



Queensland University of Technology
Brisbane Australia

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[Abeygunasekera, Ahangama Withanage Janitha Cha, Bandara, Wasana, Wynn, Moe, & Yigitbasioglu, Ogan](#)

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Nexus between Business Process Management (BPM) and accounting: a literature review and future research directions.

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Nexus between Business Process Management (BPM) and Accounting: A Literature Review and Future Research Directions

Abstract

Purpose – Multidisciplinary BPM research can reap significant impact. We can particularly benefit from incorporating accounting concepts to address some of the key BPM challenges; such as value-creation and return-on-investment of BPM activities. However, research which addresses a relationship between BPM and accounting is scarce. This paper provides a detailed synthesis of the current literature that has integrated accounting aspects with BPM. We profile and thematically describe existing research, and derive evidence based directions to guide future research.

Approach – A multi-staged structured literature review approach to search for the two broad themes accounting and BPM, supported by NVivo (to manage the papers and the coding and analysis processes) was designed and followed.

Findings – The paper confirms the dearth of work that ties the two disciplines; despite the synergetic multidisciplinary results that can be attained. Available literature is mostly from the management accounting perspective and relates to describing how performance management, in particular performance measurement can be applicable to process improvement initiatives together with tools such as activity based costing (ABC) and the balanced scorecard (BSC). There is a lack of research that examines BPM in relation to any financial accounting perspectives (such as external reporting). Future research directions are proposed together with implications for practitioners with the findings of this structured literature review.

Implications – The paper provides a detailed synthesis of the existing literature on the nexus between accounting and BPM. It summarizes the implications for practitioners and provides directions for future research by identifying key gaps and opportunities with a sound contextual basis for extension and new work.

Originality/value – Effective literature reviews create strong foundations for future research and accumulate the otherwise scattered knowledge into a single place. This is the first structured literature review that provides a detailed synthesis of the research that ties together the accounting and BPM disciplines, providing a basis for future research directions together with implications for practitioners.

Keywords – Accounting, Activity Based Costing, Balanced Scorecard, Business Process Management, Business Process Improvement, Performance Measurement, Structured Literature Review

Paper type – Literature Review

1. Introduction

Business Process Management (BPM) is a *"disciplined approach to identify, design, execute, document, measure, monitor, and control both automated and non-automated business processes to achieve consistent, targeted results aligned with an organization's strategic goals"* (ABPMP). Adopted by many organizations, BPM is a growing but relatively new field when compared to other disciplines such as Accounting (Hung, 2006). BPM has much to gain from multidisciplinary research (Burlton, 2001, Recker, 2014).

Accounting has a very long history but is continuously evolving. The role of accounting has shifted from its initial/traditional¹ role of mere assembling of calculative routines to a more influential, cohesive organizational function that caters to the increasing demands of financial and managerial information requirements of the dynamic and competitive business world. Organizations are increasingly adopting new accounting practices such as integrated reporting and strategic performance measurement systems to address the needs of a range of internal and external stakeholders (Chenhall, 2005, Hopwood et al., 2010). How the conventional accounting model is extending to accommodate a broader range of management information requirements became a topic of continued research interest since the 1960s (McCarthy, 1982).

Accounting and BPM have been used by organizations in isolation to facilitate their competitive positions. Yet, the two disciplines are contributing towards the same strategic intent of organizations, which is to support 'value-creation'. To elaborate, accounting is

¹ This early era of the accounting discipline can be considered as the period with '**traditional or conventional accounting practices**' where, accounting practices were *"typically limited to providing financially oriented information"* (Gerdin, 2005, p.104). Later, with the drawbacks of these accounting practices more advanced practices such as Activity Based Costing, the Balanced Scorecard and Economic Value Added practices etc. have emerged.

broadly described as having two distinct strands - financial accounting and management accounting - where the former seeks to meet the needs of all external stakeholders (investors, banks, suppliers, regulators etc.) of accounting information and the latter seeks to meet the specific needs of the managers within the organization (Atrill and McLaney, 2015); Unlike FA, which is statutory and governed by accounting standards, management accounting does not have to follow set principles or rules (Horngren et al., 2014). Management accounting focuses on the use of financial and non-financial information to plan and control the activities of the organization and to support the management decision making process. Cost accounting is a subset of management accounting and relates to the determination and accumulation of costs related to a product, process or service (Marshall et al., 2011). BPM is employed to improve, re-design or re-engineer existing business operations so as to improve overall effectiveness or efficiency of an enterprise (Vom Brocke et al., 2010). Thus, both accounting and BPM work towards the same goal; to improve business performance by identifying the value additions and limiting non-value adding activities.

There can be stronger synergistic impacts on the success of organizations if the concepts of the two fields can be considered and applied together than when they are operating independently. Bringing together BPM and accounting would add value to both fields and could reveal potential opportunities to enhance competitive value-creation. This paper is the first structured literature review paper that investigates the nexus between BPM and accounting. An investigation of such a nexus would help to clarify concepts and practices that occur in both fields, which can reduce confusion, inefficiency and redundant efforts, and help to create more synergies between the two sets of professionals.

Literature review papers save time and resources for future research while enabling researchers to get a deeper understanding of the already completed work and hence promote the efficient development of new knowledge (Wong, 2013, Webster and Watson, 2002). The goals of the review were three-fold; (i) to paint an overview of the current status of research that discusses BPM and accounting (Section 3), (ii) to identify how accounting and BPM has been integrated in existing literature (Section 4), and (iii) to present evidence based directions for future research, identify potential gaps and new research opportunities to tie these two fields together (Section 5).

2. Research Method

This paper followed the four-phased structured literature review guidelines of Bandara et al. (2015). The (i) paper selection and (ii) preparation (for coding and analysis) are presented below. The (iii) coding details are presented together with the (iv) write-up(s) of the findings in the next sections.

2.1 Extraction of relevant papers

There is a need to clearly articulate the inclusion and exclusion criteria for papers in any literature review, especially in emerging and interdisciplinary fields [e.g. (Vom Brocke et al., 2009, Webster and Watson, 2002, Levy and Ellis, 2006)]. Revealing the choices made during the paper extraction process enhances the value of a review and facilitates replicability (Wolfswinkel et al., 2013).

In this study the terms BPM and accounting formed the primary key words along with a few synonyms (see Table A.1 in Appendix A). These synonyms were developed based on the authors' knowledge as well as the use of a synonym checker to identify related key words for BPM and accounting. These key words were revised and justified iteratively through brainstorming, and as new terms/ themes were identified by insights obtained from the iterative search stages (following Bandara et al. 2015). Several search queries were created (see Table A.2). The searching was conducted in selected databases which related to both BPM and accounting (see Table 1), and was limited to peer reviewed full papers in English. The 'abstract', 'key words', 'title' and 'subject-headings' fields were searched. In addition to research articles, papers in popular industry forums such as BPTrends.com² and Gartner.com³ were also included.

² Business Process Trends had been launched in 2003 to provide a comprehensive and unbiased source of information relating to trends, directions and best practices in BPM (<http://www.bptrends.com/about/mission/>).

³ Gartner is a leading IT research and advisory company who deliver technology-related insights via analyst reports (<http://www.gartner.com/technology/about.jsp>).

Table 1: List of Subject Areas and Search Sources

Subject	Domain	Databases
Business Process Management	Information Systems, Business management	ABI/INFORM, Emerald Insight, Science Direct, AISeL, BPTrends.com, Gartner.com
Accounting	Accounting, General Business	ABI/INFORM, Emerald Insight, Science Direct, EBSCOhost

The initial search resulted in 398 papers that were then subjected to a multi-staged relevance check to screen and select the appropriate articles. The primary rule was that *‘the paper must discuss both BPM and Accounting (and show a nexus)’*. First, the abstracts of all the articles were reviewed. If a ‘BPM and Accounting’ relationship was not seen from the abstract, relevancy was checked by reading the paper in full. Two of the authors independently carried out the relevancy check; and the results were compared to confirm the accuracy of the selection process. It is important to note that in addition to papers that referred to BPM, as it is currently known, prior incarnations of process management efforts (such as Business Process Reengineering, Total Quality Management, Lean, Six sigma etc.) that were discussed in combination with accounting were also included. Any accounting (i.e. financial accounting or management accounting) related aspect that was discussed with BPM was considered valid. Only 39 papers resulted from this relevancy screening; 359 papers were rejected as they did not fall within the relevance criteria described above.

2.2 Coding preparation and analysis design

The selected papers together with their bibliographic information were imported into NVivo software as readable .pdf documents and were saved in ‘Author-Year-Title’ format following Bandara et al. (2015).

As mentioned earlier, the goals of the review were to; (i) paint an overview of the current status of research that discusses BPM and accounting, (ii) identify how accounting and BPM have been integrated in existing literature, and (iii) present future research directions. The first goal was achieved by profiling the selected literature based on meta-information about the papers. Some of this meta-information was maintained within NVivo as document attributes and some was maintained separately in Excel (see Section 3 for further details).

The second goal was the main focus of this paper and was achieved via content analysis applying a grounded theory approach following Wolfswinkel et al. (2013). The process is presented in detail (see the start of Section 4). The third goal (deriving a set of future research directions) was an overall synthesis of the observations identified from the outcomes of the first two goals together with any evidence that pointed to gaps, issues and opportunities associated with bringing these two fields together (see Section 5).

3. Profiling the Literature Describing the Nexus between Accounting and BPM

This section provides a descriptive overview of the papers included in this analysis and presents information related to the; (a) research method used in the studies, (b) degree of discussion about the nexus between BPM and accounting, (c) type of accounting categories being discussed and (d) outlets of publications as observed in the pool of papers included here. Such profiling provides useful insights about the overall status of existing research, assists with quality assurance (in support of selection bias) and provides input to research agendas (Gaffar et al., 2015).

The review included pure literature review papers, conceptual papers⁴ and empirical papers. Recker's (2012) classification of types of research studies was used as the framework to further classify the empirical paper types. There were 4 literature reviews, 5 conceptual papers and 30 empirical papers. Among the 39 selected papers, only 19 discussed a strong nexus between accounting and BPM, and these were either concerned with management accounting or were discussions about accounting in general. It was observed that while most papers (33 of the 39) mentioned a nexus with management accounting related topics and BPM, none mentioned a nexus between financial accounting and BPM. Table 2 presents a visual summary of this analysis.

Closer ties were observed with BPM and management accounting. The lack of discussion of financial accounting topics and BPM may be due to the financial accounting focus on external reporting in contrast to management accounting which is concerned with providing information for internal decision making, which is similar to BPM (i.e. internal process improvements). But we see potential for research on BPM and financial accounting as well; for example with process centric approaches to preparing integrated reports in organizations,

⁴ Papers that solely comprise of conceptual development of notions (without empirical data).

which is one of the latest developments in the accounting field that attempts to identify the values created by different capitals of the organizations.

Among the 30 empirical studies, 26 related to management accounting and BPM nexus discussions and 4 comprised discussions about accounting in general and BPM. There were 9 quantitative studies, 7 qualitative studies, 5 mixed method studies, and 9 design science studies. Papers that ‘tie’ the two fields in a broader manner were lacking. Research of this nature that investigates the potential of multidisciplinary ties is a useful pre-requisite to form new ideas to integrate and investigate different fields together.

Table 2: Classification of Selected Articles on: Type of Accounting covered; Degree of Discussion of the nexus; and Type of Study

Degree of Discussion of Accounting and BPM together	Management Accounting							Accounting in General					(a)+(b) Total		
	Literature Reviews	Conceptual Papers	Empirical Studies				(a) Number of Papers	Literature Reviews	Conceptual Papers	Empirical Studies				(b) Number of Papers	
			Quantitative	Qualitative	Mixed	Design Science				Quantitative	Qualitative	Mixed			Design Science
Main discussion of the Study or Fully discussed	2	2	1	2	3	4	14	1	1		1		2	5	19
A single section or few sections about a nexus as a part of another discussion			3	1	1	3	8							0	8
Mere mention ⁵			3				3							0	3

⁵ “Mere mention” is when there were 1 to 5 sentences in the paper describing the nexus.

More than a mere mention but weak nexus ⁶		2	2	2	1		7				1			1	8
Discussed Accounting & BPM separately. No Nexus	1 ⁷						1							0	1
	3	4	9	5	5	7	33	1	1	0	2	0	2	6	39
			26							4					

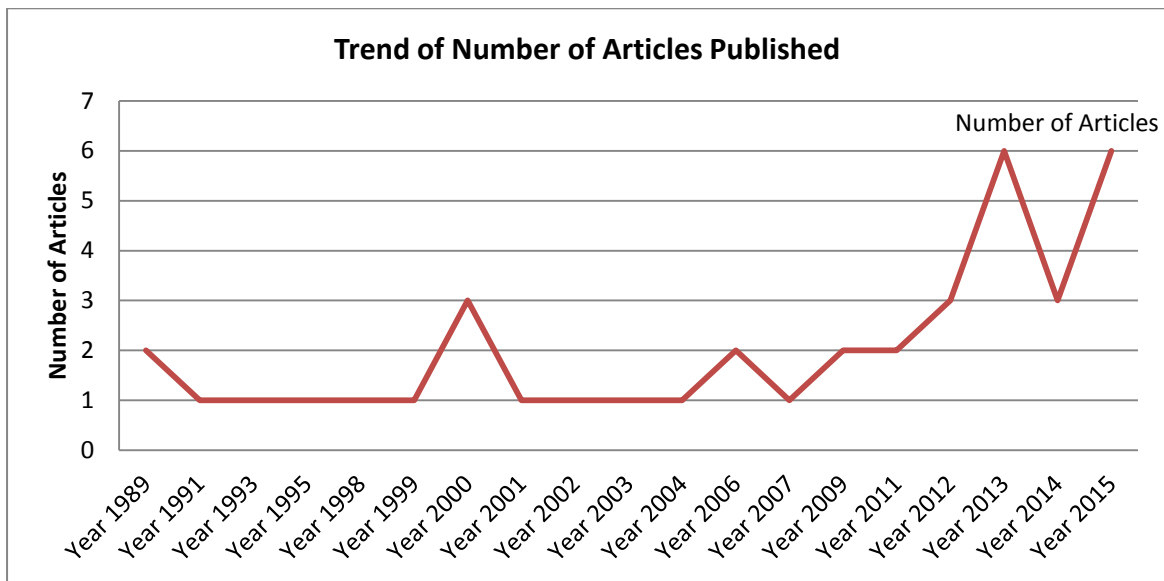
An analysis of the outlets that hosted the selected papers showed that the Business Process Management Journal (BPMJ) was most prominent (with 10 articles, close to 30% of the papers). The rest of the papers were scattered among various outlets. Thus a specific outlet (other than BPMJ) cannot be identified for hosting publications on the nexus between accounting and BPM. No relevant papers were identified in accounting specific journals, indicating the lack of attention given by the accounting discipline to potential multidisciplinary/interdisciplinary research with BPM.

Analysing the publications by year revealed that there had been discussions on the nexus since 1989 but the topic has become more popular in recent years (see Figure 1). The increasing trend indicates that the potential benefits of the nexus between the two disciplines are being recognised and the interest in research that ties these two areas together is growing.

⁶ “More than a mere mention but weak nexus” is when more than 5 sentences are available about Accounting and BPM. But a nexus is only a mere mentioned fact within the paper. No major discussion about a nexus is discussed.

⁷ This paper by Lacerda et al., (2015) is a research agenda on BPM and Performance Measurement, therefore retained in the sample even without a nexus as the authors considered it to be important.

Figure 1: The Number of Articles Discussing a Nexus across the Years



4. How Accounting and BPM are Integrated in Current Literature

A multi-phased grounded coding approach adapting the guidelines of Wolfswinkel et al. (2013) was applied to identify how accounting and BPM have been integrated in existing literature. The primary coder first reviewed the papers and line-by-line checked for areas of relevance, which were captured using open coding. This resulted in 435 open-codes at the initial stage. These open-codes were then validated by 2 other coders over a series of coder corroboration sessions, where they independently reviewed the codes with the papers and confirmed the existing open-codes and also identified new codes that should have been picked up, leaving a total of 392 open-codes for the detailed synthesis (see Appendix 2 for a detailed break-up of the 392 codes and how they formed the sub-themes and meta-themes presented below).

Next, axial coding (forming 'coding-families') took place in multiple phases. Several workshops were conducted where the primary coder prepared a proposed grouping and the 2nd and 3rd coders then reviewed these for re-specification and confirmation. An affinity

diagramming⁸ approach as discussed by Tague (2005) was adapted to facilitate this process (for consensus building of the emerging sub-themes, themes and meta-themes).

This was an iterative, multi-phased process. 25 subthemes were derived after a few iterative categorisation and analysis rounds of the open-codes. Among these 25 themes, 2 themes had a slightly different orientation (see greyed rows in Table A.3 of Appendix 2) and were treated differently in the synthesis and write-up process. One theme was on research gaps identified in the papers by the original authors. Another theme was the motivating factors as mentioned in the papers that lead those researchers to carry out such research - looking at accounting aspects and BPM together. The codes related to the research gaps were incorporated into discussions in Section 5.2 (when the future research directions were derived). The essence of the motivating factors was used to justify our own motivations for this paper, and was included in the front end of this paper (Section 1.0) rather than to the findings section.

The other 23 themes were further combined to 15 subthemes based on the commonalities of the content. Finally, these 15 subthemes were categorized into 4 main categories/meta-themes; (i) broad discussions around the nexus of BPM and accounting in general (such as: common concepts of the two disciplines; the integration of the two disciplines etc.) (see Section 4.1) (ii) the role of Performance Measurement in BPM efforts, (see Section 4.2) (iii) Activity Based Costing (ABC) in BPM efforts (see Section 4.3.1) and (iv) the Balanced Scorecard (BSC) in BPM efforts (see Section 4.3.2). Also see Appendix 2 for a detailed mapping of the themes within these four categories/meta-themes.

In the field of accounting, ABC and BSC are dominant techniques used to measure costs and keep track of performance to facilitate decision making and management control in organizations; and can be considered as tools facilitating performance measurement. In addition, the discussions in the 3rd and 4th categories/meta-themes revolved around the performance management aspects (more specifically performance measurement) of BPM, and therefore in this paper these two meta-themes are presented in subsection 4.3, together with other tools discussed related to performance measurement in BPM, positioning them as tools used for measuring performance in the BPM context.

⁸ “The affinity diagram organizes a large number of ideas into their natural relationships. This method taps the team’s creativity and intuition. It was created in the 1960s by Japanese anthropologist Jiro Kawakita” (Tague, 2005, p.96).

4.1 Broad discussions around the nexus between accounting and BPM

Accounting information is important in grounding BPM decisions. Decision making in BPM lacks an economic perspective, resulting mainly from the absence of relevant, process-oriented accounting information in the context of planning, designing and controlling business processes (Sonnenberg and Vom Brocke, 2014).

Process-aware information systems are not well-integrated with organizations' accounting information systems and cannot provide relevant accounting data for decision support. This results in dysfunctional effects such as: weak methods for operational decision support in BPM (only focused on technical and structural criteria); 'costs' being the only accounting artefact considered in BPM; economic implications of individual process states not been accounted for; economic reciprocity not been explicitly accounted for in process design and process control; and strategic decisions in BPM often based on subjective plausibility considerations (Sonnenberg and Vom Brocke, 2014).

Most corporate strategies are endangered due to obsolete and restrictive accounting systems that fail to adapt to new competitive environments (Turney and Anderson, 1989), which tend to cause failures in initiatives such as lean manufacturing (Fullerton et al., 2014). Cost accounting traditionally has two deficiencies: the bases of cost allocation do not follow causal relationships (Activity Based Costing directly addresses this issue. See Section 4.3.1); and they do not focus on distinct production processes that add value to products (Woods, 1989). Standard managerial cost accounting lacks the capability to measure specific activities and these cost accounting methods fail to accurately assess the economic impact of information systems in process reengineering (Housel et al., 1993).

Most cost accounting systems are product-oriented rather than process-oriented (Woods, 1989). Furthermore, both the traditional accounting approaches and the current accounting information systems fail to provide the data required by process managers to plan, monitor and control their business processes; and for BPM decision making processes, to mitigate the risk of achieving expected results. Also, they provide accounting aggregates that cannot be decomposed in a way that discloses how business processes contribute in quantitative terms to the expected/actual results (Vom Brocke and Sonnenberg, 2014). On the other hand, innovations in accounting systems and approaches have been the reason behind successful

turnarounds in certain companies (Turney and Anderson, 1989) and also introducing new ways for capturing process costs, and restructuring the existing cost accounting systems facilitate organizations to become process-oriented (Woods, 1989). Thus scholars have long recognised the need to modify accounting systems to cater for ongoing changes.

Not only the accounting systems but also the role of accountants needs to be changed with BPM. As discussed by Turney and Anderson (1989, p.40), “*Accounting innovation requires radically changing the role Accountants play and the information they provide to management*”. This implies the important role that management accountants can play (as transformation team members) when introducing process improvements/changes (Fullerton et al., 2014).

The following sub-sections present further information on the sub-themes broadly pertaining to the nexus between accounting and BPM as extracted from the papers reviewed.

4.1.1 Why integrate accounting with BPM: existing integration efforts

BPM decision makers need accurate process performance data and metrics to make correct decisions (Vom Brocke and Sonnenberg, 2014). Currently this necessity is unfulfilled, with very limited means to account for the economic value of a process. In particular the contribution of business processes needs to be known in order for managers to decide which processes to redesign, improve or eliminate (Sonnenberg and Vom Brocke, 2014). Lacerda et al. (2015) proposes to investigate how the decision-aiding process can be supported in a BPM implementation through performance measures.

Cost accounting techniques (especially where accounting is connected with the tools used for analysis and redesign of workflows) allow managers to obtain information for organizational redesign (Cannavacciuolo et al., 2015). Accounting measurements that search for continuous improvement opportunities can facilitate and drive continuous improvement efforts (Turney and Anderson, 1989). Further, O'Connor and Martinsons (2006) have examined relationships between delegation, incentives, and performance measurement to understand the implications for management control systems with business process change.

Moving in this direction, a few researchers have tried to integrate accounting and BPM. By

conceptualizing the intersection between BPM and accounting while using event records to document flows of economic resources, Sonnenberg and Vom Brocke (2014) proposed the process accounting model (PAM) that supports traditional accounting approaches and real-time analytics in BPM and accounting. PAM provides transparent information in business language about the economic value derived from business processes and this facilitates the justification of BPM initiatives. Also it facilitates the information needs of both accountants and business process managers while making process-oriented accounting a reality with accounting being process-aware and BPM being open to accounting (Sonnenberg and Vom Brocke, 2014). Further, the transaction focus of Accounting Control Theory has been used to facilitate BPM analysis in medication administration processes and related handoffs (Chircu et al., 2013), and in information flows for improving clinical processes (Gogan et al., 2013).

4.1.2 Shared and varied concepts common to the two fields: related implications

There are similarities and dissimilarities between how certain concepts are used in the two fields of accounting and BPM. Accountants are interested in capturing and reporting economic events because of their impact on an organization's financial statements. But in the BPM context the purpose is process coordination and control. BPM and accounting domains share a set of key concepts. Business processes, activities, tasks, transactions and events are referred to by accountants for identifying, measuring and communicating economic information to make economic decisions. In the BPM domain these same concepts are referred to, for planning, implementing, and controlling how work is done in organizations. The BPM domain positions activities, tasks, and events on separate layers of abstraction when describing business processes. However in accounting, the umbrella terms; 'economic activity' and 'economic event' are used to refer to the generic concepts of events, activities, tasks, transactions, or business processes. Further, the concept of 'events' is understood as a phenomena that changes the way one wants to plan, monitor and control and is central in both domains (Sonnenberg and Vom Brocke, 2014).

The efforts made to integrate accounting and BPM are hindered due to conceptual and technical barriers such as the difference in the understanding of concepts like 'transactions', 'activities', 'processes', 'costs' and 'value' and the lack of communication links between process-aware information systems and accounting information systems that makes it impossible to capture precise accounting data in a process context. The result of these barriers

is that accounting is unaware of business processes and provides accounting aggregates that cannot be decomposed to a level that can be used and related to business processes (Vom Brocke and Sonnenberg, 2014).

4.1.3 Applying BPM to accounting

Accounting systems can be more supportive and strategically aligned with operational objectives if common BPM efforts (i.e. to eliminate waste and inefficiencies) are extended to accounting practices (Fullerton et al., 2014). Accounting professionals are often not trained in project management, continuous improvement techniques, and information systems. But it is important that they understand how these techniques will facilitate the more efficient completion of information gathering and consolidating tasks. This will improve the speed and quality of the reporting infrastructure while maintaining accurate controls and savings. Technology-based workflow projects will strengthen the internal controls of organizations. By introducing information systems methodology principles together with BPM (i.e. Lean/Six Sigma) methodology to financial reporting environments, the reporting infrastructure can be improved (McCarthy and McCarthy, 2011).

4.2 BPM with performance management and performance measurement

There was a strong emphasis on ‘performance measurement’ within the papers that discussed a nexus between Accounting and BPM, while ‘performance management’ was also discussed by a few papers. The reviewed literature also referred to a range of other terms related to performance management and measurement. We hence clarify a few terms before we proceed with the discussion. Generally, performance measurement is “*the process of quantifying the efficiency and effectiveness of action(s)*” in the organizations (Neely et al., 1995, p.80) and ‘performance measurement systems’ are “*designed to provide useful information to support strategic decision making, planning, and the control of activities in order to accomplish organizational goals*” in organizations (Munir et al., 2016, p.null). On the other hand, ‘performance management’ is an umbrella-term under which more formal processes that organizations use in attempting to implement their strategic intent and to adapt to the circumstances in which they have to operate, are discussed (Otley, 2001). ‘Performance management systems’ are “*the evolving formal and informal mechanisms, processes, systems, and networks used by organizations for conveying the key objectives and goals elicited by management, for assisting the strategic process and ongoing management through analysis,*

planning, measurement, control, rewarding, and broadly managing performance, and for supporting and facilitating organizational learning and change” (Ferreira and Otley, 2009, p.264).

Following Otley (2001, p. 250-251) who states that the word ‘performance’ has a “*wide variety of connotations to different audiences*” , we recognise that the terms ‘performance measurement/management’ would have different meanings in different fields and perhaps even in different papers within the same field. In the context of this paper, these terms are used mostly as stated in the original papers, with the definitions mentioned in the above paragraph.

BPM is adopted with the expectation of obtaining a positive return-on-investment through improved efficiency and quality. To measure the enhanced quality and efficiency gained with process improvements, a set of KPIs that align process specific performance with business strategy and objectives is required (Vuksic et al., 2015). However, the existing performance management systems “*are still not focused on business processes*” and “*most companies still experiment with the specification of process-based performance measures*” and rarely align the process measures with the company’s strategic goals (Vuksic et al., 2015, p.120). BPM leads to management-by-process within organizations and management-by-process has consequences for performance measurement systems (Herzog et al., 2007).

The systematic measurement of business process performance is known as Process Performance Measurement (Vuksic et al., 2015). But even in the world's best managed companies, performance management with a continuous process improvement focus is not seen (Schonberger, 2013). The measurement of the business process’s performance is a relatively new topic in BPM (Vuksic et al., 2013) and Choong (2013) reports on seven elements pertaining to BPM measurement: systems and components; goals; features; processes; information and communication; customer focus; and management.

Hernaes et al., (2012) call for future research that better conceptualises process performance measurement that investigates the relationship between process performance measurement and organizational performance (as there are unclear positive relationships seen between them) and investigates how these relationships may differ across diverse contexts. Lacerda et

al. (2015) propose to investigate the support of the performance measures, towards the decision-aiding process of a BPM implementation.

The following sections are structured as per the observed sub-themes and present further discussions on how the literature discusses BPM and performance measurement.

4.2.1 Importance of performance measurement/management in BPM

Performance measurement is an important management tool that provides information for decision making (Lacerda et al., 2015). Measures can be used to improve business processes, and ‘measuring’ facilitates effective and efficient management of organizations (Choong, 2013) by enabling them to become ‘result oriented’, which is a BPM goal (Herzog et al., 2007). A measurement system that is limited to organizational units or departments is not sufficient and organizations need mechanisms that can measure the performance levels of current processes (Choong, 2013).

Performance measurement in BPM was emphasized and attention to measurements became more evident after the seminal work of Kaplan and Norton (1992). Due to the strong relationship between BPM and performance measurement (Herzog et al., 2009) relevant and congruent performance measurement systems have been recognised as an essential prerequisite for the successful design and implementation of BPM (Kuwaiti and Kay, 2000) where performance measurement system frameworks are developed as guiding tools to reinforce and safeguard BPM endeavours (Kutucuoglu et al., 2002).

Performance measurement is an important operational task within BPM efforts (Minonne and Turner, 2012) and “process performance measurement leads to better BPM adoption outcomes” (Vuksic et al., 2015, p.131) while inadequate measurements results in uncertainties regarding BPM (Lacerda et al., 2015). Given that BPM activities are interrelated, the process-oriented organizations need measurement systems that can measure the level of process performance and be focused upon processes to ensure business success (Choong, 2013). However, even though the need to identify and define process measures is recognized, still BPM projects do not fulfil this measurement requirement (Vuksic et al., 2015).

The initial/traditional accounting systems lack measurement attributes of this nature and new accounting models are suggested to cater for business processes (Choong, 2013). Fullerton et al. (2014) call for future research on management accounting practices and their effect on operations and financial performance. Vuksic et al., (2015) emphasise the importance of identifying which specific measures are likely to support BPM adoption success.

Further, the literature discusses the role of performance measurement in BPM efforts in facilitating (i) strategic alignment, (ii) successful change management and (iii) justifying the investments on improvements. Firstly, related to strategic alignment, it is stated that *“performance management is a fundamental part of BPM, particularly translating strategy into operational results, organizational diagnosis and the creation of plans of actions, monitoring, providing feedback, communicating and motivating people through performance-based rewards”* (Lacerda et al., 2015, p.2). Process performance measurement plays a positive and important mediating role in making the effects of the organizational strategy and BPM visible and measurable (Hernaus et al., 2012). Introducing a performance measurement system that is relevant, well-designed and focused on strategic aims at the early stages of the change process enables organizations to improve the strategic alignment and to empower the employees while integrating the processes and functions (Kuwaiti and Kay, 2000).

Performance measurement systems could inform strategy (Pádua and Jabbour, 2015) and BPM can be linked with the organizational strategy by introducing reliable and effective performance measurement systems unique to each organization (Minonne and Turner, 2012). A strategic approach to BPM will positively influence the implementation of process performance measurement practice and managers will be able to influence their business results through process performance measurement practice (Hernaus et al., 2012). Stimulating the thinking related to issues around construction of performance measurement systems is also important (Ackermann et al., 1999). The fundamental purpose of BPM is to produce strategic excellence and ensure operational excellence at the process level (Kutucuoglu et al., 2002) and when an integrated performance measurement system becomes part of the wider BPM strategy and related decision support system, it will be fully effective (Ackermann et al., 1999). Hernaus et al., (2012) argue that the strategic role of BPM and its process measurement dimensions are not well understood and empirical research that tests possible relationships between strategic approaches to BPM, process performance

measurement and performance outcomes should be conducted.

Secondly, performance measurement is considered important for successful change management. The literature describes how performance measurement systems can motivate individuals influenced by BPM to achieve customer-focused, result-oriented operations (Kuwaiti and Kay, 2000). When BPM is introduced, employees sometimes resist accepting the new processes. Resistance (by managers or line-employees) can be managed by setting up links between the performance measures and the expectations of the new process implementations together with links between such performance measures and the rewards system for employees (Huang et al., 2015). Huang et al., (2015) argue that an enhancement of employee performance within a BPM initiative is only possible with reasonable performance measurement systems. Such performance measures can be a tool for communicating the organizational objectives to employees, and will encourage managers and line workers to produce outcomes aligned to the set BPM goals (Huang et al., 2015). Further the framework of Kutucuoglu et al. (2002) provide a clear picture of what is expected from everybody to prevent post BPM conflicts. This performance measurement systems framework facilitates the translation of corporate vision into performance requirements for the working processes, teams, or individuals, within a manufacturing plant maintenance context.

Thirdly, measurement is needed to justify the improvement investment. The improvement initiatives are capital investments and their feasibility needs to be justified before and after the initiation. Kutucuoglu et al. (2002) developed a framework that includes multiple aspects of performance, allowing monitoring of the cost/benefit of the improvement efforts. Three interrelated matrices at organizational level, process level, and job/performer level are developed for every stage to capture the results to be monitored.

4.2.2 Important facets to consider to derive holistic and complete process measures

Most conventional business process analysis focuses on qualitative methodologies that lack strong measurements to facilitate business process improvements⁹ (BPI) (Lam et al., 2009) and links between strategic performance indicators and organizational and employee

⁹ BPI initiatives primarily have to deal with the improvement of the business process itself and the objective of a BPI is “*continuously improving one or all processes in terms of cost, time and quality*” (Davenport, 1993, p.142).

objectives (Glykas, 2011). Process-oriented organizations require process performance measures in addition to the conventional financial data (Vuksic et al., 2015). Process measures should be developed considering both internal processes (focusing on quality, cost and time) and external processes (focusing on customers) (Huang et al., 2015), as well as the industry to which the organization belongs, together with the firm's maturity level (Vuksic et al., 2013). Minonne and Turner (2012) present the essential characteristics of an effective performance measurement system describing the importance of considering critical success factors with a mix of financial and non-financial information, having different views of measurements that are *dynamic*, and *congruent* with organizational objectives, that can be *easily understood* by all employees, and *promote intended behaviour* within the organization.

Existing measurement methodologies fail to integrate useful concepts and tools from process management, human resource management and workflow (Glykas, 2011). The missing focus on 'business processes'; enormous focus on financial measures; lack of clearly defined and explained goals; and lack of communication of measured information are current gaps in performance measurement systems in meeting the measurement requirements of BPM (according to Choong (2013) as cited in Vuksic et al. (2015)).

A performance measurement system has to balance a number of dimensions and play a number of roles to enable BPM to succeed, while considering that, in a BPM context people work in teams, and produce final output(s) for a customer (Kuwaiti and Kay, 2000). In addition, when developing measurement frameworks, attention should be devoted to improving quality attributes that are valuable for customers, which address both internal and external causes of quality related problems (Choong, 2013).

A theoretically integrated framework is required that contains process measures that can be implemented to compare performance within business processes in organizations (Choong, 2013). Integrated performance measurement systems that can capture the interdependencies between processes and can be used to manage the systems to facilitate the exploitation of opportunities for further improvement should be designed (Ackermann et al., 1999). As cited in Glykas (2011) and Vuksic et al. (2015), many other researchers have indicated the need for holistic performance measurement approaches in BPM and the need for linkages between performance measurements and BPM. It is important to understand how the integrated

activities within a BPM effort lead to expected process results. An integrated performance measurement system including measures at all levels in the organization is required to enable this. The Balanced Scorecard (BSC) proposed by Kaplan and Norton has been considered as a tool to enable such an integrated performance measurement system that translates the strategic directions into actions within and across processes (Ackermann et al., 1999).

Very few frameworks (and related examples) concerning measurements in BPM exist and there is a need for an integrated framework that supports all BPM perspectives to allow business experts to apply such in practice (Vuksic et al., 2013). Furthermore, performance measurement systems have to balance a number of dimensions to enable the measurements to identify whether a BPM effort has been successful or not (Herzog et al., 2009). Such tools, techniques and frameworks developed by researchers are discussed under section 4.3.

4.2.3 Process performance measures (PPM) development stages

Most measurements of business processes are ad-hoc, and are often based on design measures from the early stages of its lifecycle (Vuksic et al., 2013). Discussions on the stages to be considered in process performance measurement are limited. However, four steps for identifying performance measures are discussed by Burlton as: *“identifying the performance indicators to be used in each process; associating the indicators in process architecture with the strategic objectives and satisfaction measures for all stakeholders, while prioritizing change processes; determining the traceability of measures throughout the value chain; and, identifying the measures that appeared in the processes caused by other processes executed previously”* (according to Burlton (2010), as cited in Pádua and Jabbour, 2015, p.406). In addition to these steps, Pádua and Jabbour (2015) describe three distinct stages; Planning, Implementation and Review in the measurement process. The ‘planning’ phase is expected to provide direction to tasks involved in performance measurement, contributing towards successful evaluation, presentation and improvement of sustainability. Steps involved in the ‘implementation’ phase are: obtaining support; integrating with business processes; monitoring and reporting performance; and improving performance. The ‘review’ phase seeks for feedback and reviews the planning steps. The performance measurement system suggested by Kutucuoglu et al. (2002) also has three main stages: (1) Identification and alignment of key performance indicators (KPIs) where critical elements of performance are determined; (2) Selection of measurement-unit-specific measures where sources of critical

elements of performance are identified and related to individual KPIs; and (3) Measurement and evaluation where the measured performance is recorded and assessed against the target for each measurement unit. For each of these stages three interrelated matrices at organizational, process, and job/performer levels are developed to capture the results to be monitored.

4.2.4 Issues pertaining to current performance measurement system and measurement needs of BPM

Several studies confirm the lack of a BPM measurement focus in current performance measurement systems (Choong, 2013) even though a performance measurement system is recognised as an essential requirement for effective BPM efforts. Further, Vuksic et al. (2013) highlight that companies adopt different elements of process performance measurement, that are “*measured ‘ad-hoc’ (occasionally, not continuously)*” (p 615).

Choong (2013) identified five major weaknesses concerning performance measurement systems, related to a BPM perspective: (i) the focus of measurement is made in relation to functional or workflow aspects and not on business processes; (ii) unclear goals related to the performance measurement system; (iii) focus not given to customers and therefore product or service quality is not matched with customer needs, leaving customer satisfaction unaddressed; (iv) the performance information criteria are mostly financial/accounting (still) regardless of a call for more balanced measures; and (v) a lack of agreement on what are the performance measurement system goals and who are the key stakeholders for the performance measurement systems. Further, Glykas (2011) specifically criticized activity-based cost calculation systems on their: a) lack of support for data collection, which results in measurement errors and/or high costs for the relevant data inputs; and b) lack of channels to provide feedback to participants on further improvements.

4.3 ABC, BSC and other tools, techniques or frameworks used with BPM

Various authors have proposed tools, techniques and frameworks for measuring performance related to BPM. Two of the main categories/meta-themes resulting from the literature analysis: Activity Based Costing in BPM efforts; and the Balanced Scorecard in BPM efforts, also revolve around measuring performance in BPM efforts. Specifically, there were 13 papers relating to ABC and 5 papers relating to the Balanced Scorecard, among the 39

selected papers, that discussed aspects related to performance measurement in BPM. Some of the remaining papers included other tools used for measuring performance (in addition to ABC and the BSC) that combined concepts from both the accounting and BPM disciplines. Given that the two meta-themes related to ABC and BSC consisted of performance measurement related tool-oriented details, they are also presented under this section, together with the other tools that discussed tools supporting BPM performance measurement.

4.3.1 ABC as a tool

In an ABC system, product cost calculation will be different from calculations with a traditional accounting system (Cooper and Kaplan, 1988) because the behaviour of overhead costs is comprehensively addressed and the causes for overhead costs and how it relates to each product type are considered when allocating costs to products (Drury, 1996).

In many papers (over a dozen), ABC is discussed within the context of BPM as a mechanism to measure process improvement impacts and also to provide process intervention decisions. Information Technology is considered an enabler for ABC and has facilitated the widespread use of ABC in BPM projects (Tatsiopoulos and Panayiotou, 2000). With the objective of improving and sustaining the business performance, ABC together with enterprise modelling is used to facilitate the generation of management information that reflects reality; is predictive; embodies strategy; explains cause and effect; reflects the customer's perspective; determines the relative profitability of both products and customers; relates to the business processes; and is in an appropriate language for sense-making by management (Tatsiopoulos and Panayiotou, 2000).

a) Support for accurate cost and time measurement

Agrawal and Siegel (1998) present how prior literature discusses how accurate cost and time measures derived from ABC can support process improvement/intervention decisions, and measure the impact of completed process improvements. The actual impact of proposed initiatives for process improvement on overall process performance can be correctly predicted if process cycle-time and process cost-per-cycle can be accurately predicted. ABC accommodates the inherent variability in a process and with its driver analysis concept the actual costs can be accurately predicted (Agrawal and Siegel, 1998).

Without tools such as ABC analysis, companies can only speculate about how suggested improvements may impact the efficiency and effectiveness of their operations/processes (Back and Maxwell, 2000). Cannavacciuolo et al. (2015) present a detailed healthcare related case study, where the strong integration between BPM and the accounting methodology – ABC - is explored. They describe the ability of ABC to infer the cost measures associated with each activity which contributes to process performance measurement; especially with the ability to highlight high cost activities and resources. This case study illustrates how the information resulting from ABC can be used by BPM practitioners; describing how ABC could integrate the information generated by pre-existing accounting-informative systems.

Time Driven Activity Based Costing (TDABC), which is an extension of ABC is also used in process improvements as it can reduce the capacity required to perform a service and/or reduce the capacity-cost-rate used to determine the cost rate utilised to trace the cost of resources to a good/service. Both these approaches (ABC and TDABC) result in reducing costs. Kee (2012) discussed how a governmental service could use the approaches to use public resources more efficiently and effectively (Kee, 2012).

b) Support for process intervention decisions and measuring process performance/impact

Detecting the activities that need reengineering is difficult (Tatsiopoulos and Panayiotou, 2000) but ABC facilitates accurate identification of opportunity areas for process improvement (Datar et al., 1991). Since ABC could suggest interventions for process improvements by detecting inefficiencies in performing processes, it can play an important role in cost accounting systems (Cannavacciuolo et al., 2015). The information provided by ABC's cost model can facilitate the decisions on how much time, effort and assets are to be invested for a process-improvement project (Dyas et al., 2015). Also ABC analysis can support process improvement endeavours in identifying value added activities and non-value added activities (Agrawal and Siegel, 1998) and ABC can be extended to facilitate business process redesign initiatives (Sweeting and Davies, 1995).

Furthermore, ABC is applied in measuring the process performance/impact. The final output of ABC efforts is performance measurement (Agrawal and Siegel, 1998) and ABC is a useful tool for improving accounting performance measures within a process perspective. There is a strong integration between BPM and accounting where the specifically discussed accounting

methodology is ABC (Cannavacciuolo et al., 2015).

A key dimension of 'process orientation' is related to process performance measurements, where cost performance plays a key role. ABC is useful for capturing costs horizontally in line with business processes (Cannavacciuolo et al., 2015). Further, Sweeting and Davies (1995) describe how ABC was widely adopted as a part of performance measurement portfolios where cost drivers were amongst the main set of performance measures of organizations. Similarly, Tatsiopoulou and Panayiotou (2000) used ABC to determine the performance indicators that are the drivers of the business process's costs. Dyas et al. (2015) discussed a model algorithm that is based on distributing the activity-based costs, evenly or per an allocation scheme, to each hour spent by patients in an emergency department in a hospital, using the activities identified in the process map. Overall, process changes are designed to improve cost through the reduction in the resource requirements to perform one or more activities, assuming that reductions in the costs to perform individual activities will result in overall reductions in process costs (Back and Maxwell, 2000).

c) ABC combined with different approaches

ABC has been used in combination with other tools and techniques to support process improvement efforts; for instance, with Analytic hierarchy process (AHP) and business process modelling using the IDEF0 method (Sarkis et al., 2006); JIT (Agrawal and Siegel, 1998); Lean Six Sigma cost-benefit analysis (Dyas et al., 2015); TQM (Chan and Spedding, 2003) and Simulation (Tatsiopoulou and Panayiotou, 2000, Back and Maxwell, 2000).

4.3.2 BSC as a tool

The BSC measures the performance of an organization across four perspectives: 'financial', 'customers', 'internal business processes' and 'learning and growth' (Kaplan and Norton, 1996). While preserving the financial objectives, the BSC also incorporates the drivers of these financial objectives in measuring performance. The mission and strategy of organizations are converted into comprehensive performance measures with the BSC to facilitate operational activities and future decisions within organizations. The BSC is also used within BPM contexts.

Researchers and practitioners have paid attention to BSC as it is concerned with how to

translate strategic directions into actions with measures related to processes using a nested model, (Ackermann et al., 1999). However, it might be problematic to use the BSC as a process improvement technique while satisfying the need to integrate non-financial measures with financial measures (Amaratunga et al., 2001).

The BSC can be used in operationalising the mission and strategy through organizational processes. As the BSC is a language of communication between mission and strategy, it can be used as a conceptual framework for translating an organization's vision into a set of performance indicators within its four perspectives (Amaratunga et al., 2001, Darmani and Hanafizadeh, 2013). The identification of the critical success factors (CSFs) for improving organizational processes and developing performance measures in these four areas is facilitated by the BSC (Amaratunga et al., 2001).

Organizations can use the BSC in process improvements to monitor their current performance, and its capacity to improve processes, motivate and educate employees, and enhance information systems (Amaratunga et al., 2001). Greasley (2004) proposed a structured approach to process improvement combining the BSC and process mapping, showing how it aids the prioritization of the processes for improvement.

4.3.3 Other tools

As mentioned earlier, in addition to ABC and the BSC, several other tools and techniques were discussed in the papers concerned with performance measurement as discussed below.

McCarthy (1982) developed an 'REA Accounting Model' that caters for business processes from both the accounting and non-accounting users' perspectives as a solution for the problems of existing accounting systems, such as lack of measurement attributes, extra focus on monetary values, and being overly aggregated (as cited in Choong (2013)).

Kuwaiti and Kay (2000) developed an instrument for measuring performance in BPM with an underlying assumption that a performance measurement system implemented in a BPM context should consider the fact that people work in teams and produce a final output for a client through internal customer-supplier ties (Herzog et al., 2007). The performance measurement systems framework of Kutucuoglu et al. (2002) can be used as a supporting and

guiding tool to safeguard BPM implementations from its drawbacks in maintenance processes. Further, Schonberger (2013) discussed the use of performance metrics to support continuous process improvement and the customer-centred benefits of it.

Glykas (2011) highlighted the need for a holistic methodology and associated toolset. Using the principles of business process modelling and analysis he develops and presents a performance measurement toolset named “ADJUST”. It can be used for (1) planning different BPM scenarios (with a focus on the desired performance outcomes), (2) assessing real-time performance and (3) reporting deviations from desired planned performance. A quantitative methodology using an activity model is proposed by Lam et al. (2009) as an integrated measurement mechanism.

Choong (2013) proposed an integrated business process measurement and management system (IBPMMS). It is an integrated theoretical framework that combines a management system, a measurement system and business processes. In implementing IBPMMS the value-chain methodology is used to measure and compare performance within business processes.

Huang et al. (2015) introduced business process management systems (BPMS), which are software platforms that support the definition, execution, and tracking of business processes. The BPMSs facilitate the tracking of the KPI achievements in real time and enable the design, analysis, optimization, automation and diagnosis of business processes. Process performance measurement is an important functionality of BPMS, because BPMSs should provide managers with an in-depth understanding of how a process is performing, while identifying areas for improvement. To adopt the BPMS and the process performance measurement successfully, organizations should have shared BPMS and process performance measurement goals, objectives and values; improve communication, and ensure that process measures are clearly linked to strategies and are easily understood by employees. When the measurement culture is enhanced the users will accept the results of process performance measurement, all important aspects of process performance will be reflected in the KPIs, stakeholders will have access to performance data and a sufficient measurement frequency can be maintained (Vuksic et al., 2015).

Pádua and Jabbour (2015) discussed performance measurement systems that measure

sustainability through business process approaches. A systemic business process that integrates the company's strategic planning and day-to-day operations effectively is referred to as a 'sustainability performance measurement system' (SPMS). The key considerations when updating the SPMS are: planning, evaluation and follow-up. To monitor corporate sustainability in a quantitative and qualitative manner, the SPMS should measure progress toward identified goals with a long-term focus while addressing those issues associated with the triple bottom line. By addressing the sustainability management through business processes the challenge of managing the trade-offs of the three dimensions of the triple bottom line can be addressed. This will enable the performance measurement systems to implement the strategy with a focus on business processes to add value (Pádua and Jabbour, 2015). A pentagon of SPMS promotion and evolution with a focus on business processes is proposed by Pádua and Jabbour (2015). Further, a taxonomy of parameters for measuring the sustainability of business processes was proposed by Nowak et al. (2011) that included three dimensions: social; environmental; and economic (Pádua and Jabbour, 2015).

5. Summary Discussions

This structured literature review was carried out to determine the current state of the nexus between the accounting and BPM disciplines. A rigorous literature search followed by a synthesis of the reviewed studies resulted in findings useful for both practitioners and future researchers.

Profiling of the related literature together with a detailed content analysis is presented in Sections 3 and 4. The 39 papers that resulted from the selection process (see Section 2.1) provided several interesting insights into the current state of the literature combining BPM with accounting. Most of the studies drew on management accounting concepts and techniques as opposed to the financial accounting branch, to discuss issues in relation to BPM. Specifically, a large number of studies focused on performance management/ measurement aspects of BPM initiatives. The lack of and the need for 'process performance measurement systems' considering the needs of BPM/BPIs was recognized by many. Measurement frameworks do exist for BPM/BPI using accounting techniques such as ABC and BSC but performance measurement systems need to be more integrated/ holistic to quantify the impact of BPM. Financial accounting perspectives were not discussed in the

papers reviewed, despite possible benefits (suggested under implications for future research section).

Comprehensive and rigorous efforts were made to search for studies discussing the relationship between accounting and BPM disciplines. To ensure that all relevant research was identified the authors used many key words and their synonyms and created search strings combining them. In addition, two authors independently carried out the multi-staged relevance check in screening and selecting the appropriate articles. A further limitation is the potential for missing out certain insights during the coding process, as well as introducing coder bias while extracting the codes. To mitigate this risk, the initial open-codes were validated by two other coders who independently reviewed the codes with the papers and revised the initial open codes.

In the following sections, the implications of this review for both practitioners and future research are presented.

5.1 Implications for practitioners

Literature reviews can be useful to practitioners as a single source of reference that consolidates existing knowledge. But generally, contributions to practice created through literature reviews (as opposed to empirical research) are limited. However, during the literature analysis conducted in this study a list of specific practice considerations was extracted. These (together with the sections of this paper from which they were derived) are presented in Table 3.

Table 3: Summary Recommendations for Practitioners

Implication	Supporting Sections
For the organizational strategies to be successful, the management accounting practices related to measurements (such as cost or value added to the organization) should cater to the changes (such as lean, BPM) occurring in the organization.	4.1
For BPM efforts to be successful they should be strategically aligned. The strategies of the organizations can be aligned with the BPM efforts through appropriate performance management. Therefore, when KPIs are designed to	4.2, 4.2.1

measure the impact of process improvements, they should be aligned with the business strategy and objectives.	
For BPM efforts to be successful, the accounting systems within the organizations should change. The Accounting Information Systems (AIS) need to be designed to focus more on providing process-oriented accounting information while trying to integrate the AIS with process-aware information systems. This will facilitate the incorporation of process oriented accounting information to ground BPM decisions.	4.1, 4.2
For the process improvements/changes to be successful and the organizations to become process oriented, they should develop ‘process performance measurements’. Also there should be process measures to compare performance of business processes in an organization. Therefore, in BPM decisions, ‘measuring performance’ related to the contributions of the business processes that are improved should be given attention.	4.1.1 4.2.1, 4.2.2
For effective BPM, ‘performance measurement’ can be used as a tool (for instance to manage resistance from employees; to achieve expected outcomes)	4.2.1
To exploit the process improvement opportunities in organizations, efforts should be made to design integrated PMS within organizations related to all levels (i.e. holistic PM approaches with BPM)	4.2.2, 4.2.4
When designing PMS for BPM, attention should be focused on internal processes; external processes; the maturity level of the organization; the related industry; internal and external causes of quality-related problems; and should consider the fact that in a BPM context people work in teams, and actually produce final output(s) for a customer.	4.2.2
To address the accounting focus in BPM, organisations should get the management accountants involved in business process change/improvement efforts.	4.1
Companies should try to address weaknesses (such as: lack of focus on business processes; unclear goals related to PMS; lack of agreed PMS goals; lack of customer focus; lack of balanced performance information) in the PMSs that are designed in BPM	4.2.4
For improving the efficiency in accounting practices, accounting professionals	4.1.3

can seek guidance from BPM practices	
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5.2 Implications for future researchers

The research agenda building guidelines of Müller-Bloch and Kranz (2015) and Alvesson and Sandberg (2013) were applied to systematically derive the research directions presented below. This was a collection of gaps and opportunities identified based on thematic pattern matching of the coded content, and what other authors (in the papers reviewed) directly proposed as possible future research (identified during the synthesis and interpretation of the content analysis). This resulted in a series of specific, traceable (evidence based) research questions (see Table 4), together with higher level general observations.

Table 4: The Potential Research Questions

Proposed Research Questions	Supporting Sections
<p>... Generally, in relation to Information and Information Systems</p> <ul style="list-style-type: none"> - How can process-oriented accounting information be created and maintained to enhance BPM decision making from an economic perspective? - What changes are needed to the existing accounting systems to cater to ongoing process changes in organizations? - How can existing process-aware information systems be better integrated with an organization's accounting information systems to provide relevant accounting data for BPM decision support? - How can a common lexicon be created for BPM and accounting to enable shared understanding of important key concepts? - How can technologies used to support processes be better designed to provide the required process centric (performance and other) data? 	<p>4.1</p> <p>4.1, 4.1.1</p> <p>4.1</p> <p>4.1.2</p> <p>4.3</p>
<p>... Generally, in relation to Organizational structure, roles and related controls</p> <ul style="list-style-type: none"> -How might the roles and responsibilities of accountants need to change to enable the collection, analysis and reporting of economic aspects of processes? <ul style="list-style-type: none"> - What training will accounting professionals need to enhance their ability to contribute to continuous improvement efforts and work with 	<p>4.1</p> <p>4.1.3</p>

related systems? - How can delegation, incentives and performance measurement within management control systems be set up to support business process change?	4.1.1
... Specifically, in relation to performance measurement	
- What would characterise a Continuous Process Improvement (CPI)-focused performance management system? - How are 'process' performance measures related (different/ similar/ aligned) to performance measurement in general? - What are the measures/KPIs that facilitate the impact-measurement of BPI initiatives?	4.2 4.2, 4.2.1 4.2
- How should PMS that are relevant, well-designed and focused on strategic aims be best designed and introduced to an organization? - What are the possible relationships between accounting practices, strategic approaches to BPM, PPM and performance outcomes? - What aspects need to be considered when 'customizing' the Performance Measurement System (PMS) to unique organizational settings? - How to best integrate a PMS as part of the wider BPM strategy? - What are the tools and frameworks to consider in this quest? - How can they be best adopted?	4.2.1 4.2.1 4.2.1 4.2.1, 4.3 4.2.1, 4.3 4.2.1, 4.3
- How can a PMS be designed and maintained to influence positive process-stakeholder behaviour that supports continuous process improvement? - How can PMS empower employees towards BPM best practices? - How can a PMS become a useful communication tool about corporate process improvement intentions?	4.2.1 4.2.1 4.2.1
- What is the relationship between PPM and organizational performance? - How may these relationships differ in different organizational contexts? - How can the BPM decision-aiding process be supported through performance measures? - Which specific measures are likely to support BPM adoption success?	4.2.2 4.2.2 4.2 4.2.1
- Why is complete/ holistic process PMS important?	4.2.2

- Which tools and methods will enable a complete/ holistic measurement of BPI impact?	4.2.2, 4.3
- How can these tools and methods be deployed to obtain the required metrics to determine BPI impact?	4.2.2, 4.3
- What is the process of PPM?	4.2.3
- What tools/ frameworks might support the process of PPM?	4.2.3, 4.3
- How can organizations move from ad-hoc to continuous process performance practices?	4.2.4
- What are the potential means to overcome the common issues related to PPM?	4.2.4
- What are the data collection challenges associated with process performance measurement and how to overcome them?	4.2.4
- How can the synergistic relationships of existing performance measurement tools and techniques be better understood and applied to enhance process performance?	4.3

The general observations warranting action included the following:

- Research that ties BPM and financial accounting was not identified at all. The link between BPM and financial accounting could be further investigated (for example, with topics such as; *How to manage accounting processes to improve reporting quality, disclosure, and compliance?*)
- Lack of conceptual work that explores the potential nexus between accounting and BPM, and lack of literature reviews that synthesises prior studies related to aspects of the two areas. Such conceptual work can form a strong basis for future research.
- Based on the few papers reviewed from top tiered journals (none from Accounting) on this important and under-researched area, we make a call for action to editors of leading journals of the two disciplines to encourage research on the ‘nexus’ of BPM and Accounting (i.e. through special issues etc.). We encourage accounting researchers to see how they can contribute to another discipline like BPM and encourage BPM researchers to see how well developed Accounting principles can be applied to address some of the long standing gaps in the BPM field

- We also make a call for action to researchers interested in this area to make use of this literature review; the collated papers, synthesis, and proposed future research directions as a basis for future research that ties Accounting and BPM more strongly together.

6. Conclusions

This structured literature review was conducted with the intention of facilitating the current/emerging need to expand interdisciplinary research into the BPM and accounting disciplines. This is the first structured literature review that collates and synthesises all related work that ties the BPM and accounting fields together. It provides a sound overview and a detailed synthesis on what has been discussed to date. A detailed content analysis supports our argument that there are significant opportunities associated with bringing accounting concepts and perspectives into BPM and that accounting could also benefit from consideration of the BPM perspective given the cross functionality of the accounting role (Burns, 2000, Burns and Baldvinsdottir, 2005). Given our identification of the dearth of existing research focused on a nexus between the two fields, this paper presents a set of evidence based research directions and makes a call for action to future researchers to respond to this exciting and important area of research.

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Appendix 1: Further details about the paper searching process

Table A.1: Keywords and Synonyms for the Search

Key Words	Sub Categories of Key Words	Synonyms
Business Process Management		Process Redesign, Process Improvement, Process Re-engineering, Process Reengineering, Process innovation, Process transformation, process change, Process Workflow, Process control, Process mining
Accounting	Financial Accounting	Bookkeeping, Double entry, Double-entry, Financial Reporting, Sustainability Reporting, Integrated Reporting
	Management Accounting	Cost measurement, Costing, Budgeting, Process costing, Cost accounting, Performance measurement, Performance management, Management Control System

Table A.2: Search Queries

String A	"business process management" AND accounting
String B	("business process management" OR "process redesign" OR "process improvement" OR "process re-engineering" OR "process reengineering" OR "process innovation" OR "process transformation" OR "process change" OR "process workflow" OR "process control" OR "process mining") AND (accounting OR "financial accounting" OR bookkeeping OR "double entry" OR "double-entry" OR "financial reporting" OR "sustainability reporting" OR "integrated reporting" OR "management accounting" OR "cost measurement" OR costing OR budgeting OR "process costing" OR "cost accounting" OR "performance measurement" OR "performance management" OR "management control system")

Appendix 2: Themes, Meta Themes mapped to the initial 392 Codes

Table A.3: Themes, Meta Themes mapped to the initial 392 Codes

Initial Themes	♦♦ ¹	▲ ²	Next level of Sub-themes	Meta-themes ³	
Common discussions on the nexus (general)	6	37	Common discussions on the nexus (general)	1. Broad discussions around the nexus between traditional accounting and BPM	
Why integrate accounting with BPM	6	18	Why integrate accounting with BPM +Existing integration efforts		
Existing integration efforts	3	18			
Shared and varied concepts common to the two fields	1	7	Shared and varied concepts common to the two fields + related implications		
Implications in integration efforts	1	5			
Applying BPM to accounting	2	9	Applying BPM to accounting		
BPM and performance management (general)	7	20	BPM and performance management (general)	2. BPM and performance management	
Importance of performance measurement in BPM	13	53	Importance of performance measurement in BPM		
Important facets to consider to derive holistic and complete process measures	10	28	Important facets to consider to derive holistic and complete process measures		
Process performance measures (PPM) development stages	2	10	Process performance measures (PPM) development stages		
Issues pertaining to current PMS	3	6	Issues pertaining to current PMS and measurement needs of BPM		
Measurement needs of BPM	1	1			
Other tools, frameworks and models other than ABC and BSC	9	30	Other tools, frameworks and models other than ABC and BSC for Performance measurement		
ABC with IT for BPM	1	1	ABC with BPM (ABC with IT for BPM + ABC for management information generation in BPM)	3. ABC for measuring BPM	
ABC for management information generation in BPM	1	5			
ABC Support for accurate cost and time measurement	3	6			Support for accurate cost and time measurement
ABC Support for process intervention decisions and measuring process performance/impact	7	22			ABC Support for process intervention decisions and measuring process performance/impact
AHP with ABC	1	6			ABC combined with different approaches (AHP with ABC, JIT with ABC, Lean Six Sigma with ABC, TQM with ABC, and Simulation for ABC)
JIT with ABC	1	1			
Lean Six Sigma with ABC	1	2			
TQM with ABC	1	12			
Simulation for ABC	2	12			
BSC in BPM measurement aspects	4	12	BSC in BPM measurement aspects	4. BSC in BPM measurement	
Research Gaps Identified in Articles	6	16	<i>Research Gaps Identified in Articles</i>		
Motivating factors for the research conducted	18	55	<i>Motivating factors for the research conducted</i>		
25 Initial Themes			17 Merged Themes		

¹ Number of Sources (Articles)

² Number of Codes extracted from the Sources (Articles)

³ Groups of themes organized in a logical hierarchy