A THEMATIC LITERATURE REVIEW ON BUSINESS PROCESS MANAGEMENT

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ABSTRACT

Business Process Management (BPM) is considered as a management approach that primarily focuses on analyzing and continuously improving business processes. It has been a key strategy adapted by organizations to manage their businesses successfully along with information technology. In the past few decades BPM has been one of the promising research areas. This paper adds knowledge to the existing research by answering following questions: (1) what is the status of BPM research domain? And (2) what are the possible future research directions on BPM? A thematic review was conducted focusing a series of literature on BPM which have been published between 2001 and 2020. The findings highlight that the integration of BPM into new digital innovations, such as process mining, is essential for an effective and efficient organization. More research on BPM and IT management needs to be conducted to support this integration between BPM and digital innovations.

KEYWORDS

Business Process Management, thematic literature review, digital innovation, process mining

1. INTRODUCTION

Business processes are a part of any organization and they shape how the respective organization runs its business. The way processes are designed and performed affects both the quality of service that customers perceive and the efficiency with which services are delivered [1]. At present, organizations behavior and their customers' expectations are changing rapidly due to many reasons such as technological upgrades, and new inventions [2]. As such, business processes need to be continuously monitored and relevant changes should be introduced.

Business Process Management (BPM) is the practice of evaluating, enhancing, and monitoring the business processes for continuously improving them [3]. In other words, BPM is a way to oversee what kind of tasks are there in the organization and how those tasks are executed and performed. Moreover, BPM helps an organization to keep continuous eye on what is going on and discovering opportunities for process development and improvement [1, 4]. Therefore, BPM can be broadly described as a provider of tools and techniques to efficiently manage business processes [5]. BPM plays a key role in the advancement of an organization, especially which focuses on a business process view [6] because BPM can provide interaction, control, analysis, and optimization of processes [7].

BPM was originated as the next big thing after the workflow wave [8]. Currently, it has evolved to many concepts such as workflow management (WFM), case handling (CH), enterprise application integration (EAI), enterprise resource planning (ERP), and customer relation management (CRM) [9].

1.1. Research Objectives and Research Questions

Currently, awareness of BPM is highly expected by researchers and practitioners since BPM is one of the most developing research scopes [8, 10]. The purpose of this paper is to review a series of literature on BPM which have been published between 2001 and 2020 to accumulate the knowledge base and the current development in this domain. It is expected that the findings from this paper will emphasize the current development of BPM domain and contribute towards future research for both researchers and practitioners by answering following questions.

1. What is the current development of BPM domain?
2. What are the potential future research directions on BPM?

The remainder of this paper is structured as below. Section 2 discusses the background of the research, section 3 discusses the research design used in this research, and section 4 presents research results and their brief discussion. Section5 concludes the paper and suggests future research.

2. BACKGROUND

Origin of BPM can be traced as early as in 1980s in terms of 'process management' [11]. "Porter's value chain" and "Deming's flow diagram" concepts guided process management towards a more powerful method of reshaping business processes [12]. In 1990s the concept of Business Process reengineering (BPR) emerged incorporating radical process redesigning. This BPR movement highlighted the importance of maintaining inter-functional processes (not just processes) [13]. "BPM is a revival of BPR, as indeed BPM adopts the process-centered view on organization" [1]. Business Process Change (BPC), which is defined as the analysis, redesign, and improvement of existing processes to achieve competitive advantage in operations [14], is a most recent term used in the context of BPM [11]. BPC is implemented in the BPM program itself to manage the complexity of business processes, especially in large organizations.

Implementation of BPM can have two different aspects: broader aspects and deeper aspects [15]. Broader aspects include integrating the business process with other enterprise applications, such as taking in electronic forms and e-documents, populating transactional databases, and providing a single point of interfaces for users. Deeper aspects include process modelling and simulation, reusable process modules, and process monitoring and optimization. However, when considering the developing nations implementation of BPM mostly follow the broader aspects as BPM is in its genesis in those nations [16].

Although BPM continues to be a top business priority, building business process capability is still a major challenge [17]. BPM initiative should be approached from a holistic perspective considering all factors that could facilitate or hinder process improvement of an organization [18]. These factors are known as BPM core elements. Literature has revealed strategic alignment, people, culture, methods, information technology and governance as core BPM elements [18, 19]. For instance, different hierarchical levels in an organizational structure (e.g., board of directors, managers, and assembly line workers) need to support the organization's BPM adoption [20]. Moreover, bridging the cultural gap in communication between BPM vendors and clients from different cultures is crucial for successful BPM adaptation in organizations [21]. The contextual factors of an organization's external environment (e.g., stakeholders, customers and competitors) also impacts the BPM initiatives [22]. These contextual factors can be summarized into four groups, namely goal-related, process-related, organization-related and environment-related factors [23].

BPM brings significant benefits to organizations such as improved process transparency, enhanced process standardization, and improved employee communication [24]. Achieving one or many of these benefits has become the reason for organizations to adopt BPM [25]. [26] categorize the objectives of adopting BPM to organizations into two groups: business objectives (e.g.: improving business performance) and technical objectives (e.g.: an ERP implementation). However, both these objectives should be aligned with the organization's strategy [18]. Accordingly, depending on the strategic direction of the organization, the steps undertaken for the BPM implementation should be defined [19].

3. RESEARCH METHODOLOGY

The purpose of this research is to gather insightful information about the status of BPM domain in terms of its practical applications, BPM frameworks, and success and failure factors of BPM initiatives and exploring future research directions. The data sources utilized for this purpose are scientific journals, books, reports, and conference proceedings from different databases such as Emerald, IEEE Xplore, Science Direct, and SAGE journals. Figure 1 shows the literature review process that was followed during this study.

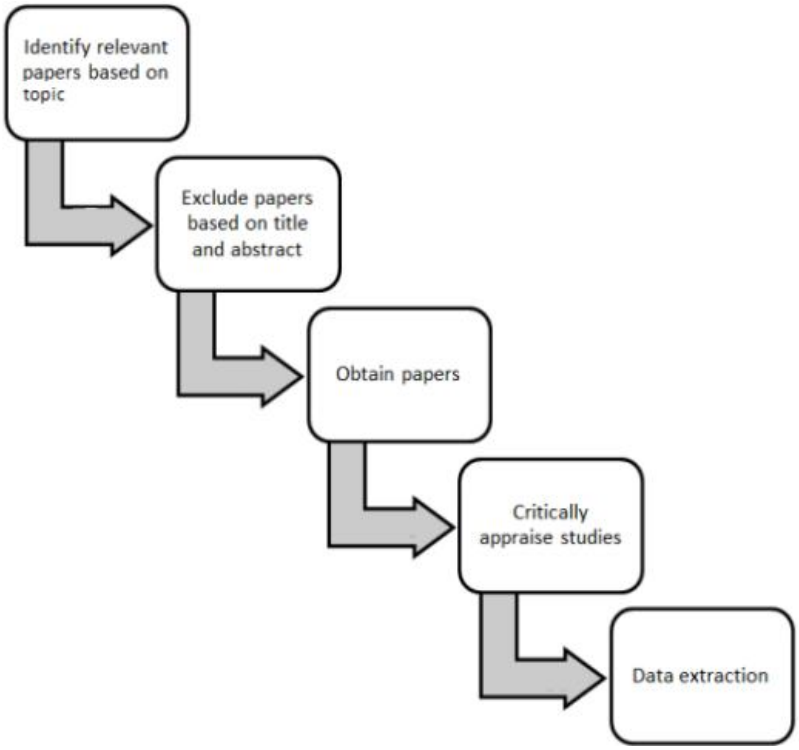

Figure 1: Research Methodology

4. RESEARCH RESULTS

This section summarizes the most notable observations from the literature review.

4.1. Business Process Management Lifecycle

The BMP Life Cycle is characterized by an iterative set of activities that are conducted in phases [1]. This means that the cycle can be repeated, instead of ending once the final phase is over.

Several BPM lifecycle models were introduced in the literature such as [27], [1], [28], [29], and [18]. All these models distinguish between several phases that a BPM initiative can go through. The phases these models consist of are partially different in terms of detail. For instance, [28] and [29] discusses more on strategy and governance of the organization where as others discuss more on culture of the organization.

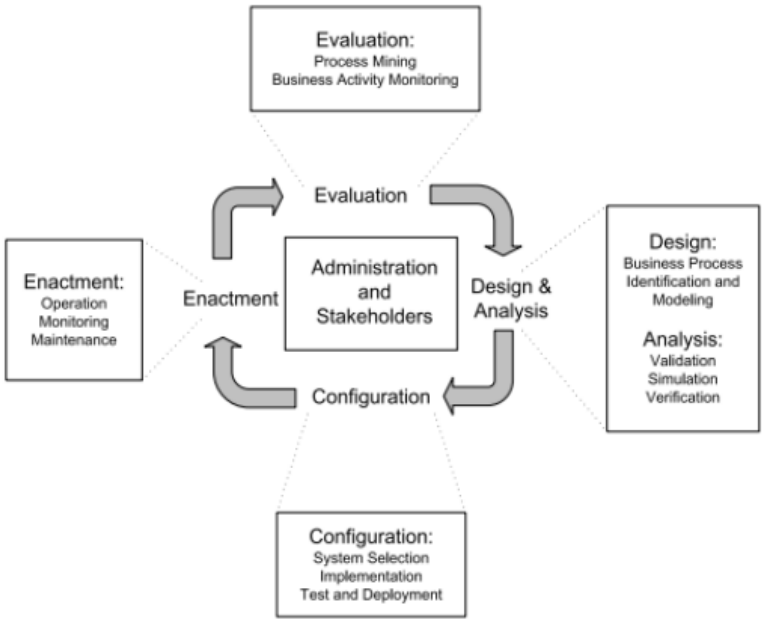

Figure 2: BPM lifecycle according to Mathias (2012)

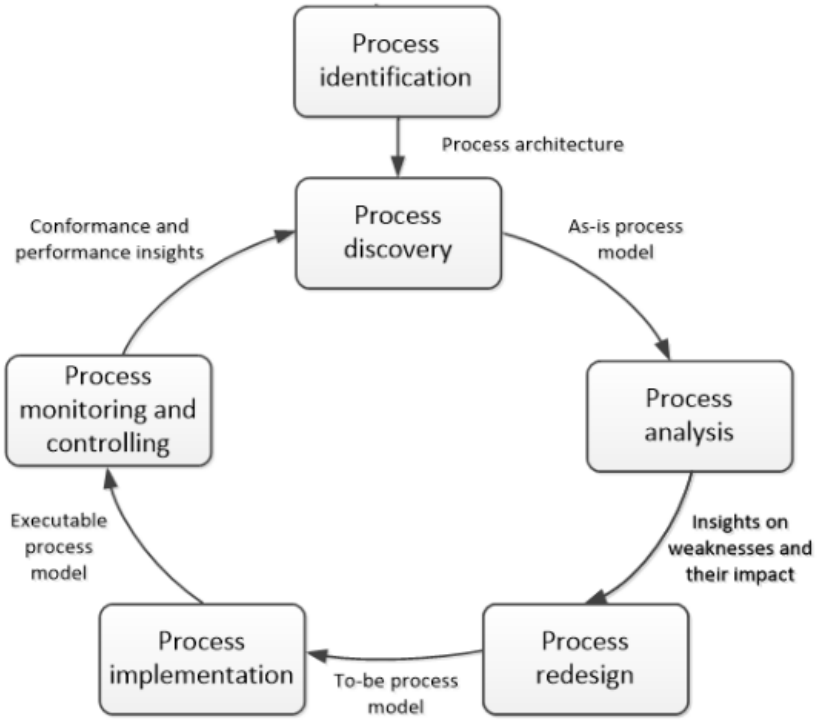

Figure 3: BPM Lifecycle according to Dumas et al. 2013

The number of phases in each model is also different. For instance [27] discusses four phases namely, evaluation, design and analysis, configuration, and enactment (see Figure 2), whereas [1] discusses six phases namely, identification, discovery, analysis, redesign, implementation, and monitoring and control (see Figure 3). However, all the models have considered a business process as an object that is continuously being improved.

4.2. Business Process Management Suits

The interest in BPM has prompted significant academic and commercial work aiming toward advanced BPM solutions [19]. Business Process Management Suits (BPMS) is an example for such BPM solutions. BPMS is a software that provides a central point of control to define the business processes and orchestrate their execution [30]. A business process can be described as workflows that consist of activities which are either human-based, system-based, or a combination of the two. BPMS contain a workflow execution engine which coordinates the execution of the workflow of a business process. Each business process instance is tracked by BPMS and insights on success or any failures of the entire process are provided [31]. In case of a failure, BPMS supports to identify, monitor, and evaluate the respective part of the business process.

According to an IT architectural perspective, a BPMS acts as an extra layer of software that locates above other software applications and uses business process specifications to decide when to call on other software applications [32]. Figure 4 adapted from [32] shows the architecture of BPMS emphasizing its components and the functionalities provided by each component.

Several BPMS vendors provide complete software suites such as Oracle BPM Suite [33], Appian BPM Suite [34], Bizagi [35], jBPM [36], and Activi [37] that can support the BPM lifecycle: process modelling, process analysis, process implementation, and process monitoring and evaluation. These BPMS can be either opensource software or commercial software. Several research studies, for instance [38], [39], and [32] have compared the features and applicability of both opensource and commercial BPMS focusing on different regions of the world. [32] suggest that BPMS must provide management tools that can associate Key Performance Indicators (KPI) with each of the business processes and support its monitoring through KPI measurements and target values. Thus, BPM would be able to support business process evaluation and management lifecycles.

4.3. Critical Success Factors of BPM Initiatives

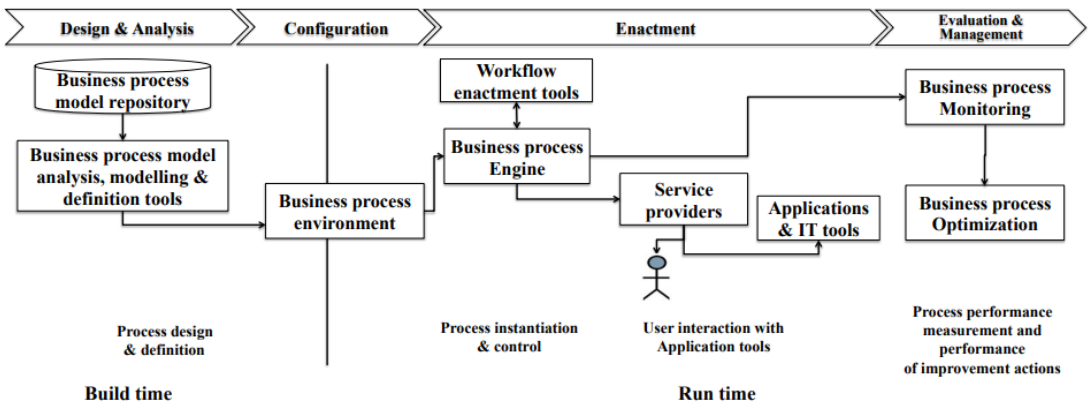

Figure 4: IT architecture of BPMS adapted from Antonio et al. 2012

Literature provides different definitions for the success of BPM initiatives based on their unit of analysis such as project and organization. Thus, [25] proposes a more general definition; "BPM is successful if it continuously meets pre-determined goals, both within a single project scope and over a longer period of time". Critical Success Factors (CSF), namely the reasons for the success, are any attribute in business that guarantees a competitive performance in the organization only if they perform well [40]. Even though several common causes of failure and success are known and identified, a generic model to describe attitudes of organizations that should have to succeed in BPM implementations is not yet available (Castro et al., 2019).

The literature mainly discusses similar and general CSFs for BPM initiatives. Followings are almost always discussed by the research studies: top management support [41-43], project management and project management skills [44, 45], communication and inter-departmental cooperation [46-48], and preparedness for organizational change [49, 50]. Among these factors top management support is often considered as the most important – it must initiate and support BPM efforts [51]. Moreover, other familiar CSFs that are often referred in traditional information systems management such as, leadership, investment, IT infrastructure, and ICT awareness also apply to BPM initiatives [52].

Despite the investment that organizations make on BPM initiatives, 60 to 80 percent of such initiatives have failed [25]. Such risky nature of BPM domain motivates further detailed evaluations of its critical success and failure factors [53].

4.4. Frameworks for Measuring BPM Success

Even though there are plenty of studies available in the literature that identify success and failure factors of BPM adoption, research studies that investigate the interplay of these factors to build a general BPM adoption framework are limited. The major reason for this limitation is the complexity of the BPM concept itself [19].

[54] Introduced a model for presenting the effect of the factors on BPM implementation success. The model categorizes the success factors into seven groups namely, (1) strategy, (2) people, (3) optimization and process management, (4) process architecture, (5) IT architecture, (6) project management, and (7) standards and measurement. Three BPM success measures, (1) process efficiency, (2) process agility, and (3) process quality, were introduced based on the logical interrelationship between these categories. However, this model assumes that the BPM implementation success should only be achieved when the BPM initiative delivers measurable degrees of success measures.

[19] Developed a BPM success assessment framework that comprises ten elements that are interlinked with each other. This framework is based on the six phases of BPM implementation lifecycle as proposed by [1] and four core elements that affect BPM implementation as proposed by [18]. However, this framework has not taken information technology as a core measurement in BPM success which plays a major role in todays' organizational context.

Further research is needed to empirically evaluate the BPM success measuring frameworks using survey data or case studies. Moreover, these frameworks need to be further refined incorporating new developments in BPM domain to achieve their maximum usefulness.

4.5. Business Process Management and Digital Innovations (DI)

With the new drifts in information technology such as IOT, blockchains, process mining, Artificial intelligence, and virtual reality, organizations are struggling to incorporate these new technologies

into their business processes [55]. Traditional version of BPM also has been reshaped creating new opportunities for improving business processes [22]. For example, internet-based and intelligent devices help automate several manual BPM tasks and help during process analysis by tracking and monitoring in a fast and efficient manner [3].

Emerging blockchain technology, a public ledger and public transactions stored in a chain, provides the potential to drastically change the interorganizational processes operating environment. Application of blockchain technology in the traditional BPM lifecycle introduced by [1] is discussed in several research studies such as [56, 57]. BPM capabilities that are supported by blockchain technology for instance, governance, strategy, information technology, people, and culture were identified by [57, 58]. Application of blockchain technology in BPM is limited due to several reasons such as scalability problem and privacy leakage [58]. To overcome these limitations [59] proposes a blockchain lifecycle which combines BPM and Internet-of-Things (IoT) concepts. This blockchain lifecycle includes seven steps; analysis, IoT security people, design, strategy, execution, implementation, and security. They have also proved the application of this concept by combining it with smart cities.

[60] Proposed three future research and development directions for BPM and DI, namely, ambidextrous BPM, value-driven BPM, and customer process management. Ambidexterity BPM is more explorative variant of traditional BPM which is a mixture of two aspects: (1) exploitative BPM (exploiting the benefits of existing technologies), and (2) explorative BPM (exploring the benefits of new IT) [61]. The notion of ambidextrous BPM highlights importance of exploring innovation opportunities instead of only utilizing existing BPM methods and techniques. Value-driven BPM (VBPM) focus on shaping the BPM project to achieve the values which motivated the BPM initiative rather than mapping the BPM project with traditional hierarchical value-chains [62]. Transparency, efficiency, quality, agility, compliance, integration, and networking can be considered as the values that motivate any BPM initiative [60]. Customer Process Management suggests incorporating a design-inspired view on the customers' experience of the process into the traditional internal organizational view of BPM [60]. However, BPM practitioners need to develop strong design capabilities such as empathy, integrative thinking, optimism, experimentalism, and collaboration, to successfully work with customer process management [63].

Practitioners' opinions on future BPM trends were evaluated with respect to emerging technologies and digital innovation by [64]. Based on empirical data their study revealed following seven BPM-DI trends that future of BPM would evolve.

1. Intelligent BPM/collaboration BPM/case driven BPM
2. Value-driven BPM
3. Agile BPM
4. Collaboration BPM
5. New CxO role to bring BPM and DI to the Board
6. BPM becomes more appealing
7. Less resistance to BPM and digital innovation

[65] Discussed how BPM and digital innovations can be combined and highlighted how methodologies from each stream could benefit the other. Seven paradoxes that the BPM discipline must solve when developing new IT artifacts were introduced by [66]. These paradoxes emphasize the application of smart devices and digital transformation to align BPM with IT. However, more research on BPM and IT management need to be conducted to support the growing awareness of the linkage between BPM and DI [64].

4.6. Process Mining and its Impact on BPM

Anyone working in the field of BPM or business optimization today is increasingly working across the term "process mining" [67]. Process Mining is the practice of visualization and analysis of event logs with the help of algorithms and mathematical procedures [68]. Particularly, from looking at the steps someone takes to complete a task, a model of the business process can be automatically constructed. By continuing to gather this data over time, process analyst can start to see where bottlenecks occur or where inefficiencies lie within the process.

Process mining can be distinguished into three types: (a) process discovery, (b) conformance checking, and (c) model enhancement [67]. Process discovery is about tracking event logs to discover what people are doing and then defining a process around those actions in a form of a process model. Currently, many process discovery algorithms are developed targeting different domains such as, e-learning, banking, insurance, and health care [69]. Conformance checking diagnose deviations between the event log and the corresponding process model. These checks help process analysts to judge the quality of discovered process models and support auditing, six sigma, and compliance checking [67]. Model Enhancement describes the analysis of the process model for optimization potentials. For instance, analysis of an event log containing information about resources would discover possible roles, work distribution mechanisms, and resource characteristics [67].

BPM tools such as BPMS, enable organizations to generate process models and analyze, execute, implement, and monitor those models. However, these models are often completely disconnected from the actual operation of the process [70]. A new approach to traditional BPM initiatives which is much capable in improving and optimizing business processes is enabled by process mining [71]. Specifically, process mining techniques facilitate a dynamic system that reflects the changes in the process in real time.

Process mining combined with the traditional BPM lifecycle offers several advantages [70]. Table 1 describes benefits and key challenges of using process mining in BPM lifecycle.

Table 1: Challenges and benefits of using process mining in BPM lifecycle

BPM lifecycle phase	Key challenges	Process mining capability	Benefits
Process modelling	Uncovering the real process as it is and representing it in a model.	Process discovery: taking the event log and producing a model.	Less time is spent on human judgments, subjectivity and arguments from personal experiences, and the process is more accurately described.
Process redesigning	Providing insights into what process changes are needed.	Process enhancement: enhancing or extending existing process models by using additional data from the recorded logs.	Timing, frequency, and deviation information is made handy for assertive process improvement recommendations.
Process execution and monitoring	Extracting process information, calculating the KPIs and putting the information in the ideal	Process monitoring: automatically consolidating data as soon as it is generated during process	There is no need of spending time collecting and calculating KPIs. (Real–time data is automatically feeding

	formats for leadership to evaluate.	execution (real time) and updating dashboards.	KPIs, so that off-track behaviors can be quickly identified and corrected).
Process refinement	Achieving full transparency and identifying potential issues as soon as they happen or even before it happens.	Process refinement: refining real–time information for advanced machine learning and artificial intelligence enablement.	Important insights are provided by the tool to identify potential improvements and changes needed.

Source: Adapted from [70]

Managing the interaction between human resources when executing processes is a common and significant problem that is faced by BPM practitioners [72]. Process mining offer a major contribution to manage such problems within BPM disciplines [73] since analysis of the processes and their activities in different process perspectives is possible with process mining tools.

The ultimate use of process mining in BPM is to provide a google map-like facility to organizations' business processes [74]. At any time, there should be an up-to-date map for each process with real-time information so that information systems can visualize "traffic jams" in processes and suggest alternative routes for any delayed cases.

5. DISCUSSION

The study of the research sources discussed in this paper has revealed the status of BPM research and practices, and relevant insights for future research. Despite the other management disciplines, the interest in BPM remains very high among researchers.

Based on the insights of the researchers reviewed in this paper, it can be argued that BPM is neither a separate autonomous concept nor a management concept focused exclusively on IT. Moreover, it is not just a method of automation that governs the process lifecycle improvement and optimization. It can be called as an integral part of all quality management paradigms that helps to achieve business goals [11]. Most particularly, BPM focuses on how to manage the flow of value-creating processes across the organization.

Organizations that implement digital technologies are much more innovative than other organizations [75]. [76] Argues that BPM can be treated as a "missing middle" between business strategy and IT. Currently, information systems have paid special attention to BPM and incorporate BPM concept into the domain of the IS architecture, research, and practice [76]. The number of scientific sources on IT-based BPM topics is ever-growing. However, BPM is essentially a management concept, and IT remains as its peripheral field [12].

We accept that this paper is not without limitations. Firstly, a quantitative review of research sources has not been performed. This paper is based on researchers' insights identified in the BPM literature to communicate the current state and future trends of BPM. In the future studies, it would be beneficial to conduct a systematic literature review, involving a quantitative analysis of literature. Second, this study does not deeply investigate the link between BPM and digital innovations. This domain is highly recommended for future research as BPM is currently aligned with digitization concepts.

6. CONCLUSIONS

This paper contributes to the information systems research community by discussing the status of Business Process Management domain with evidence-supported data. It is also relevant in the practical sense. Conclusions drawn below are useful for both practitioners and researchers that work in the BPM domain.

Emerging technologies and digital innovations such as IOT, blockchains, process mining, Artificial intelligence, and virtual reality, enable rethinking and streamlining BPM. For example, internet-based and intelligent devices help automate several manual BPM tasks and help during process analysis by tracking and monitoring in a fast and efficient manner. Among these new digital innovations, BPM domain is increasingly incorporating the term "process mining". Process mining enables analysis of the processes and their activities in different process perspectives using event logs created by information systems. Process mining tools offer a dynamic system that can reflect the changes in the process in real time. Even though process mining is a popular research domain, contribution of Asian region to this domain is limited. Further research is required from this region such as evaluating how process mining concepts can be incorporated with BPM, revealing critical success and failure factors of BPM and process mining projects.

The integration of BPM into new digital innovations opens new avenues for the development of an effective and efficient organization. For instance, digital process innovations help accomplish tasks in faster and smarter ways. Organizations should not view BPM as separate and independent management discipline. BPM can be seen as a tool that is integrated into organizations' value creation process. Thus, organizations can achieve its goals by efficiently and effectively managing processes.

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