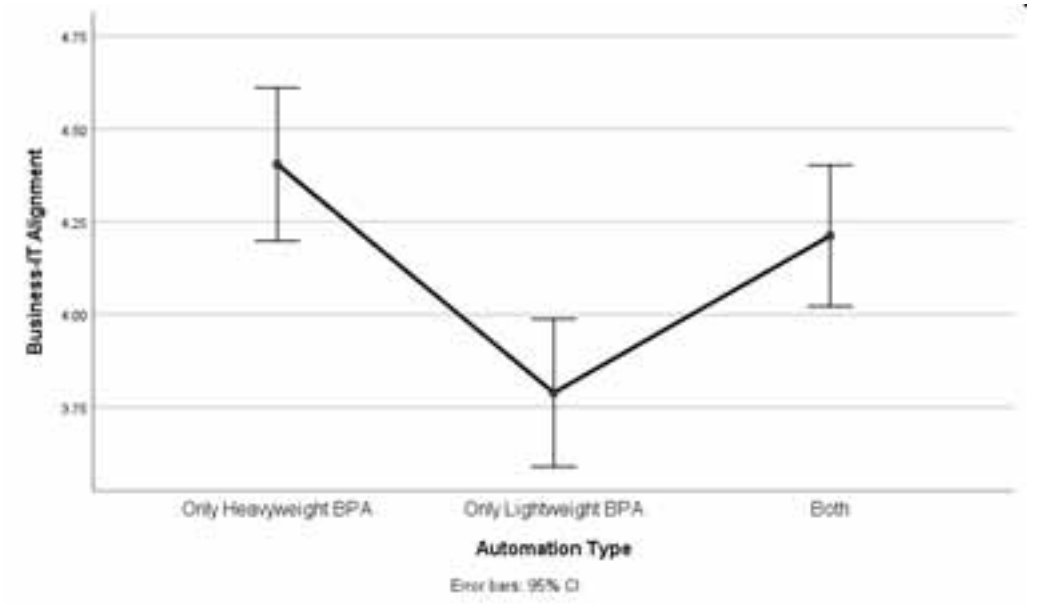
Exploration of CSFs for Demographics

In our survey questionnaire, we capture some key demographics variables to assess the importance of CSFs. We compared the importance of CSFs as perceived by respondents from different demographic groups. Figure 5 shows how the individuals based on their age and gender evaluated each of the CSFs. We observe that the respondents in the all the age groups value goal communication, and training & empowerment as vital CSFs on the top part of Figure 5. This assessment is also consistent when CSFs are compared based on the gender (bottom part of Figure 5). Male participants rate importance of goal communication slightly higher than females. However, IT business alignment is perceived

Table 2.
Test of hypotheses for the difference of CSF importance per automation type (HW denotes Heavyweight BPA and LW denotes Lightweight BPA)

Hypothesis	CSF	Only HW (n=28)		Only LW (n=30)		Both (n=33)		p-value	Support	Partial Eta Sqrd
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.			
H4	CSF4 Business-IT alignment	4.41	0.36	3.79	0.72	4.21	0.50	.000	Yes	0.18
H5	CSF5 Training &Empowerment	4.41	0.48	4.41	0.49	4.42	0.39	.985	No	-

Figure 4.
The importance of CSF4 compared for automation types (over a scale of 1-strongly disagree to 5-strongly agree)



more important by male participants compared to female respondents. Overall, both age and gender show consistent patterns in terms of the assessment of each CSF; thereby, attenuating a possibility of any systematic bias in responses.

We also explored the relative importance of CSFs based on the respondents' prior education and work experience as depicted in the top and bottom parts of Figure 6 consecutively. The figure shows a consistent pattern regarding management support, goal communication, and business and IT alignment CSFs. We observe that the most experienced cohort (15 or more years of experience) values the management support as key driving success factor in BPM and BPA. Nonetheless, on average, goal communication is assessed to be the most important factor in driving the success of BMP and BPA initiatives in all groups.

Exploration of CSFs for IT Strategic Role and Expert Perspective

We further analyzed if CSFs could be perceived differently in importance in industries of different IT nature and by experts of certain perspective. Understanding such patterns can develop our insights on CSFs to be majorly considered under different circumstances and help improve project management practices. The IT-related nature of an industry may impact the view on CSFs. Strategic information systems literature (SIS) suggests that the impact of IT varies across industries because of the business processes and competitive opportunities (Dehning et al., 2003; Joshi et al., 2018; Zmud et al., 2010). Though the role of IT at the firm level might differ, the nature of IT deployments at the industry level shows a great degree of similarity. Prior SIS research classifies industries with similar IT adoption patterns into three IT strategic roles; namely automate, informate, and transform (Zuboff, 1988). Organizations that operate in industries of automate group mainly rely on IT to substitute human labor in order to reduce operating costs (e.g., manufacturing and engineering). The informate group deploys IT to achieve business process flexibility and improve IT-enabled decision making (e.g., legal, law, and real estate). Transform IT strategic role manifest that firms in this industrial group operate in a turbulent competitive business environment (e.g., financial and banking). In such industries, business processes, products or services leverage innovative digital technologies to create value propositions. Using prior

Figure 5.
The importance of CSFs compared for age (top) and gender (bottom) (over a scale of 1-strongly disagree to 5-strongly agree)

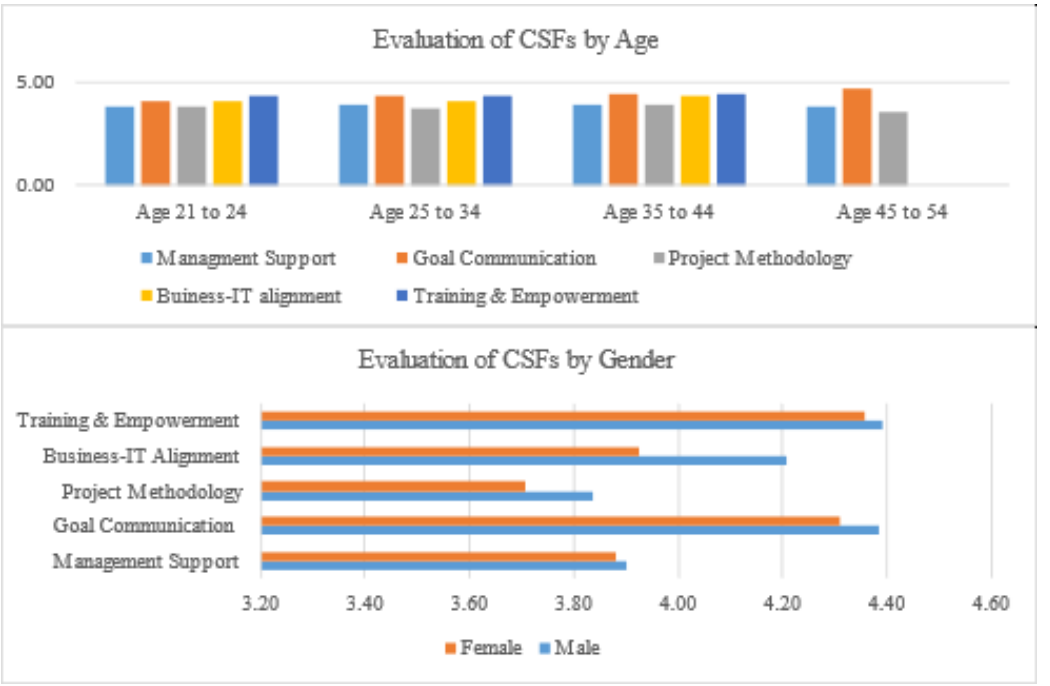
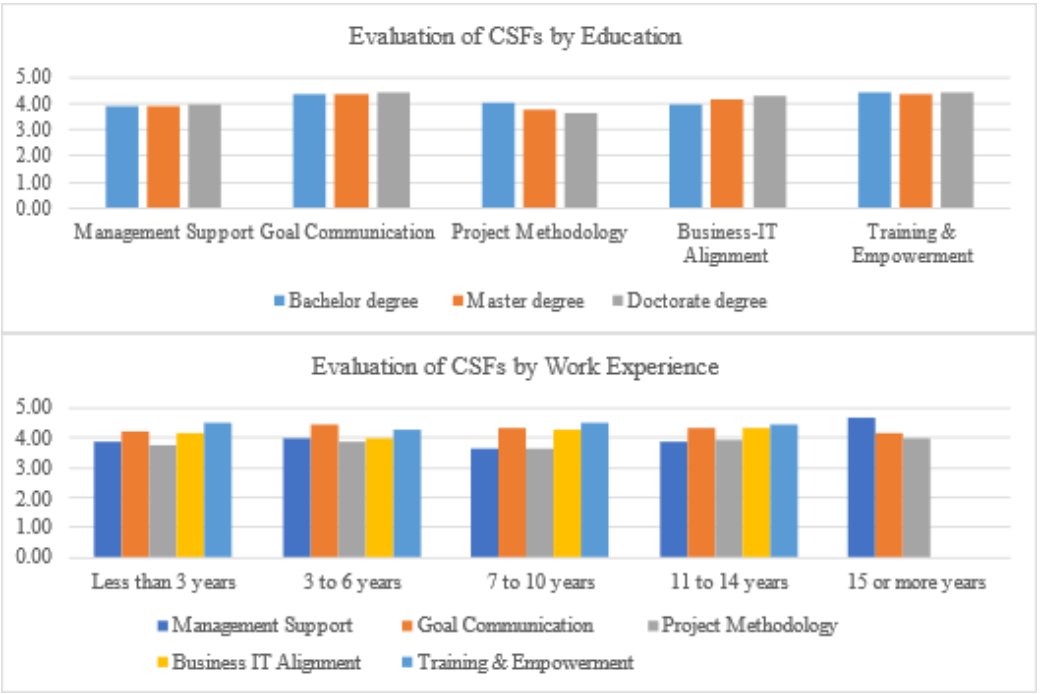


Figure 6.
The importance of CSFs compared for education (top) and work experience (bottom) (over a scale of 1-strongly disagree to 5-strongly agree)



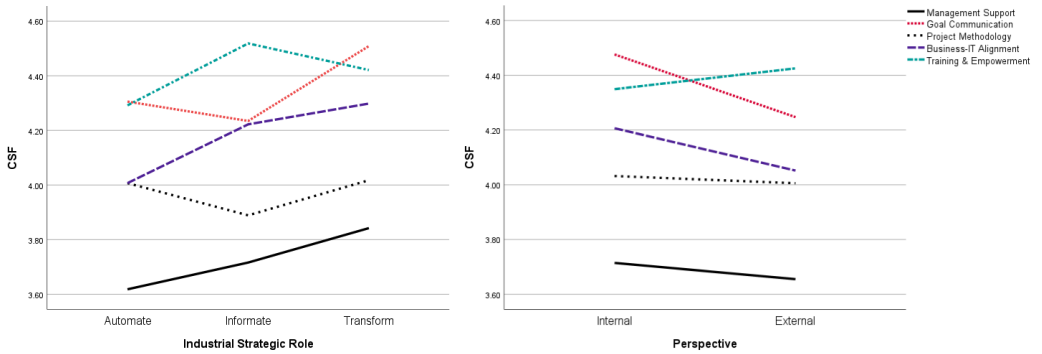
studies, we classified our sample into three IT strategic roles at industry level. We observe that 59% of the responses belonged to the automate group, whereas 25.9% fell into the informate group and 15.1% was categorized in the transform group[2]. Accordingly, we grouped the responses into these three industrial strategic roles. We investigated how the importance of each CSF is perceived based on the IT strategic role. Results are depicted on the left side of Figure 7. The analysis reveals that on average there is a varying degree of importance of the CSFs. Especially, the transform group value top management support, goal communication, and business-IT alignment as key CSFs when compared to the automate and informate roles. This indeed provides further insights about our findings. Considering the turbulent nature of the transform IT role, senior management needs to ensure that BPM and BPA initiatives are supported at the senior management level, and that the achievement of IT-driven transformation requires clear goal communication. We also observe that the informate group emphasizes more on training and empowerment, which is also consistent with the strategic role of IT for the informate group. BPM and BPA initiatives in this group are primarily focused on improving the information assimilation for senior managers and employees. In other words, for informate industry, IT deployments are often aimed at improving information flow, and, thereby, empower decision-making abilities of the employees and senior managers (Zmud et al., 2010). Nonetheless, such initiatives require considerable behavior change (e.g., learning new practices) to realize the benefits of the BPM and/or BPA initiatives (Sambamurthy & Zmud, 2012). Thus, it is logical to observe that the respondents have identified empowerment and training as a critical factor for the informate role, as it might potentially ensure the success of BPM and BPA initiatives for this industry group.

To further explore any patterns regarding the importance of CSFs, we checked if any differences are observed with respect to the perspective of the participants, i.e., internal perspective of the employees working in BPM projects within the organization and external perspective of the consultants that support the organization with an outsider view. The results are depicted on the right side of Figure 7. We did not use the perspective of respondents having both views since the percentage of this group is low and we aimed to have a sharper comparison among perspectives. The analysis shows that internal perspective values goal communication, business-IT alignment, and management support more in comparison to the external perspective. This is consistent with the assumption that internal employees/experts have a better overview of the BPM initiatives, and value the support from top management, and understand the significance of the alignment between business and IT.

Exploration of CSF patterns

We applied fuzzy set Qualitative Comparative Analysis (fsQCA) to reveal if there are any patterns in the evaluation of CSFs. QCA is a set-theoretic method to determine specific patterns of elements

Figure 7.
The importance of CSFs compared for IT strategic roles (left) and expert perspective (over a scale of 1-strongly disagree to 5-strongly agree)



to reach a certain outcome (Mattke et al., 2021). To this end, we used each CSF as the dependent variable to see if there are any set of configurations for the rest of the CSFs that explain the perception of the dependent CSF. This allows us to reveal patterns about dependencies among the importance of CSFs. If there are one or more consistent patterns for an outcome (i.e., a CSF), it means that, in some cases, the importance of that CSF is related to the extent the other significant independent variables (i.e., the rest of the CSFs we input to the model) are found to be important. fsQCA has been used frequently in information systems research for revealing interrelated structures that lead to an outcome rather than examining variables in isolation (Pappas & Woodside, 2021). It enables an exploratory analysis of the data through the examination of alternative configurations (Park et al., 2020).

To apply fsQCA, we used fs/QCA software tool of the University of California (Ragin & Davey, 2016). We first calibrated each variable through the suggested procedure for Likert-scale variables (Pappas & Woodside, 2021; Ragin, 2018). We then calculated the truth tables by using each CSF separately as a dependent variable and the rest as input variables. The following table (3) summarizes the consistent patterns found for the data. The black circles (●) denote the presence of a condition and the empty circles (◌) indicate the absence of it.

The results show certain configurations that lead to high or low importance evaluation of a CSF. P1 shows a pattern where CSF2 goal communication is identified as an outcome. According to this pattern, goal communication is found important for cases where CSF5 training & empowerment is also evaluated to be high-importance and CSF1 top management support is found of low importance. P1 and P2 both specify CSF2 goal communication as the outcome. The two patterns together depict that the importance of CSF5 training & empowerment is highly related to the importance of CSF2, since these two patterns both identify the presence of CSF5 condition and have a high overall coverage. Pattern P3 identifies CSF4 as the outcome. However, we do not deem this pattern useful since the overall consistency is below the suggested level of 0.8 (Pappas & Woodside, 2021). Patterns P4, P5, and P6 specify CSF5 training & empowerment as outcome. Overall, they have a high solution coverage. However, there is no presence or absence of a condition (i.e., CSF) that is valid for all these patterns. Therefore, we can only deduce that patterns of importance are diverse for CSF5 to be evaluated of high importance. Lastly, there is no pattern identified where CSF1 and CSF3 are outcomes. This points out that the importance attributed to them is rather independent of the other CSFs.

Table 3.
Patterns leading to consistent outcomes for related CSF

	P1	P2	P3	P4	P5	P6
CSF1 Top management support	◌			◌		◌
CSF2 Goal communication	Outcome	Outcome	●	●	●	
CSF3 Project methodology						●
CSF4 Business-IT alignment		●	Outcome		●	◌
CSF5 Training & empowerment	●	●	●	Outcome	Outcome	Outcome
Consistency	.88	.91	.75	.92	.93	.94
Raw Coverage	.59	.66	.82	.58	.64	.21
Unique Coverage	.14	.21	.82	.06	.21	.03
Overall Solution Consistency	.87		.75	.81		
Overall Solution Coverage	.80		.82	.93		

DISCUSSION AND CONCLUSION

While prior research has extensively focused on BPM critical success factors, the understanding of the relevance of such CSFs for BPA and the differences between BPM and BPA are somewhat under-researched. Drawing onto BPM literature, we posit that the BPM CSFs are instrumental in understanding the success of BPA. In this context, we first shortlist the key CSFs for BPM and contrast its importance with BPA. Moreover, we classify BPA into heavyweight and lightweight to bring additional insights on how the selected CSFs can contribute to the success of BPA. The high perceived importance score of each CSF in the overall results confirms the relevance of the selected CSFs. We test our proposed set of hypotheses using a final sample of 139 survey respondents. Our empirical analysis confirms a few of the proposed hypotheses. First, we find that top management support as a CSF warrants more attention for BPM when compared to BPA. This is consistent with our expectation that BPM is more comprehensive in the sense that it involves governance, culture, and human resources in addition to tools and methods. This certainly demands higher synergy between business and IT. As a result, senior managers will pay more attention to BPM initiatives when compared to mostly software tools and methods-driven BPA projects. Second, we find that project methodology as a CSF showed a significant difference between BPA and BPM. Since BPA projects are argued to be better executed in an agile way, the organizational culture must embrace these values (Rizk et al., 2020). Thus, it can be reasoned that the choice of project methodology and its fit with the organizational culture is more important in BPA projects than in BPM engagements. Nevertheless, the selection of the appropriate project methodology is a relevant decision also for BPM (Aysolmaz et al., 2018), as shown by the high overall importance score attributed to this CSF in our results (4.0/5.0). Particularly, agility in process improvement is an emergent capability that organizations are required to develop in today's dynamic market (Kerpedzhiev et al., 2020). Thus, this CSF may be soon recognized as important as BPA projects also for BPM projects. The CSF regarding the goal communication was not perceived to be significantly different but highly important for both BPM and BPA projects. The underlying reasons for the importance of this CSF for BPM and BPA may be different. We expect that the need for goal communication in BPA projects would arise mostly for overcoming automation resistance whereas for BPM, the main cause can be attributed to the complexity of the projects and diversity of the involved stakeholders. In future research, it is important to distinguish the reasons behind the importance of this CSF for BPM and BPA projects so that communication can be performed effectively based on the project type.

As part of the exploratory analysis, we analyzed our dataset in two ways. First, we explored how key demographics, IT strategic role at industry level and the perspective of the respondents affect the perception of CSFs. The results revealed that the importance of CSFs systematically varies across industries with different strategic roles of IT. Given the dynamic nature of industries with IT strategic role of transform, the respondents of such industries value the importance of clear goal communication, alignment of business and IT, and support of the top management. This assessment is consistent with the strategic information systems literature. BPM and BPA initiatives in turbulent business landscapes need to highly leverage managerial capabilities. In addition, the CSF of training & empowerment is specifically valued in the informate group, which supports the view that BPM initiatives enhance information flow, and, thereby, decision-making abilities of employees and senior managers. We also observe that internal experts identify the top management support and goal communication more critical when compared to consultants with an external view, while training & empowerment is valued more by those with an external perspective. Second, our additional qualitative comparative analysis (fsQCA) suggests that the importance of certain CSFs may be related to other CSFs in a structured way. Notably, training and empowerment is of high importance when goal communication is also an important factor for the project. The importance of the training and empowerment CSF is specifically bound to the other CSFs.

Our comparison between heavyweight and lightweight BPA provides some insightful findings. The empirical analysis shows that the top management support is less relevant in lightweight BPA when compared to heavyweight BPA. One plausible explanation could be that the lightweight BPA initiatives do not require any integration to existing legacy applications. This makes it more a technical

update and then organizational change, without affecting much of the processes of the existing IT systems. However, it should be noted that IT does not become entirely redundant but takes on a rather passive role when lightweight BPA projects are rolled out. However, when lightweight software is coupled with heavyweight software, IT takes on a more active role again (Osmundsen et al., 2019).

Implications for Research

This study contributes to BPM and BPA literature in two major ways. First, we extend our understanding on the BPM CSFs in the context of BPA. That is, prior research (e.g., (Buh et al., 2015; Syed et al., 2018; Trkman, 2010)) mainly focuses on CSFs in the BPM context. Those studies that examine the success of business process system implementation are performed with a perspective independent from BPM in general (e.g., (do Amaral Castro et al., 2019; Ravesteyn & Batenburg, 2010)). In this view, we argue that CSFs are not a rigid concept and can be studied in the context of BPA. Contrasting the relevance of BPM CSFs with BPA provides theoretical insights to develop a common or independent set of CSFs for BPA initiatives. Second, we classify BPA into two categories: lightweight and heavyweight BPA. This classification helps to examine and understand that BPA initiatives that differ in scale and scope might differ on CSFs. Overall, our qualitative and empirical insights underline the importance of top management support and project methodology in the context of BPM and BPA. Our comparative analysis contributes to understanding patterns of importance among CSFs, which have not been previously investigated in the literature. This analysis may help researchers distinguish between groups of CSFs that are related or stand out from the others among the high number of CSFs studied in the literature (do Amaral Castro et al., 2019). The findings contribute to the project management literature since project managers of BPM and BPA projects need to understand project success factors and balance their efforts accordingly (Kanter & Walsh, 2004). In our analysis, for example, top management support and project methodology are distinguished from other CSFs as their importance are not particularly related to others, whereas the importance attributed to training & empowerment, for example, is mostly linked to the perception of other CSFs. Lastly, using fsQCA, we evaluate how the selected CSFs are related with each other in a structured way. This can enrich the relevance and importance of CSFs while analyzing BPM and BPA initiatives.

Implications for Practice

The study offers several practical implications to project managers and key project stakeholders. First, the study reveals that the involvement of senior management is more warranted in BPM initiatives than BPA. This might be useful for organizations that struggle to optimize the involvement of top management between BPM and BPA initiatives. Second, we find that the choice of the project methodology and focusing on a good fit between the project methodology and the organizational culture is more relevant in BPA projects. Therefore, BPA initiatives need decisions that promote a good fit between the selected project methodology and organizational culture. Such decisions might involve the consideration of agile methodologies vs. waterfall and adapting the selected methodology to the organization considering the scope of the project and the organizational characteristics. The patterns of importance among CSFs found in this study can additionally support organizations in their project decisions. For example, since top management support is found to be an important CSF that is independent of the others, investing more in management support can directly increase the project success without the need for considerable investment about the other CSFs.

Concerning the heavyweight/lightweight comparison of BPA projects, business-IT alignment plays a significant role. Heavyweight BPA projects need a high involvement of IT and, therefore, a good alignment. In contrast, lightweight BPA projects require a lower level of IT involvement due to the development on the business side. This knowledge assists project managers with the project set-up and can also help reduce the costs associated with the involvement of IT departments.

Limitations and Future Research

The study presents some limitations, which can offer opportunities for future research. First, our research design exclusively focused on contrasting between BPM and BPA initiatives. This rules out the possibility

of performing an analysis on a broader response choice. For example, in this study, we compare three answer options with each other ("Only BPM" vs. "Only BPA" vs. "Both" or "Only Heavyweight BPA" vs. "Only Lightweight BPA" vs. "Both"). However, additional insights might be found by investigating further when participants have the perspective of a single or multiple project type. Since organizations frequently conduct a portfolio of BPM-related projects (Lehnert et al., 2017), they can benefit from a deeper understanding of relevant CSFs and how to balance the project management efforts among different process management and automation projects. Second, the demographic data revealed that 79.8% of the respondents are younger than 35 and have up to 10 years of professional experience (88.5%), which implies that senior executives were underrepresented in the study. Additionally, mostly Europe, and within that, prominently two countries were represented. Finally, other factors such as duration, volume, and shoring method (onshore vs. offshore) might significantly alter the results.

Future research can extend this study in several ways. First, we invited experts from diverse industries and nationalities in this research to incorporate diverse views. Nonetheless, the importance of CSFs may be different per industry and country (Gabryelczyk & Roztocki, 2018). Thus, it would be interesting to investigate how several demographic and contextual aspects might influence the importance of CSFs in BPM and BPA initiatives. Second, we performed survey research to test the set of hypotheses. However, a qualitative approach can also be useful to bring some meaningful insights. For instance, case studies might offer deeper investigations for the applicability of CSFs in different BPM contexts. Next, our study investigated a selected number of CSFs to develop an insight into the differences between BPM and BPA. Although the selected CSFs are justified through their perceived importance, further studies can look into additional CSFs considered in the BPM literature. Lastly, we assert that data analytics and Artificial Intelligence (AI) applications in BPM in various phases are becoming widely used both in the context of BPM (Neu et al., 2021)) and BPA (Chakraborti et al., 2020). It is seen essential that organizations develop data analytics and AI capabilities for their processes to remain competitive (Kerpedzhiev et al., 2020; Klee et al., 2021; Korsten et al., 2022). Furthermore, such technologies are in close relation with BPM and BPA since they rely on data produced during the execution of processes (Miller, 2018). This calls for further research on understanding and comparing CSFs when data analytics and AI are used in the context of BPM and BPA, and how BPM and BPA CSFs interact with data analytics CSFs when organizations execute these projects in a complementary way. Such studies would further support organizations in managing these projects in an integrated way to ensure success since similar CSFs, e.g., factors related to management and people, are shown to come into play in also data analytics projects (Al-Sai et al., 2020). Finally, an emerging field of digitalization-focused process innovation, explorative BPM, stresses that, for competitiveness, organizations need to continuously initiate projects for reengineering and development of completely new processes to provide new value offerings (Grisold et al., 2019). Literature explicitly states the need for guidance in explorative BPM initiatives (Baier et al., 2022; Lara Machado et al., 2022); thus, the investigation of CSFs for such initiatives is also a promising research line. Since such projects need to combine a high-level BPM view with a focus on process automation as an integral technology for transformational process innovation, our results can provide a starting point for such studies.

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Competing Interests

The authors of this publication declare there are no competing interests.

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ENDNOTES

1 MarketsAndMarkets estimates a growth from USD 8.8 billion in 2020 to USD 13.3 billion by 2025 (https://www.marketsandmarkets.com/PressReleases/business-process-management.asp)

2 We observe that some respondents (N=12) did not specify their industry sector affiliation, we assigned them to automate group as we assumed a more stable and support role of IT. Also, we notice that few respondents (N=6) reported more than one industry affiliation for their firm, which suggests more dynamic nature of the industry. Hence, we assigned such responses to transform industry IT strategic role.

APPENDIX

Survey questions including the general demographic and experience questions (Part 1) and the questions used to measure the importance of CSFs on project success (Part 2)

Part 1. General demographic and experience questions

Question No	Options
Q1. Consent	o Yes o No
Q2. The projects I work in focus on…	o Only Business Process Management (Modeling, Redesign, etc.) o Only Business Process Automation (RPA, Back-end automation, etc.) o Business Process Management and Business Process Automation o None of the above
Q3. What is your age?	o Under 21 o 21 to 24 o 25 to 34 o 35 to 44 o 45 to 54 o 55 to 64 o 65 or older
Q4. What is your gender?	o Male o Female o Other o Wish not to disclose
Q5. What is the highest degree or level of school you have completed?	o Less than a high school diploma o High school degree or equivalent o Bachelor's degree (e.g. BA, BSc) o Master's degree (e.g. MA, MSc) o Doctorate degree (e.g. PhD, EdD)
Q6. What is your nationality?	"Country list dropdown"
Q7. Please indicate your total years of professional experience (excl internships)	o Less than 3 years o 3 to 6 years o 7 to 10 years o 11-14 years o 15 or more years
Q8. In which industry do you have experience?	*"List of Industries"*
Q9. Do you have experience with heavyweight (e.g. ERP automation) or lightweight (e.g. Robotic Process Automation) IT projects?	o Only heavyweight BPA projects (e.g. ERP automation) o Only lightweight BPA projects (e.g. RPA) o Both
Q10. Which perspectives do/did you have in your projects?	o Only internal perspectives (e.g. employed) o Only external perspectives (e.g. consultant) o Both
Q11. What is your job designation?	"Text Field"
Q12. What is your current project role?	"Text Field"

Part 2. Questions used to measure the importance of CSFs on project success

	CSF and Related Questions	Informing sources for CSF identification/ question
Project Type (BPM vs BPA)	*CSF1: Top management support*	(Bruin & Rosemann, 2006; Buh et al., 2015; do Amaral Castro et al., 2019; Ravesteyn & Batenburg, 2010; Syed et al., 2018)
	Q1: The support of executives is needed to achieve project success.	(Bruin & Rosemann, 2006)
	Q2: Without top management support projects fail.	(Bruin & Rosemann, 2006)
	Q3: Senior management is vital for the overall project success.	(Bruin & Rosemann, 2006)
	CSF2: Goal communication	(Buh et al., 2015; Ravesteyn & Batenburg, 2010; Syed et al., 2018)
	Q1: Transparent communication (communication of project goals) is necessary to achieve project success.	(Ravesteyn & Batenburg, 2010)
	Q2: Projects without a good communication strategy fail.	(Ravesteyn & Batenburg, 2010)
	Q3: Miscommunication can endanger the overall project success	(Ravesteyn & Batenburg, 2010)
	CSF3: Project methodology	(Buh et al., 2015; do Amaral Castro et al., 2019; Ravesteyn & Batenburg, 2010; Trkman, 2010)
	Q1: Using agile working methods is important for the project success.	(Trkman, 2010)
	Q2: Using a waterfall methodology increases the risk of project failure.	(Trkman, 2010)
	Q3: The fit between selected project methodology and organizational culture is essential.	(Trkman, 2010)
Automation Type (Heavyweight vs Lightweight BPA)	*CSF4: Business-IT Alignment*	(do Amaral Castro et al., 2019; Syed et al., 2018; Trkman, 2010)
	Q1: Strong business-IT alignment is necessary to achieve project success.	(do Amaral Castro et al., 2019)
	Q2: Misalignment between business and IT leads to project failure	(do Amaral Castro et al., 2019)
	Q3: Good cooperation between the business side and the IT side is necessary for project success.	(do Amaral Castro et al., 2019)
	CSF5: Training & Empowerment	(Buh et al., 2015; de Oliveira Dias et al., 2018; do Amaral Castro et al., 2019; Syed et al., 2018; Trkman, 2010)
	Q1: Staff's knowledge and skillset is essential to succeed.	(de Oliveira Dias et al., 2018)
	Q2: Staff training and empowerment sessions are significant for project success.	(de Oliveira Dias et al., 2018)
	Q3: Lack in training and empowerment increases the risk of project failure.	(de Oliveira Dias et al., 2018)

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