ORIGINAL ARTICLE

Business process management (BPM): terminologies and methodologies unified

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Abstract Business process management (BPM) is one of the effective performance management methodologies used in managing process-oriented organizations. BPM was adopted by many organizations and impressive results were achieved. However, BPM still in its infancy and many issues yet to be resolved. Having a unified list of the BPM critical success factors (CSFs) and BPM principles considered one of the important research areas. The literature review showed that despite the majority of BPM principles and CSFs are the same or there are minor differences between them, different terminologies were used to describe them. The literature review showed also that the methodologies used for BPM implementation were either very old, it does not cover the human interaction with BPM systems (BPMS), or it describes BPM methodology partially. Therefore, the main objectives of this research are building insights about BPM's most recent developments, unifying BPM principles and CSFs and proposing a comprehensive BPM. The literature was analyzed to extract BPM's developments. Moreover, the mapping process was used to propose a unified list of BPM CSFs and BPM principles. A critical success principles (CSPs) name was given to the unified list. 22 CSPs were identified, based on the nature of CSPs and implementation level, CSPs were classified into three main areas or levels namely strategic, supportive and operational CSPs. Out of 22 CSPs, 36.5% of CSPs were classified as a strategic CSPs, 45.5% of CSPs were classified as operational CSPs, and only 18% were classified as a supportive CSPs. A comprehensive BPM methodology was proposed, the proposed methodology combining the steps of generic BPM methodologies and BPMS methodologies and it is unifying the terminologies used in the reviewed methodologies. Pros and cons of the proposed methodology discussed in this research. The implications of this research can be seen in both theoretical and practical sides. For the theoretical side, the researchers can see the most recent developments in the scope of BPM, summarized in this research, and build on it to conduct future research. The proposed CSPs can be further analyzed to find the relationship between CSPs and how each one of them can affect BPM implementation. The proposed BPM methodology can be tested by applying it to the different business sectors and measure organizations' performance during implementation stages. For the practical side, the proposed methodology can provide a guide for managers and organization leaders about the right steps to be followed during implementing BPM and conducting BPM projects. Moreover, CSPs can guide BPM project managers, organization leaders, and business excellence units to focus their efforts on the significant improvement areas and actions to be taken on strategic and operational levels.

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1 Introduction

Processes can be defined as the way of doing our work (Jeston 2018). The process-oriented organization can be defined as an organization that focuses on managing and improving processes' outcomes, i.e. they follow horizontal hierarchies as opposed to vertical hierarchies to improve organization performance, productivity, return on investment, customer satisfaction (Christiansson and Rentzhog 2019). Viewing organization as a set of cross-functional processes at different levels and through organization's boundaries is one of the recent and effective approaches for managing organizations' business (Škrinjar and Trkman 2013; Looy 2019; Mäkinen 2019). Business process management (BPM) is one of the effective methodologies used for improving the efficiency and performance of the process-oriented organizations (Ongena and Ravesteyn 2019; Suša Vugec et al. 2019). BPM developed gradually from merging the quality approach and business process reengineering (BPR) approach (Rosemann and Brocke 2015). Jeston presented the same facts as he said that BPM emerged from multi disciplines that include process thinking, automation, and quality thinking. BPM defined as a management discipline that considers business processes as the main contributor to achieving the organization's objectives by improving, continuously managing performance of essential business processes, and govern it (Jeston 2018).

Rosemann and Brocke stated that despite impressive results of adopting BPM by many companies but it is still in its infancy. Those who started their journey of adopting BPM still not yet reached the anticipated results. Many issues "have yet to come to grips" such as management structure and responsibility, IT support, interenterprise processes, i.e. the processes that their ends reside in different companies together, standards development, processes and strategies, industry structure, i.e. "how will process management affect the structure of industries?" and many other issues in micro and macro levels (Rosemann and Brocke 2015). The Identification of Critical success factors (CSFs) or BPM principles considered one of the important research areas. However, despite that majority of BPM principles/CSFs are the same or there are minor differences between them, different terminologies used in the literature to describe them such as critical success factors (CSFs) (Trkman 2010; Bai and Sarkis 2013), BPM principles (vom Brocke et al. 2014), or critical practices (Škrinjar and Trkman 2013). For the methodologies or the structures used in the literature to describe the steps of BPM implementation, BPM methodologies used were either very old (Elzinga et al. 1995), it does not cover the human interaction with BPM Systems (BPMS)

(Jeston 2018), or it describes BPM methodology partially (Gulledge and Sommer 2002; Ko et al. 2009; van der Aalst 2013).

Taking the aforementioned BPM issues into consideration, the main objectives of this research are building insights about BPM's most recent developments, unifying the similarities in the BPM principles and CSFs and proposing a comprehensive BPM methodology that able to integrate the generic BPM methodologies and the Business Process Management Systems (BPMS) methodologies. The paper will follow the following structure, after the introduction, in Sect. 2, the literature review conducted. In Sect. 3, the research methodology explained. In Sect. 4, a process of unifying CSFs and BPM principles described. In Sect. 5, the details of proposing the comprehensive BPM Methodology presented. In Sect. 6, research results discussed and in the last section, Sect. 7, the conclusions and future research directions summarized.

2 Literature review

Four keywords used to search in the BPM literature that is "Business process management"; "Critical success factors"; "BPM principles" and "BPM methodology". Search results will subject to the screening process to exclude irrelevant papers and accept only papers falls within the research scope. Google scholar database used in this literature review. Google scholar database assists researchers to access a wide spectrum of rigor scientific journals, and access other papers cited by or cites the selected papers. Researchers decided to keep the search timeframe limited to 25 years between 1994 and 2019. After conducting a search on google scholar database and screening of first search results, only 19 paper and one book have been selected because it falls within the current research scope. However, the selected publications' numbers considered acceptable taking in consideration the recent developments of BPM discipline, this fact can be seen in the work of Buh, Kovačič and Indihar Štemberger as they were able to find only 18 articles that relevant to their research scope and they end up with 9 articles that cover their exact research problem (Buh et al. 2015). The newness of BPM discipline can be seen as well in the work of Duha and Rangiha as they were able to find ten articles only in the scope of social BPM (Duha and Rangiha 2019). To simplify the literature review process, the literature review will be divided into the following sub-headings.

2.1 Business process

Many definitions have been provided in the literature to define business processes. However, most of the definitions

agreed on general specifications of business processes. Business processes are event-driven, i.e. processes start and end by event (Gulledge and Sommer 2002). The Business process is a set of activities or logically related tasks and its characterized by its cross-functional nature, or it can be implemented within a unit or organization. Business processes are horizontal, its linking organization's operations to customers' requirements, its fulfilling other strategic goals and its dynamically coordinated, i.e. no single person responsible for the entire process. In general, business processes encompasses two processes types (Lee and Dale 1998; Trkman 2010):

1. Temporary processes i.e. processes that start when it is needed and end in the future.
2. Permanent processes, i.e. process that constantly running.

Therefore, a business process can be defined *as a dynamically coordinated set of activities or logically related tasks that start and end by an event. Processes developed to link organizations' operations to customers' requirements or to fulfill other strategic goals. The Business process can be implemented within a unit or organization, or it can cross-functional.*

2.2 Business process management (BPM)

Elzinga, Horak, Chung-Yee and Bruner defined BPM as a systematic, structured approach aim at improving products and services' quality through analyzing, improving, controlling, and managing processes. Same authors stated as well that "BPM is thereby the method by which an enterprise's "Quality" program (e.g. TQM, TQC, CQI) is carried out" and any improvement in the products and services quality is a reflection of processes improvement via BPM (Elzinga et al. 1995). BPM defined by Lee and Dale as a "systematic, structured approach to analyze, improve, control, and manage processes to improve the quality of products and services". Lee and Dale stated that many improvement tools such as BPR, continuous improvement and benchmarking were used in the BPM approach. Therefore, BPM is both a tool and a technique used to focus on improving whole organization processes. The authors mentioned that BPM is successful if it is linked to policy deployment and if processes to be improved by BPM represent the processes critical to achieving organizational goals and objectives (Lee and Dale 1998).

Hung defined BPM as management principles that represent best practices if implemented will ensure superior performance achievement and helps companies sustain competitive advantage (Hung 2006). Ko, Lee and Wah Lee defined BPM as an approach that uses methods, techniques, and software to design, enact, control and analyze business processes that involve organizations, documents, humans, applications and other sources of information. Ko, Lee and Wah Lee stated as well that software tools used to support management in performing the aforementioned actions became known as Business Process Management Systems (BPMS) (Ko et al. 2009). Another definition of BPM saying that BPM can be all efforts to improve organization fundamental activities and major elements, e.g. manufacturing, marketing, communications, and any other operations through conducting analysis and continuous improvement efforts (Trkman 2010).

Vom Brocke and Sinnl stated that culture is one of the key elements in BPM practices. Therefore, a holistic organizational perspective will be required. Also, Information Technology (IT) adoption should be one of the major activities in the BPM project (vom Brocke and Sinnl 2011). Van der Aalst defined BPM is an approach that focuses on improving business processes by combining knowledge from information technology and management sciences. Van der Aalst stated as well BPM has a broader scope if it is compared to Workflow Management (WFM) because "WFM primarily focuses on the automation of business processes", whereas BPM, in addition to process automation and process analysis, will focus on operations management and the organization of work (Van der Aalst 2013). Bai and Sarkis found that BPM phases encompass defining business processes, modeling business processes, analyzing processes by using approaches such as Six sigma and Lean Management, improving processes by using approaches such as business process re-engineering and process innovation, processes execution and processes monitoring, audit, and control" (Bai and Sarkis 2013). Škrinjar and Trkman supported most of the aforementioned definition as they stated that "BPM is a structured, analytical, cross-functional approach for continuous improvement of processes. BPM includes a myriad of practices from different fields" (Škrinjar and Trkman 2013). In 2018, BPM defined by John Jeston, as a management discipline that considers business processes as the main contributor to achieving the organization's objectives by improving, continuously managing performance of essential business processes, and govern it (Jeston 2018).

The review of the literature showed that BPM has five main drivers and seven themes. BPM drivers encompass globalization, establishing business networks beyond current business boundaries, changing technology, regulation, and stakeholders' actions (Lee and Dale 1998), While the seven themes associated with BPM includes (Armistead et al. 1999):

1. Developing strategy congruent with BPM based on organization resources and plans linked to the organization's goals and objectives.

2. BPM incorporated into the second theme which is organizational design. Organizational design is another theme related to design organization structure, organization boundaries, and authorities around and with processes.

3. Maximizing the market value chain is the third theme, BPM's role in this theme associated with the creation and improving processes that maximize interaction between organizations which in turn maximize the market value chain and leads to maximize the value delivered to the customer.

4. Performance management is the fourth theme associated with BPM. BPM relies on the models and tools used for performance management such as Balance Scorecard (BSC), European Foundation of Quality Management (EFQM) model, and any other excellence models or self-assessment tools because BPM in need for measurement systems to support the process of setting targets, progress monitoring, and taking necessary corrective actions.

5. Organizational coordination is the fifth theme associated with BPM, organizational co-ordination can be internal and external. Internal coordination between organization units and external coordination can be with customers or suppliers. BPM can be a facilitator of organizational co-ordination because by using BPM, boundaries between processes become more ill-defined which in turn facilitates the decision-making process.

6. BPM can serve as a framework for organizational learning and knowledge management which represents the sixth theme.

7. The approaches used in applying BPM affected by organizational culture and converse is also the case, therefore, organizational culture represents the seventh theme.

2.3 BPM critical success factors (CSFs)

Critical success factors (CSFs) can be defined as factors or areas that if developed or improved successfully will lead to an improvement in business performance or it will assure organizations goals achievement (Elzinga et al. 1995; Trkman 2010; Škrinjar and Trkman 2013). To identify organization CSFs, organization top management should review their vision and mission and goals. Next, CSFs should be clarified and classified based goals. After that, based on the goals and CSFs, measures for monitoring CSFs' performance will be established (Elzinga et al. 1995). In the reviewed literature, many researchers already investigated and listed the CSFs for BPM successful implementation. CSFs listed in the literature are:

1. *Strategic alignment* To ensure sustainable business improvement and improved performance, BPM and organizational strategy linkage is mandatory (Trkman 2010; Bai and Sarkis 2013; Škrinjar and Trkman 2013; Buh et al. 2015; Duha and Rangiha 2019). Jeston (2018), discussed similar CSF as he stated that BPM project vision should be clear, i.e. how the business will look after completing the BPM project (Jeston 2018). Now as we agree that BPM vision should be aligned with organization strategy, in the current research, BPM vision CSF will be embedded in strategic alignment's CSF.

2. *Level of IT investment (informatization)* IT strategy should be aligned with the business strategy to secure a competitive market place. The company's strategy and other organizational resources represent the driver to decide the IT investment level (Trkman 2010; Bai and Sarkis 2013; Buh et al. 2015; Duha and Rangiha 2019).

3. *Performance measurement* To reach and sustain an excellent performance level, Performance measurement is crucial. Each process should be measured at the area of the prime effects, appropriate measure such as cost, time, productivity, etc.… should be used to measure the processes and select the processes that gives better performance to replace ineffective process (Trkman 2010; Škrinjar and Trkman 2013; Buh et al. 2015; Jeston 2018).

4. *Level of employee's specialization* An appropriate specialization level of employees considering the available and required resources should be selected to conduct the activities in each process (Trkman 2010; Buh et al. 2015; Duha and Rangiha 2019).

5. *Organizational changes* Organizational change is important CSF because implementing BPM usually will lead to many changes in organizational structure (Trkman 2010; Škrinjar and Trkman 2013).

6. *Process owners* Having process owner for each process is mandatory in process enterprise because process owner is the one responsible for measuring process performance and ensure process continuous improvement (Trkman 2010; Škrinjar and Trkman 2013; Buh et al. 2015).

7. *Proposed changes implementation* To ensure successful organizational changes, an effective implementation process should be in place, therefore, a manager and change agents should maintain an effective joint effort (Trkman 2010; Buh et al. 2015).

8. *Continuous improvement system* Both organizational culture and formal structures should encourage continuous improvement. Many companies fail to maintain continuous improvement because they do not have appropriate change management in BPM

programs. Therefore, an appropriate continuous improvement system needs to be designed and integrated with other systems such as quality and process-oriented improvement approaches (Trkman 2010; Buh et al. 2015).

9. *Processes standardization* Assurance of processes standardization means that all tasks can be standardized which means that those tasks can support implementing a proper technological solution. However, over-standardization should be avoided (Trkman 2010; Škrinjar and Trkman 2013).

10. *Automation* Process automation and informatization have a strong connection. The link between process automation and informatization refers to the "use of IT to assist or replace employees in the performance of a business process". In general, tasks can be classified as fully manual, automated, and semi-automated and processes modeling and automation will ensure "performance improvement of business activities and enables enterprise-wide monitoring and coordination" (Trkman 2010; Škrinjar and Trkman 2013).

11. *Employees empowerment and training* Organizations should continuously spend time and funds on training and empowering their employees (Trkman 2010; Škrinjar and Trkman 2013; Buh et al. 2015; Jeston 2018).

12. *Project management* Viewing BPM implementation and its related planning activities as projects and using project management principles to manage BPM implementation processes is important CSF (Bai and Sarkis 2013; Buh et al. 2015; Jeston 2018).

13. *Collaborative working environment* In BPM, because most of the processes are cross-functional nature, employees should work together "horizontally across functional departments within the organization", therefore, the collaborative working environment is an important CSF (Trkman 2010; Škrinjar and Trkman 2013; Buh et al. 2015).

14. *Top management support* Top management support was always one of the important BPM success principles and the case not different in the BPM. Therefore, organization senior management should support show their commitments toward BPM projects and be involved to ensure BPM success (Trkman 2010; Škrinjar and Trkman 2013; Buh et al. 2015). Jeston listed similar CSF but the name was slightly different as he said that the BPM project will succeed only if senior leadership drives it (Jeston 2018).

15. *User/customer focus* Customers will either internal customer (the owner of the next process who receives the output of the previous process) or external customer (the end-user who receive final organization products or services). Business processes should be performed with a focus on delivering value to their customers (Bai and Sarkis 2013). The Similar idea discussed by Jeston as he stated the business needs to be customer-centric and employee-centric (Jeston 2018).

16. *Culture* The way people thought, believe, and behave represents the cultural elements that differentiate the group of people from another. In the process-centered organization, "culture incorporates the collective values and beliefs". Actually, "Culture creates a facilitating environment that complements the various BPM initiatives and can help BPM project progress by leading it to success" (Bai and Sarkis 2013). Therefore, culture and changes required to create BPM culture represent one of the core CSFs (Bai and Sarkis 2013; Buh et al. 2015; Duha and Rangiha 2019).

17. *Business drivers understanding* Everybody participating in the BPM project, especially senior management, should understand the drivers of change, i.e. why BPM project required and which problems need to be resolved (Buh et al. 2015; Jeston 2018).

18. *Establishing incentives and rewards system* To motivate people participating in BPM efforts, effective incentives and reward systems should be created and managed (Jeston 2018).

19. *Governance* The responsibilities and roles of all BPM teams from a high level to the operational level should be defined. Moreover, the rewarding process and decision-making process should be defined as well (Buh et al. 2015; Duha and Rangiha 2019).

20. *Methods* All tools and techniques used in BPM projects' life cycle can be one of the important CSF (Buh et al. 2015; Duha and Rangiha 2019).

2.4 BPM principles

Hung presented the following ten principles to ensure BPM success and sustain competitive advantage (Hung 2006):

1. *Process alignment* To sustain an organization's competitive advantage and improve organization performance, all organization processes and its institutional elements should be aligned with organization strategy and its strategic goals and objectives. Therefore, "the organizational structure needs to be redesigned to accommodate cross-functional requirements".

2. *Horizontal structure alignment* Hung found that having a horizontal organization structure rather than a vertical structure is one of the important BPM

principles that will ensure business success. It means that organization structure should avoid vertical organization hierarchically, and it should be created around core business processes to ensure "effective employees interaction from different departments and foster close working relationships and better communication".

3. *Strategic alignment* For organizations practicing BPM, strategies developed for core processes and functional strategies are developed for business units to ensure that all business units aligned and contributing to its core processes objectives. Hung stated that alignment must exist between the firm's strategies, actions and performance measures to compete successfully.

4. *Information Technology (IT) alignment* IT development in terms of hardware and software and the improvement of the possibility of having and accessing extensive amounts of information facilitated the organization's communication process and decision-making process. Hung stated that "IT offers the capability to redefine the boundaries of markets and structural characteristics, alter the fundamental rules and basis of competition, redefine business scope, and provide a new set of competitive weapons". Therefore, during BPM implementation, IT alignment became an important principle to support changes in core processes.

5. *Top management commitment* Top management commitment and support considered as core business principles to sustain organization competitiveness. For implementing BPM, top management support is the core principle because it ensures whole organization participation.

6. *Employee empowerment* building a shared vision, crafting an organizational culture and climate, and operating values represent the main empowerment elements that empower employees and motivate them to be active and creative in pursuing the firm's vision.

7. *Performance measurement* Establishing effective measures for all processes and tasks is important for BPM success.

8. *Continuous improvement* BPM should emphasis on continuous improvement cycles.

9. *Benchmarking* Best practices benchmarking is one of the main BPM principles.

10. *Organization structure change* BPM implementation should change organization structure to ensure "horizontal linkages between key activities" and make processes focused on delivering value to customers.

11. *Continuity* Hung presented continuity or continuous improvement as one of the rules should be available in any BPM program/project.

Jeston stated that IT in BPM scope means the BPMS used in BPM projects. BPMS components usually classified into three components that encompass modeling and design, execution and tracking, and performance management (Jeston 2018). vom Brocke and Sinnl stated that changing organization culture through BPM implementation and creation of BPM culture is one of the major BPM principles (Vom Brocke and Sinnl 2011). Schmiedel, Recker and vom Brocke supported aforementioned statement as they confirmed that applying BPM methods will lead to change organization culture and changes in culture will foster organization performance, i.e. culture change and establishing BPM culture is fully mediating the influence of BPM methods on process performance (Schmiedel et al. 2019). Vom Brocke, Schmiedel, Recker, Trkman, Mertens and Viaene listed the following BPM principles (vom Brocke et al. 2014):

1. *Context-awareness* Context-awareness principle means that no unique way of managing business processes, and to implement BPM specific organizational settings should be taken into consideration. Each BPM program for each organization will have its characteristics such as "size, strategy, industry, market, and objectives of BPM, and types of processes or available resources" within an organization.

2. *Continuity* Continuity means that organizations should improve their business efficiency and effectiveness continuously through implementing BPM.

3. *Enablement* In the enablement principle, BPM capabilities for organizations and individuals should be developed. In fact, in addition to the current BPM capabilities, the organization should build BPM dynamic capabilities to respond to future contingencies.

4. *Holism* Holism means, while implementing BPM, the focus shouldn't be on specific areas of an organization or one department but it should run throughout the value chain. Moreover, BPM should focus on all organization business aspects.

5. *Institutionalization* Institutionalization means that BPM implementation should not add another layer to organizational structure, i.e. BPM program should be embedded in the organizational structure. Vom Brocke, Schmiedel, Recker, Trkman, Mertens and Viaene stated that organization should ensure that BPM will not be an ad hoc responsibility and the level of process orientation can be enhanced by

having a centralized BPM through establishing BPM Centre for Excellence or BPM Office.

6. *Involvement* The involvement principle is critical for BPM success because of its emphasis on the involvement of all groups of people/stakeholders who are affected by BPM due to the expected changes in organization structure, jobs, strategies …etc.
7. *Joint understanding* A Common language that allows stakeholders to view, frame, analyze organizational systems should be provided by BPM to ensure establishing a shared understanding of processes and improve it.
8. *Purpose* Purpose principle explain the main role of BPM in value creation and achievement of organizational change.
9. *Simplicity* Simplicity principle emphasis on the fact saying that resources used by BPM should be economical, this can be achieved by selecting processes that should go for improvement based on strategic, technical, staffing, etc. viewpoint.
10. *Technology appropriation* Technology appropriation principle emphasized on the appropriate level of usage of technology in general and specifically IT technology in BPM.

2.5 BPM methodologies

BPM implementation will change organizational culture to create BPM culture that will foster processes and organization performance (Schmiedel et al. 2019). Having a structured and systematic BPM methodology that aligned with organization strategy is very important for BPM project and program success. BPM implementation is a complex process and the BPM project is multifaceted. Therefore, starting this project without adopting a structured approach will most likely lead to project failure or it will not meet the expectations of the stakeholders. Anyhow, the proposed methodology/approach should be flexible enough to be tailored for each organization based on organization needs (Jeston 2018).

Gulledge and Sommer explained that BPM methodology encompasses four steps that include; (1) understanding workflow, processes details to generate the required documents; (2) processes owners' selection; (3) processes optimization, processes management and performance measurement; (4) implementation of the improved processes to "enhance product quality or measures of process performance". However, compared to the other BPM methodologies or life cycles described in the literature, the above-stated methodology is oversimplified (Gulledge and Sommer 2002). Ko, Lee and Wah Lee found that BPM

methodology or life cycle implemented in the Business Process Management Systems (BPMS) consists of four generic steps that include: (1) process design; (2) system configuration; (3) process enactment; (4) and diagnosis. In the process design, the model of as-is business processes will be modeled into BPMS, graphical standards used in the process design step. In the system configuration step, BPMS and the underlying system infrastructure will be configured. In the process enactment step, business processes modeled in the first step will be deployed in BPMS engines. In process enactment step, execution standards will be used. In the diagnosis step, the bottlenecks and potential fraudulent loopholes will be identified and improved in the business processes. Diagnosis standards and its associated tools will be used in this step (Ko et al. 2009).

Van der Aalst supported the BPM life cycle proposed by Ko, Lee and Wah Lee as he found in their research that the BPM life cycle or methodology has four main activities namely modeling, enactment, analyzing and management. BPM activities described in the following points (van der Aalst 2013):

1. *Modeling* This activity related to the creation of a process model to be used in the next steps.
2. *Enactment* Enactment is the activity that uses the developed process model to control and support concrete cases.
3. *Analyzing* Process models created will be analyzed to identify bottlenecks and potential improvement areas.
4. *Management* This activity encompasses many sub-activities such as processes adjustment, resource reallocation, and large collections of related process models management.

BPM is a continuous improvement effort. Therefore, the improved and implemented processes should go through the next improvement cycles (van der Aalst 2013). From the description of steps and activities stated in the above paragraphs, the activities presented by van der Aalst can be mapped to the steps proposed by Ko, Lee and Wah Lee. Mapping showed that modeling activity is equivalent to process design, enactment activity equivalent to process enactment step, and analyzing and managing activities can be mapped to the diagnosis step. Satyal, Weber, Paik, Di Ciccio, and Mendling stated that BPM methodology consists of four major phases that encompass redesign, implementation, execution, and monitoring. Satyal, Weber, Paik, Di Ciccio, and Mendling improved the aforementioned methodology by adding a phase to it, the additional phase will validate of new versions of processes under improvement by simulating and testing those processes against old versions (Satyal et al. 2019).

The activities and/or steps of BPM life cycle/methodology presented by Ko, Lee and Wah Lee, van der Aalst, and Satyal, Weber, Paik, Di Ciccio, and Mendling were related to the BPMS (Ko et al. 2009; van der Aalst 2013; Satyal et al. 2019). But, to talk about the generic description of BPM methodology steps, Elzinga, Horak, Chung-Yee and Bruner found that despite the specific nature of each BPM approach in each organization, but most BPM methodologies can be mapped into a generic BPM methodology. The following points summarize the generic BPM methodology steps (Elzinga et al. 1995):

1. *Preparation for BPM* The first step in any BPM methodology is establishing a set of guiding principles, those principles usually embedded in the organization's vision, mission, and goals and they should be communicated to all organization employees. Each unit/department can develop its vision, mission, and goals. However, units/departments' vision, mission, and goals should be aligned with the entire organization's vision, mission, and goals. CSFs need to be developed based on goals, vision, and mission to have a clear understanding of the organization's ultimate purpose of the actions and processes required to achieve organizational goals. The next step is forming the Quality Council consisting of members from senior management levels. Quality Council usually chaired by a quality coordinator. Quality Council's main roles are "guiding and monitoring the improvement activities and for selecting the specific processes to study". Quality coordinator and the facilitators work together to coordinates training required for facilitators and BPM teams.

2. *Process selection* CSFs will be used by Quality Council, quality coordinator, or organization upper management to select a process from several alternatives for study, analysis, and improvement. After selecting the process, the process owner needs to be selected. By implementing BPM, the process owner has many activities and responsibilities such as forming a cross-functional team and sharing with the quality council and management success and failure stories.

3. *Process description* complete description and common definition of the selected process will be generated. Precise documentation of the process is very important because it contains processes boundaries, identify the scope of the study, and what constitutes the process.

4. *Process quantification* after selecting and describing the process, primary improvement opportunities will be detected from process documentation. Next, to identify essential improvement opportunities, process quantification is necessary, i.e. the tasks and activities constituting the process need to be analyzed to identify value-add or non-value-add activities. In process quantification, activities cost, activities time and value will be detected and then a computerized simulation model for the process can be generated to obtain precise process characterizations.

5. *Improvement opportunities selection* Based on the information and knowledge gained from previous steps a decision can be made to select the best and most important improvement opportunities.

6. *Human resource system* The existence of human resource systems during process preparation step and employees' involvement in the next steps including process improvement and implementation is mandatory for BPM success.

7. *Implementation* The improved processes resulted from the selected improvement opportunities will be implemented in this step. After implementation, process description and quantification for the improved process should be generated. For the improved process the following activities will be required:

    a. The analysis usually conducted to justify project goals achievements are required, e.g. cost–benefit analysis, return on investment.

    b. A new measure or refining previous measures for the improved process is required. Therefore, additional process quantification to be carried out. Moreover, the improved process should be monitored over time and compared with original process statistics.

    c. Improved process implementation cost, which is different from process operation cost, needs to be calculated.

8. *Continuous improvement cycle* BPM is a continuous improvement project. Therefore, after the implementation step, the steps stated in the previous points need to be repeated to improve improved processes again.

9. *Benchmarking* Benchmarking is a process of identifying what are the best practices implemented in the competitive business environment, in the scope of the process under improvement, and implement it to reach and sustain the highest performance level. "Benchmarking can be used at any stage of the BPM method described above. Who should benchmark and what to benchmark will differ according to specific needs and capabilities".

Jeston presented his comprehensive BPM implementation methodology in his book namely the 7FE framework. 7FE framework implement BPM through ten phases that include foundations, enablement, Launchpad, understand, innovate, people, develop, implement, realize value, and sustainable performance. Also, the 7FE framework has

three essential components that include leadership, BPM project management, and people change management. 7FE framework name came from grouping ten phases to four major parts of framework (4Fs) that includes foundations (foundations, enablement, and Launchpad), findings and solutions (understand and innovate), fulfillment (people, develop, and implement), and future (realize value and sustainable performance) and (3Es) which represent aforementioned three essential components. 7FE framework should be adopted by organizations depending on the organization's level of experience and maturity with BPM. However, the ideal approach in using the 7FE framework is starting, in the foundation phase, by using organization vision, mission, and goals and objectives to define organization strategy toward goals and objectives achievement. Based on organization strategy and organization needs for improving essential processes, Business Operating Model (BOM) needs to established. BOM represents a set of guidelines that guide the organization on how to operate a business or in other words how a business will be conducted. BPM enablement phase should start after the foundation phase. In the enablement phase, an organization should work to develop the necessary capabilities to drive four main components namely people, process, technology, and BPM project management which represent business success components, i.e. it is mandatory for BPM project success. After that, the rest of the 7FE framework phases will follow (Jeston 2018). The rest of 7FE framework phases can be summarized in the following points:

1. *Launchpad* Three major actions need to be taken that includes; (1) deciding location where to start next or new BPM activity, i.e. location of process to be improved; (2) define the goals of process under improvement which should be aligned with organization strategy; (3) establishing activities need to be taken to improve process and achieve process goals.
2. *Understand* Process metrics should be defined and root-cause analysis should be conducted to understand the current process situation, possible quick wins, and enable the innovate phase to take place.
3. *Innovate* All process end-users, BPM teams, and stakeholders should contribute to this phase. After identifying all available options to replace the old process, the aforementioned contributors should work together to run simulations and conduct necessary analyses to identify the most feasible process that can replace the old process. New metrics for the new process should be defined to compare it with the old process.
4. *People* Activities, performance management, and roles of employees should be aligned with organization

strategy and process goals. In this phase, the BPM team will ensure that.

5. *Develop* All components necessary for implementing new processes will be established in this phase. Components can be software, hardware, or any other requirements rather than IT requirements.
6. *Implement* Processes developed in the previous phases will be implemented in this phase with all related measures, performance management, training, etc.… However, this is not the end of the BPM project.
7. *Realize value* The processes for realizing the benefits of BPM projects and the resulted development as well as benefits realization reporting systems will be established in this phase considering the values realization steps executed in previous phases.
8. *Sustainable performance* The processes developed or improved in the 7FE framework have a specific life cycle. Therefore, at the end of the process life cycle, another improvement project should start, i.e. organization should establish a continuous improvement system/method to ensure performance sustainability and processes agility.

For the three essential components, it is well-known and supported by many business process change experts that top management support is one of the core values for any change or improvement project success which emphasized in the leadership component in the 7FE framework. For the BPM project management component, its emphasized in this component that experiences in BPM as well as project management is mandatory for managing BPM project to realize values and get the desired benefits. For people change management component, Jeston stated that 60% of effort or BPM project activities were focused on people change. Therefore, this component represents one of the major parts of the 7FE framework (Jeston 2018).

3 Research methodology

The methodology used in the current research encompasses analyzing the literature on three parallel lines. In the first line, the literature will be analyzed to extract the BPM developments and discuss them in the results discussion section. In the second line, the literature related to BPM CSFs and BPM principles will be analyzed, summarized and then mapping process will be used to find the similarities between CSFs and principles and the unique CSFs and principles. The unified list of CSFs and principles will be proposed. The unified list will be given critical success principles (CSPs) name. CSPs will be used as an input to the proposed comprehensive BPM methodology. In the third line, the literature related to BPM methodologies will be analyzed to identify the pros and cons of each
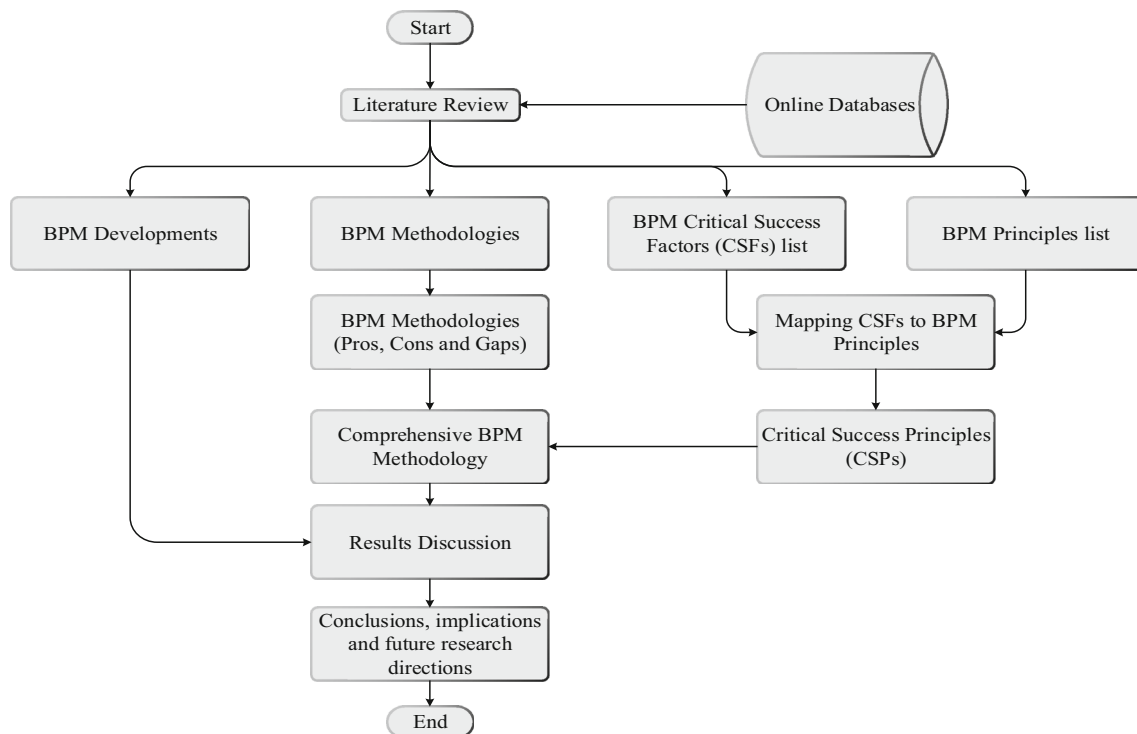
Fig. 1 Research methodology

methodology, highlight the gaps in each methodology and then propose a comprehensive BPM methodology that able to fill the gaps of the previous methodologies. In the end, a structured and focused results discussion will be conducted to build conclusions, discuss research implications, and suggest future research directions. The research methodology is shown in Fig. 1.

4 Unifying CSFs and BPM principles

BPM CSFs defined as a specific number of factors or areas that if it is developed or improved successfully will lead to an improvement in business performance, or it will assure organizations goals achievement (Trkman 2010; Elzinga et al. 1995; Škrinjar and Trkman 2013). BPM principles defined as a set of best practices any organization implementing BPM should follow to sustain competitive advantage and ensure BPM projects success (Hung 2006). However, as it is shown in Table 1, mapping CSFs to BPM principles reveals that most of CSFs have an equivalent or exact principles. Therefore, a unified list proposed in this section. To avoid confusion came from using different terminologies, in this research, the term critical success principles (CSPs) will be used to describe the comprehensive list unified from mapping and combining CSFs and BPM principles.

The analysis of CSFs and principles collected from literature and summarized in Table 1 reveals identifying a list of 22 CSPs. Based on the nature of CSPs and implementation level, CSPs classified into three main levels namely strategic, supportive, and operational CSPs. CSPs details are as follow:

1. **Strategic CSPs**

   1.1. *Strategic alignment* Alignment of BPM strategies, processes, performance measures and actions with organization strategy.

   1.2. *Top management commitment* To ensure BPM success, top management support is a core principle because it ensures whole organization participation.

   1.3. *Culture* Organizational culture is a mindset shared by all employees over the organization. Culture is a set of beliefs, attitudes, values, and behaviors. Having appropriate culture will facilitate jobs and complements the various BPM initiatives, which will support BPM project progress (Bai and Sarkis 2013).

   1.4. *Holism* BPM should be implemented throughout the value chain and it should focus on all organization business aspects.

   1.5. *Institutionalization* The implemented BPM project or approach should be embedded and integrated with organization systems and plans,

Table 1 Mapping BPM CSFs to BPM principles, and the unified list of critical success principles (CSPs)

Sr.	CSFs	Principles	Critical success principles (CSPs)
1	Strategic alignment: BPM and organizational strategy linkage are mandatory	Process Alignment: All organization processes and its institutional elements should be aligned with organization strategy and its strategic goals and objectives	Strategic alignment
		Strategic Alignment: Hung stated that "for a firm to compete successfully through its strategic objectives, alignment must exist between the firm's strategies, actions and performance measures" (Hung 2006)	
2	Level of IT investment (informatization): The company's strategy and other organizational resources represent the driver to decide IT investment level	IT Alignment: IT development in terms of hardware and software and the improvement of the possibility of having and accessing extensive amounts of information facilitated organizations' communication process and decision-making process. Therefore, during BPM implementation. IT alignment became an important principle to support changes in core processes	Technological investment
		Technology appropriation: an appropriate level of technology in general and specifically IT technology should be used in BPM projects	
3	Performance measurement: Each process should be measured in the area of the prime effects. The appropriate measure should be used to measure the processes and select the processes that give better performance to replace the ineffective process	Performance measurement: establishing effective measures for all processes and tasks are mandatory	Performance measurement
4	Level of employee's specialization	Enablement: In addition to the current BPM capabilities, the organization should build BPM dynamic capabilities to respond to future contingencies	Continually developing BPM capabilities
5	Organizational changes: Implementing BPM usually will lead to many changes in organizational structure	Organization structure Change: BPM implementation should change organization structure to ensure "horizontal linkages between key activities" and make processes focused on delivering value to customers	Organizational structure change
6	Proposed changes implementation: an effective implementation process should be in place	Context-awareness: To implement BPM, specific organizational settings should be taken into consideration. Each BPM program for each organization will have its characteristics such as "size, strategy, industry, market, and objectives of BPM	BPM implementation
		Simplicity: Simplicity principle emphasis the fact saying that resources used by BPM should be economical. This can be achieved by selecting processes that should go for improvement based on strategic, technical, staffing, etc. viewpoint	
7	Continuous improvement system: Appropriate continuous improvement system needs to be designed and integrated with other systems such as quality and process-oriented improvement approaches	Continuity: continuity or continuous improvement is one of the BPM principles. In any case, continuity means that "BPM should be a permanent practice that facilitates continuous gains in efficiency and effectiveness"	Continuous improvement system
8	Processes standardization: Assurance of processes standardization means that all tasks can be standardized which means that those tasks can support implementing a proper technological solution	Joint understanding: A Common language that allows stakeholders to view, frame, analyze organizational systems should be provided by BPM to ensure establishing a shared understanding of processes and improve it	Processes standardization
		Having Systems and documented procedures	
9	Employees empowerment and training	Employees Empowerment	Employees empowerment

Table 1 continued

Sr.	CSFs	Principles	Critical success principles (CSPs)
10	Collaborative working environment: In BPM, because most of the processes are cross-functional nature, employees should work together	Horizontal Structure Alignment: Organization structure should avoid vertical organization hierarchically, and it should be created around core business processes to ensure "effective employees interaction from different departments and foster close working relationships and better communication"	Collaborative working environment
		Involvement: The involvement principle is critical for BPM success because of its emphasis on the involvement of all groups of people/stakeholders who are affected by BPM due to the expected changes in organization structure, jobs, strategies …etc	
11	Top management support	Top management Commitment: Top management commitment and support considered as core business principles to sustain organization competitiveness.	Top management commitment
12	User/customer focus: BPM should be performed with a focus on delivering value to their customers	Purpose: The role of BPM "as a management method to achieve organizational change and create value" highlighted by purpose principle	Delivering value to the customer
13	Culture	Culture	Culture
14	Process owners: having an owner for each process under improvement is the one responsible for measuring is important for BPM success and maintaining continuous improvement		Process owners
15	Project management: Viewing BPM implementation and its related planning activities as projects and using project management principles to manage BPM implementation processes are important CSFs		Project management
16	Business drivers understanding		Business drivers understanding
17	Establishing incentives and rewards system		Establishing incentives and rewards system
18	Governance		Governance
19	Methods		Methods
20		Holism	Holism
21		Institutionalization	Institutionalization
22		Benchmarking	Benchmarking

i.e. it shouldn't add another layer to organizational structure.

1.6. *Business drivers understanding* Organization senior management and BPM teams should understand the drivers of change, i.e. why BPM project required and which problems need to be resolved.

1.7. *Governance* The responsibilities and roles of all BPM teams from a high level to the operational level should be defined. Moreover, the rewarding process and decision-making process should be defined as well.

1.8. *Delivering value to the customer* Organizational change and delivering value to the customers

should be emphasized during the planning and implementation of BPM.

2. **Supportive CSPs**

2.1. *Technological investment* Identifying an appropriate level of investment in technology and specifically in IT technology based on organization strategy, resources, and changes level.

2.2. *Continually developing BPM capabilities* In addition to the current BPM capabilities that include employees' specialization, an organization should build BPM dynamic capabilities to respond to future contingencies.

2.3. *Benchmarking* As it was stated in the literature review, Benchmarking represents an effective

improvement approach that can be used at any stage of BPM and it ensures the improvement projects will consider the practices and technologies implemented by competitors.

2.4. *Methods* To ensure BPM project success an effective tools and techniques need to be used.

3. **Operational CSPs**

3.1. *Performance measurement* effective measures for all processes and tasks are essential to measure processes performance levels and select the processes that give better performance to replace an ineffective process.

3.2. *Organizational structure change* BPM implementation should change organization structure to ensure horizontal linkages, cross-functional nature of processes, and make processes focused on delivering value to customers.

3.3. *BPM implementation* An effective BPM implementation process that characterized by its simplicity, i.e. resources used by BPM should be economical, and contextual awareness, i.e. while implementing BPM, organization setting factors such as size, strategy, business scope, BPM objectives, available resources, and types of processes should be considered.

3.4. *Continuous improvement system* An appropriate continuous improvement system needs to be designed and integrated with other systems such as quality and process-oriented improvement approaches.

3.5. *Processes standardization* BPM should create an effective system for standardizing and documenting all processes to ensure having joint understanding, i.e. a common language that allows stakeholders to view, frame, analyze organizational systems and improve it.

3.6. *Employees empowerment* BPM implementation should emphasis on empowering employees to contribute to processes improvement and implementing changes.

3.7. *Collaborative working environment* in BPM, due to the cross-functional nature of processes, employees' participation and contribution to processes analysis and improvement from across organizations should be emphasized.

3.8. *Process owners* Having an owner for each process means having an accountable person whom responsible for measuring process performance, buy in-process changes, implement and monitor implemented changes, and ensure process continuous improvement.

3.9. *Project management* Project management principles should be followed while implementing BPM and its related planning activities.

3.10. *Establishing incentives and rewards system* To motivate people participating in BPM efforts, effective incentives and reward systems should be created and managed.

5 Comprehensive BPM methodology

The review of the literature reveals that BPM still one of the developing research scopes and many gaps still exist as many researchers stated in their work, for instance, Ko, Lee and Wah Lee found that at the time of writing their research "no diagnosis standards that are completed and implemented in BPM systems" (Ko et al. 2009). Therefore, it could be concluded that by applying BPM, achieving business goals does not necessarily imply that all the associated tasks have been accomplished because current BPMS is lacking of evaluation techniques for all BPM standards. Bandara, Indulska, Chong, and Sadiq found as well that many gaps still exist in BPM scope and discussed in their work the issues that prevent BPM success in three levels, strategic, tactical, and operational. Strategic issues encompass lack of governance, lack of employee buy-in, and lack of agreement on BPM importance and applicability. Tactical issues encompass lack of standards, ill-defined processes specification, lack of BPM education, and the last issue on tactical issue can be described by lack of holistic and reliable methodology that support end-to-end BPM projects (Bandara et al. 2007). Therefore, the reviewed BPM methodologies/life cycles will be analyzed in the coming paragraphs and a comprehensive BPM methodology will be proposed.

Based on the literature review results, BPM methodologies either oversimplified (Gulledge and Sommer 2002), or it focuses on BPMS only without taking into consideration the activities or actions performed out of the system (Ko et al. 2009; van der Aalst 2013). Only two methodologies were found as generic methodologies, i.e. it considers the common steps or phases followed during BPM implementation. The first methodology was presented by Elzinga et al. (1995) and the other methodology (7FE framework) was presented by Jeston (2018). However, the analysis conducted on both methodologies and mapping the Elzinga et al. methodology to the Jeston framework showed that those methodologies have a common logic and the stated steps or phases for implementing BPM are almost the same but terminologies used were different. It has been noticed that some steps in Elzinga et al. methodology, based on the description of activities of each

Table 2 Mapping Elzinga et al. methodology to 7FE framework by Jeston

Sr.	Elzinga et al. (1995) BPM methodology	7FE framework (Jeston 2018)
1	Preparation of BPM	Foundation and enablement phases
2	Process selection	Launch pad
3	Process description	Understand
4	Process quantification	Innovate
5	Improvement opportunities selection	
6	Human resource system	People
7	Implementation	Develop
8		Implement
9	Continuous improvement cycle	Realize value
10		Sustainable performance
11	Benchmarking	1st E-Leadership (top management support)
12		2nd E-BPM project management
13		3rd E-People change management

step and phase, can be mapped to one phase from the Jeston framework and vice versa, i.e. some phases from Jeston framework can be mapped to one step.

As we can see the Table 2, the analysis of both methodologies showed that process quantification and improvement opportunities selection steps from Elzinga et al. methodology can be mapped to the innovate phase from the Jeston framework. On the other hand, develop and implement phases from the Jeston framework can be mapped to the implementation step from Elzinga et al. methodology. Also, "realize the value and sustainable performance" phases from the Jeston framework can be mapped to the continuous improvement cycle step from Elzinga et al. methodology. The three essential components from Jeston framework can be mapped as well to benchmarking step from Elzinga et al. methodology if we consider that, by best practices benchmarking, the organization can learn and implement activities related to the three essential components.

From the above statement, we can conclude that between 1995 and 2018, 23 years, no major development can be noticed in the general logic of BPM implementation methodologies. The major development can be noticed on the BPMS scope. Despite that, yet the reviewed methodologies do not show how BPMSs interact with humans within BPM methodology phases (Elzinga et al. 1995; Jeston 2018). Therefore, a comprehensive BPM methodology proposed, see Fig. 2. The proposed methodology combines the steps of generic BPM methodologies (Elzinga et al. 1995; Jeston 2018) and BPMS methodologies (Ko et al. 2009; van der Aalst 2013) and unify the terminologies used in reviewed methodologies.

The preparation process represents the first step of the proposed methodology. The preparation process starts by analyzing organization vision, mission, goals, strategy, and CSPs to identify CSFs and work on needed culture change

to prepare the organization for implementing BPM. Next, CSFs and aforementioned information used to select processes that need improvement. Process description step will start after processes selection step to identify processes owners, generate processes documents, set performance measures for as-is processes and use the generated information for BPMS configuration. Process quantification starts after process description to identify data such as cost, time, values …etc. and used it for processes modeling, and to identify primary improvement opportunities. Graphical standards from BPMS will be used along with data identified during the process description for processes modeling to create a model for each process. Generated models used to deploy processes in BPMS by using execution standards during Process enactment step. In the next step, the diagnosis standard from BPMS will be used to select improvement opportunities, analyze it, improve it, and implement it. If BPM project goals achieved, the improved processes, by using diagnosis standards from BPMS, will be analyzed and monitored. Then, the related information will be recorded in the databases to use in the next improvement cycle because BPM methodology has no end and its closed improvement cycle. If the targeted goals of the BPM project not achieved, the BPM project will be repeated from the BPM preparation step. Best practices in leadership (top management support), BPM project management, and people change management need to be applied at any stage of methodology or BPM project.

6 Results discussion

BPM literature reviewed in the previous sections. Based on the review results, CSFs and BPM principles were analyzed and the similarities between them were identified. Then, review results were analyzed to propose a
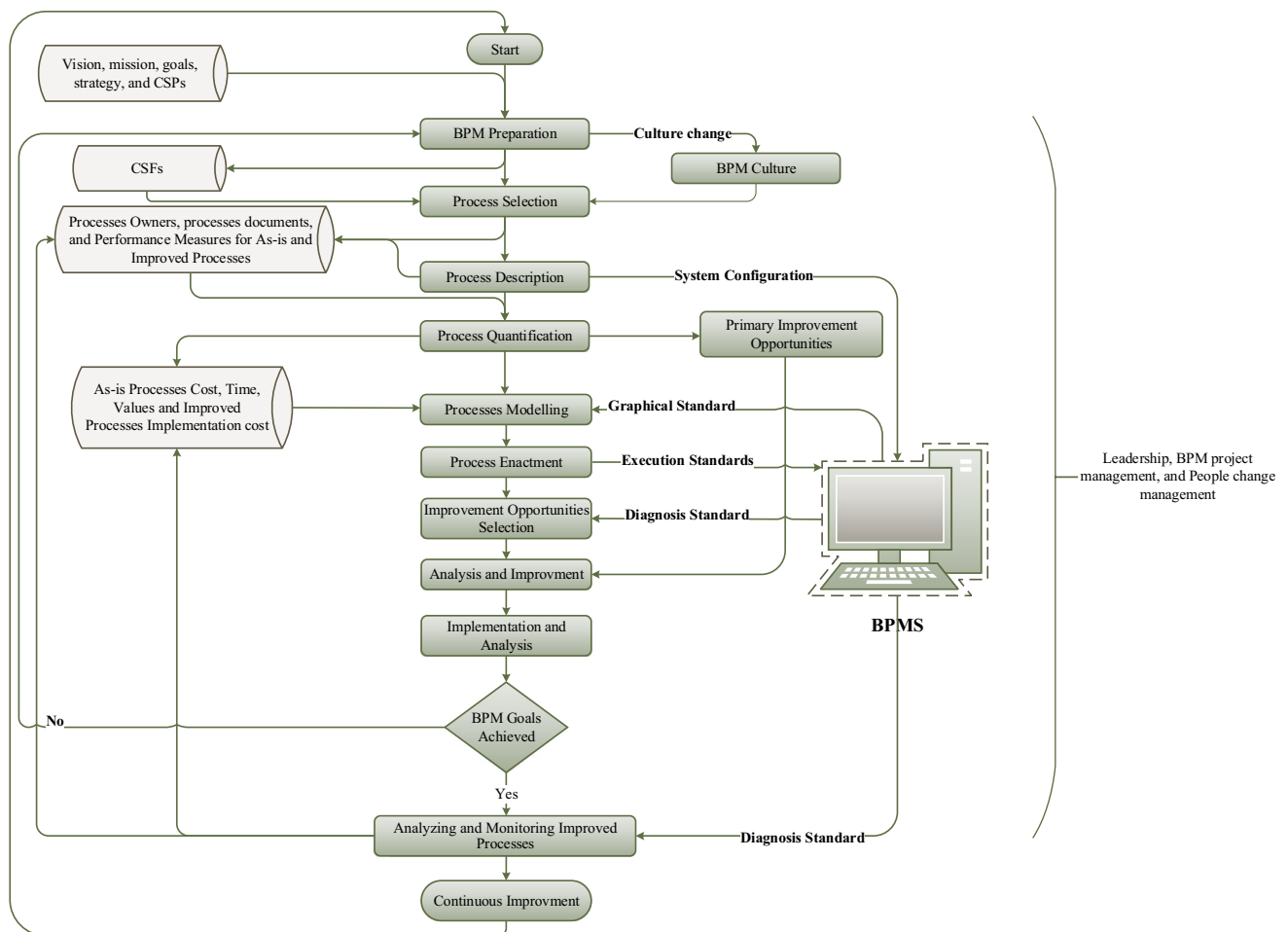
Fig. 2 The proposed BPM comprehensive methodology

comprehensive BPM methodology. In the current section, results discussion will be divided into three sub-sections. In the first section, BPM developments extracted from the literature will be discussed. In the second section, CSPs list details will be discussed. In the third section, the implications and benefits of the proposed BPM methodology will be discussed.

6.1 Insights about the BPM developments

The business process, based on the literature review, can be defined as a dynamically coordinated set of activities or logically related tasks that start and end by an event. Processes developed to link organizations' operations to customers' requirements or to fulfill other strategic goals. The business process can be implemented within a unit or organization, or it can be cross-functional. The review of BPM literature for a period between 1995 and 2018 resulted having insights about the developments in BPM characteristics, targeted areas for improvement, BPM

actions/activities, and tools and techniques used in BPM project over the years which is summarized in the Table 3.

As it is shown in Table 3, BPM is an approach linked to organizational strategy and its focus on improving essential business processes. BPM developed over the years from merely systematic and structured approach used for improving and managing organization performance to management discipline that, in addition to what mentioned before, start using methods, techniques, and software for improving and managing organization performance, i.e. BPM approaches start to combine knowledge from information technology and management sciences for improving business processes. Used software became known as Business Process Management Systems (BPMS). However, considering the most recent developments in BPM, BPM now saw as a house named as a "BPM house". BPM house consists of foundation, walls, and roof. Foundation represents all BPM principles and capabilities necessary for BPM stability and success. Walls that represent all activities (how work should be done) that if implemented will ensure BPM program efficiency and effectiveness. The

Table 3 BPM developments details

Sr.	References	Characteristics	Targeted areas	Actions/activities	Tools and techniques
1	Elzinga et al. (1995)	Systematic and structured approach	Aim of improving products and services' quality by improving related processes	Analyzing, improving, controlling, and managing processes	Quality program, e.g. TQM, TQC, CQI
2	Lee and Dale (1998)	Systematic, structured approach and it should be linked to organizational strategy	Aim of improving the quality of products and services". processes to be improved by BPM represent the processes critical to achieving organizational goals and objectives	Analyze, improve, control, and manage processes	Many improvement tools such as re-engineering, continuous improvement and benchmarking were used in the BPM approach
3	Armistead et al. (1999)	This area not covered in this reference	Organization structure, organizational boundaries, authorities around and with processes, market value chain, and organizational culture	This area not covered in this reference	BPM relies on the models and tools used for performance management such as Balance Scorecard (BSC), European Foundation of Quality Management (EFQM) model, and any other excellence models or self-assessment tools
4	Ko et al. (2009)	BPM is an approach that uses methods, techniques, and software that became known as Business Process Management Systems (BPMS)	Organizational documents, humans, applications and other sources of information	Design, enact, analyze and control	This area not covered in this reference
5	van der Aalst (2013)	An approach that focus on improving business processes by combining knowledge from information technology and management sciences	BPM in addition to process automation and process analysis will focus on operations management and the organization of work	Process automation, process analysis, operations management, and the organization of work	This area not covered in this reference
6	Jeston (2018)	BPM is a management discipline seen as a house named as a "BPM house". BPM house consists of foundation, walls, and roof. Foundation represents all BPM principles and capabilities necessary for BPM stability and success. Walls that represent all activities (how work should be done) that if implemented will ensure BPM program efficiency and effectiveness. The roof represents all guidelines and systems needed to create culture and governance structures to hold all BPM house elements together and provide sustainability for all BPM activities	Achievement of organization objectives that satisfying and meets customers' needs through improving. managing performance and governance of the essential business processes	BPM has four major activities that represent the walls of BPM house and it includes alignment with organization strategy, identification of the essential business processes that should be enhanced first, Business process improvement and people change, and the activities related to benefits realization and performance management. Stated activities translated to a practical framework for implementing BPM namely 7FE framework	Many tools and techniques used in BPM activities. Tools and techniques can be categorized mainly under three main categories that include quality thinking, process thinking, and automation

roof represents all guidelines and systems needed to create culture and governance structures to hold all BPM house elements together and provide sustainability for all BPM activities. The framework or methodology that an organization needs to adapt and use for BPM implementation needs to be a systematic, structured, cross-functional, and analytical approach with an emphasis on balanced investment on IT and using IT resources during BPM implementation.

The initial focus of BPM improvement projects was on continuously improving processes related to products and services' quality. In the last two decades, the objectives of BPM projects or the targeted improvement areas were extended to encompass processes in all organizational aspects such as Organization structure, organization boundaries, authorities around and with processes, market value chain, organizational culture …etc. Recently, BPM projects start to focus on the Achievement of organization objectives that satisfying and meet customers' needs through improving. Managing performance and governance of the essential business processes.

At the early stage of BPM research, the BPM encompasses activities that include analyzing, improving, controlling, and managing processes. In 2009, after advancement and availability of BPMS, Ko, Lee and Wah Lee said that BPM activities start to include design, enact, analyze and control business processes but with focus on feeding data to BPMS and trying to automate processes after improving it (Ko et al. 2009). Later in 2018, BPM major activities were classified to four major activities that represent the walls of BPM house and it includes alignment with organization strategy, identification of the essential business processes that should be enhanced first, Business process improvement and people change, and the activities related to benefits realization and performance management. Stated activities translated to practical frameworks/methodologies for implementing BPM. Frameworks should include set of activities or actions that focus build necessary business foundation and capabilities, understand current processes, innovate new processes, training and empower people, build all components necessary for implementing new processes wither software or hardware, implement new processes, having system to measure processes performance and realize benefits of the conducted improvements, and finally having a system or methods to ensure performance sustainability and processes agility.

For tools and techniques used in BPM projects, at the early stage, the tools and techniques used with BPM were related to organization quality programs such as TQM, TQC, and CQI but later, all incremental and breakthrough tools for performance management and improvement were incorporated in the BPM approach such as BPR, continuous improvement, benchmarking, BSC, EFQM model …etc. most of tools and techniques can be categorized mainly under three main categories that include quality thinking, process thinking, and automation.

6.2 Critical success principles (CSPs)

The analysis conducted on the BPM CSFs and BPM principles literature reveals that when organizations, during implementing BPM, reach to CSFs development stage, they should refer to the BPM principles and adapt it to fit for their business by focusing on the principles that will gain more weight in term of fulfilling organizations' goals and objectives and delivering the desired value to the customers and stakeholders. However, practitioners and organizations' managers may face difficulties or get confused during the CSFs development stage because of different terminologies used in the literature to describe the same BPM CSFs and BPM principles. Therefore, the CSPs list proposed to facilitate the mission of the practitioners and BPM project managers during the aforementioned stage. CSPs may use to select the CSFs that fit for organization business and have a stronger effect in terms of meeting organizations' goals and objectives. Out of 22 CSPs, 36.5% of CSPs were classified as a strategic CSPs, 45.5% of CSPs were classified as operational CSPs, and only 18% were classified as a supportive CSPs, which show that there is no major importance of one level compare to other, i.e. the importance of CSPs in strategic and operational levels are almost equal in BPM projects and organization should pay attention to both levels during planning and implementing BPM project. Also, organizations shouldn't overlook supportive CSPs that can be critical for the BPM project's success.

6.3 Comprehensive BPM methodology pros and cons

The proposed methodology has the features of the effective BPM methodology that was stated in the literature. The comprehensive methodology characterized by its systematic and structure nature. The pros of the proposed methodology may include but not limited to explaining what BPMS standards to be used during BPM methodology implementation, in which stage it should be used and how it will interact with human factors within the organization. The methodology incorporates the proposed CSPs list and shows methodology users when and how they should use it to identify CSFs for their organizations. The methodology highlights the importance of BPM culture creation as a vital factor for BPM efforts' success. Moreover, the Methodology stressed the importance of identification of improvement opportunities at the early stage and after analysis as well and make use of them to improve organizational processes. BPM

methodology emphasis that the improvement process continues the improvement process and it has no end. Methodology highlighted the significance of the best practices benchmarking because it will assist the organization to compare their processes with frontier organizations' processes. The major cons of this methodology, despite that it was build based on the tested methodologies, is still a theoretical methodology and it needs to be tested by applying it to a case study organization.

7 Conclusions and future research agenda

Business process management (BPM) is one of the effective performance management methodologies used in managing process-oriented organizations. BPM was adopted by many organizations and impressive results were achieved. However, BPM still in its infancy and many issues yet to be resolved. Our main contributions in the current research were defining BPM, explaining the most recent developments in the BPM scope, proposing a unified list of BPM critical success factors (CSFs) and BPM principles that given critical success principles (CSPs) name and proposing a comprehensive BPM methodology.

Regarding BPM developments, BPM developed over the years from merely systematic and structured approach used for improving and managing organization performance to management discipline that, in addition to what mentioned before, start using methods, techniques, and software for improving and managing organization performance, i.e. BPM approaches start to combine knowledge from information technology and management sciences for improving business processes. The software used for BPM became known as Business Process Management Systems (BPMS). Considering the most recent developments in BPM, BPM now saw as a house named as a "BPM house". BPM house consists of foundation, walls, and roof. Foundation represents all business principles and capabilities necessary for BPM stability and success. Walls represent all activities (how work should be done) that if implemented will ensure BPM program efficiency and effectiveness. The roof represents all guidelines and systems needed to create culture and governance structures to hold all BPM house elements together and provide sustainability for all BPM activities. The framework or methodology that an organization may need to adapt and use for BPM implementation should be systematic, structured, cross-functional, and analytical with emphasis on the balanced investment on IT and it should use IT resources during BPM implementation.

Regarding CSPs, the CSPs list proposed to facilitate the mission of the practitioners and BPM project managers during the CSFs selection stage while implementing BPM. CSPs may use to select the CSFs that fit for organization business and have a stronger effect in terms of meeting organizations' goals and objectives. A list of 22 CSPs identified. Based on the nature of CSPs and implementation level, CSPs classified into three main areas or levels namely strategic, supportive and operational CSPs. Out of 22 CSPs, 36.5% of CSPs were classified as a strategic CSPs, 45.5% of CSPs were classified as operational CSPs, and only 18% were classified as a supportive CSPs, which indicate that no major importance of one level, i.e. the importance of CSPs on strategic and operational levels are almost equal in BPM projects. Organizations should pay attention to both levels during the planning and implementing BPM projects. Besides, organizations shouldn't overlook supportive CSPs that can be critical for the BPM projects' success.

In the third part of our contributions, a comprehensive BPM methodology was proposed. The proposed methodology combining the steps of generic BPM methodologies and BPMS methodologies and it is unifying the terminologies used in the reviewed methodologies. The proposed methodology starts with the preparation process by analyzing organization vision, mission, goals, strategy, and CSPs to identify CSFs and work on needed culture change to prepare the organization for implementing BPM. After that, CSFs and the aforementioned information used to select processes that will subject to the improvement process. Process description step will start after processes selection step to identify processes owners, generate processes documents, set performance measures for as-is Processes, and use the generated information for BPMS configuration. Process quantification will start after process description to identify data such as cost, time, values …etc. and used it for processes modeling, and to identify primary improvement opportunities. Graphical standards from BPMS will be used along with data identified during the process description for processes modeling to create a model for each process. Generated models used to deploy processes in BPMS by using execution standards during Process enactment step. In the next step, the diagnosis standard from BPMS will be used to select improvement opportunities, analyze it, improve it, and implement it. If BPM project goals achieved, the improved processes, by using diagnosis standards from BPMS, will be analyzed and monitored. Then, the related information will be recorded in the databases to use in the next improvement cycle because BPM methodology has no end and its closed improvement cycle. If the targeted goals of the BPM project not achieved, the BPM project will be repeated from the BPM preparation step. Best practices in leadership (top management support), BPM project management, and people change management need to be applied at any stage of methodology or BPM project.

The pros of the proposed methodology may include but not limited to explaining what BPMS standards to be used during BPM methodology implementation, in which stage it should be

used and how it will interact with human factors within the organization. The methodology incorporates the proposed CSPs list and shows methodology users when and how they should use it to identify CSFs for their organizations. The methodology highlights the importance of BPM culture creation as a vital factor for BPM efforts' success. Moreover, the Methodology stressed the importance of identification of improvement opportunities at the early stage and after analysis as well and make use of them to improve organizational processes. BPM methodology emphasis that the improvement process continues the improvement process and it has no end. Methodology highlighted the significance of the best practices benchmarking because it will assist the organization to compare their processes with frontier organizations' processes. The major cons of this methodology, despite that it was build based on the tested methodologies is still a theoretical methodology and it needs to be tested by applying it to a case study organization.

The implications of this research can be seen in both theoretical and practical sides. From the theoretical point of view, researchers can refer to the most recent developments in the scope of BPM and build on it to conduct future research. The proposed CSPs can be further analyzed to find the relationship between CSPs and how each one of them can affect the implementation of BPM. The proposed BPM methodology can be tested by applying it to different business sectors and measure organizations' performance during the implementation stages. From the practical side, the proposed methodology can provide a guide for managers and organizations leaders about the right steps to be followed during implementing BPM and conducting BPM projects. Moreover, CSPs can guide BPM project managers, organizations leaders, and business excellence units to focus their efforts on the significant improvement areas and actions to be taken on strategic and operational levels.

References

Armistead C, Pritchard J-P, Machin S (1999) Strategic business process management for organisational effectiveness. Long Range Plan 32(1):96–106. https://doi.org/10.1016/S0024-6301(98)00130-7

Bai C, Sarkis J (2013) A grey-based DEMATEL model for evaluating business process management critical success factors. Int J Prod Econ 146(1):281–292. https://doi.org/10.1016/j.ijpe.2013.07.011

Bandara W et al (2007) Major issues in business process management: an expert perspective. In: Proceedings ECIS 2007—the 15th European conference on information systems. St Gallen, Switzerland, pp 1240–1251. http://eprints.qut.edu.au/%0ABandara. Accessed 23 June 2019

Buh B, Kovačič A, Indihar Štemberger M (2015) Critical success factors for different stages of business process management adoption—a case study. Econ Res 28(1):243–258. https://doi.org/10.1080/1331677X.2015.1041776

Christiansson M-T, Rentzhog O (2019) Lessons from the "BPO journey" in a public housing company: toward a strategy for BPO. Bus Process Manag J. https://doi.org/10.1108/bpmj-04-2017-0091

Duha S, Rangiha ME (2019) Social business process management (SBPM) critical success factors (CSF). In: Lecture notes in business information processing. Springer, pp 85–95. https://doi.org/10.1007/978-3-030-11641-5_7

Elzinga DJ et al (1995) Business process management: survey and methodology. IEEE Trans Eng Manag 42(2):119–128. https://doi.org/10.1109/17.387274

Gulledge TR, Sommer RA (2002) Business process management: public sector implications. Bus Process Manag J 8(4):364–376. https://doi.org/10.1108/14637150210435017

Hung RY-Y (2006) Business process management as competitive advantage: a review and empirical study. Total Qual Manag Bus Excell 17(1):21–40. https://doi.org/10.1080/14783360500249836

Jeston J (2018) Business process management practical guidelines to successful implementations, 4th edn. Routledge, Abingdon

Ko RKL, Lee SSG, Wah Lee E (2009) Business process management (BPM) standards: a survey. Bus Process Manag J 15(5):744–791. https://doi.org/10.1108/14637150910987937

Lee RG, Dale BG (1998) Business process management: a review and evaluation. Bus Process Manag J 4(3):214–225. https://doi.org/10.1108/14637159810224322

Mäkinen T (2019) Operational performance through business process management. Tampere University of Applied Sciences, Tampere

Ongena G, Ravesteyn P (2019) Business process management maturity and performance. A multi group analysis of sectors and organization sizes. Bus Process Manag J 26(1):132–149. https://doi.org/10.1108/BPMJ-08-2018-0224

Rosemann M, Brocke JV (2015) Handbook on business process management 1: introduction, methods, and information systems. Springer, Berlin. https://doi.org/10.1007/978-3-642-45100-3

Satyal S et al (2019) Business process improvement with the AB-BPM methodology. Inf Syst 84(July):283–298. https://doi.org/10.1016/j.is.2018.06.007

Schmiedel T, Recker J, vom Brocke J (2019) The relation between BPM culture, BPM methods, and process performance: evidence from quantitative field studies. Inf Manag. https://doi.org/10.1016/j.im.2019.103175

Škrinjar R, Trkman P (2013) Increasing process orientation with business process management: critical practices. Int J Inf Manag 33(1):48–60. https://doi.org/10.1016/j.ijinfomgt.2012.05.011

Suša Vugec D, Ivancic L, Milanovic Glavan L (2019) Business process management and corporate performance management: does their alignment impact organizational performance. Interdiscip Descr Complex Syst 17(2):368–384. https://doi.org/10.7906/indecs.17.2.12

Trkman P (2010) The critical success factors of business process management. Int J Inf Manag 30(2):125–134. https://doi.org/10.1016/j.ijinfomgt.2009.07.003

van der Aalst WMP (2013) Business process management: a comprehensive survey. ISRN Softw Eng 2013:1–37. https://doi.org/10.1155/2013/507984

Van Looy A (2019) Capabilities for managing business processes: a measurement instrument. Bus Process Manag J 26(1):287–311. https://doi.org/10.1108/BPMJ-06-2018-0157

vom Brocke J, Sinnl T (2011) Culture in business process management: a literature review. Bus Process Manag J 17(2):357–378. https://doi.org/10.1108/14637151111122383

vom Brocke J et al (2014) Ten principles of good business process management. Bus Process Manag J 20(4):530–548. https://doi.org/10.1108/bpmj-06-2013-0074