A Bibliometric Analysis of Business Process Capabilities: Towards a Conceptual Model

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Abstract

This study presents a bibliometric analysis using the Web of Science core collection database to support the development of the business process capabilities domain, enhancing the knowledge about the key scientific journals, authors, and papers, besides the subject areas and the main definitions that shaped this topic. This bibliometric analysis comprises the following fundamental matters: (1) the number of studies published per year, (2) the most prolific and influential authors, (3) the assessment of studies citing business process capabilities, and (4) the main subject areas and definitions on this topic. Furthermore, based on the list of studies and the indicators identified, we mapped the business process capability concept and its main related concepts. This study provides helpful information for those attempting to analyze and deepen the business process capabilities in the literature while providing some insights concerning its conceptualization and growth.

Keywords

Business process capabilities, bibliometric analysis, Web of Science

1. Introduction

Organizations perform better when they pay explicit attention to their business processes from start to end, than when they do not. It is essential to understand the parts of the business process, but also the people involved in these steps, the information being exchanged and processed while going through them, and the technologies invoked when executing the various steps to do this well. Optimizing and aligning all these elements will enable an organization to improve the generation of a particular product or service [1]. Probably because of that, in general, it is more common to find works about business capability (capabilities related to aspects of a business as processes, information, and value), or business process management capability (capabilities related to the management of business processes). A (set of) business process(es) is typically part of what constitutes a business capability and is part of constituting BPM capability. Therefore, in this paper, our research's main objective is to clarify the core of business capabilities and BPM capabilities, i.e., the business process capability concept.

To achieve these objectives, we performed a bibliographic analysis to elucidate a better definition of business process capabilities and its central relationships, mapping its state of the art and identifying gaps and trends related to this concept, based on this topic previous studies. Our study contributes to the literature, improving the perception of the theoretical corpus of business process capability research.

This paper is structured as follows: Section 2 summarizes the bibliometric analysis method. Section 3 presents a bibliometric analysis of business process capabilities based on the method identified in Section 2. Section 4 discusses the main contributions of the conceptual model. Finally, Section 5 presents the limitations and future directions of the business process capability concept research.

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2. Method

The concept of bibliometrics, or bibliometric analysis, was introduced by Alan Pritchard in 1969 and it has grown exponentially since the advent of the Internet. Bibliometric analysis is a discipline that applies statistical methods to evaluate the development and knowledge enhancement related to a specific subject and to assess the scientific quality and influence of the distinct works and sources [2]. Its application in a study's initial phase can ensure that relevant references to the literature are considered. In addition, it sheds a light on the literature gaps and allow us to substantiate the scientific demand and originality of the proposed study [3].

The bibliometric analysis is used to measure and compare the scientific output, research groups, institutions, regions, or countries using indicators based on the number of publications, the quotes received, and the collaborations. It can also identify the most important or influential journals in a specific field and monitor the evolution of a discipline or research subject over time [4]. We conducted this bibliometric analysis considering the method stage based on [3] proposal, as seen in Figure 1.

Figure 1: Bibliometric analysis method stages based on [3]

Bibliometric methods involve several tools to help researchers identify a relevant and current research problem. Bibliometric indicators can give more consistency to a research project as they use statistics from different bibliographic databases that differ in scope, data volume, and coverage. The research project objectives and methods can clearly and concisely illustrate the scientific gaps in a field with the development of the research project based on bibliometric analysis. The gaps analysis's main objective in the literature is to provide the researcher with ways to identify opportunities for exploring new relevant topics of a given field of research, as well as studies that had not been fully explored and which require the further studies development to advance the state of the art of a particular theme [3].

3. A Business Process Capabilities Bibliometric Analysis

3.1. Defining Field of Study and Selecting Search Platform

This work's primary purpose is to clarify the concept of business process capabilities (topic), conduct a bibliometric analysis of the existing research on business process capabilities, and develop a conceptual model. We chose the Web of Science (WoS) core collection database [5] as a basis, after confirm on google scholar database that about 53% of article titles cite only 'Web of Science' as the bibliometrics database. WoS search platform embraces general interest IS journals and conference proceedings [5]. A bibliometric analysis was performed on 68 manuscripts extracted from WoS.

As related works, we identified an article about "Bibliometric analysis for process capability research" to assess operational losses due to noncompliance to customer specifications in manufacturing [6]. That work applied the process capability analysis to assess the capability of a manufacturing process, where information about the process is used to improve the capability. It is a specific application of business process capability in manufacturing, so it has a different purpose from our work, which is to clarify the business process capability concept, using the previous studies on this topic.

3.2. Mining Bibliometric Data

Firstly, we defined and executed the search criteria. Its search string was enclosed in the title (business process* capabilit*) AND abstract (business process* capabilit*) without the restriction of published date, type, or categories. This topic comprehended 68 papers published on the WoS, which included 41 journal papers, 25 proceedings papers, two reviews, and one anticipated access. Then, we identified bibliometric indicators adequate to our study (highlighted in *italic*).

The most *seminal paper* on business process capability is the highest cited in this topic. In 2004, this paper [7] was introduced connecting capabilities, business processes, competitive advantage, and the resource-based view. It discussed the relationship between resources and capabilities, on the one hand, and business processes, activities, and routines, on the other. The paper argued that these results would not mean organizations should not invest in technology resources and other tangible aspects of customer service. However, because these resources would not be costly to imitate, most organizations in a mature industry like the insurance industry should already have them in place, and thus they should not be a source of competitive advantage.

Times cited and publications over time. The total of 68 publications distributed per year on business process capabilities since 2004 (the year of the *seminal work*) is presented in Figure 2. During the first year, there was only one published study on the WoS. The following two years had no publications, they were seen again in 2007. During the following years after the *seminal work*, the annual volume presented two positive peaks in 2010 and 2014. However, in 2021, the number of publications experienced a slight decrease, which may suggest that the topic might be entering a reevaluation considering the impacts of the pandemic. The annual citations' volume has continually increased.

The 21 countries with the *highest productivity rate* were Peoples R China (11 papers); USA (9); Germany (7); Indonesia (6); Australia and Belgium (4); Ireland, Italy, and Russia (3); Brazil, England, Finland, India, Malaysia, Netherlands, New Zealand, Poland, Spain, Sweden, Taiwan, and Tunisia (2), totalizing 42 publications. The other 26 countries cited presented one publication each. This productivity rate was measured through different indicators such as the h-index used to measure the quality of research output based on the number of citations received.

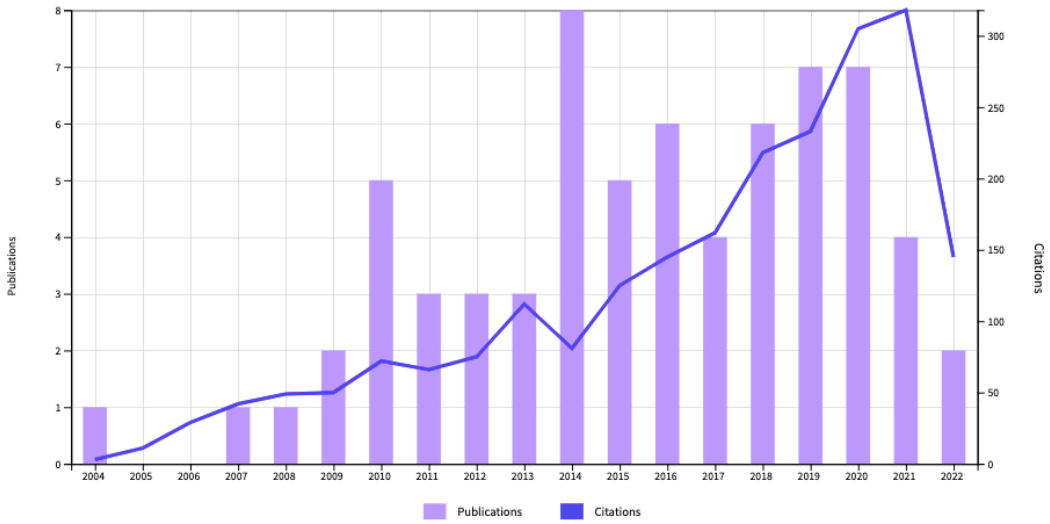

Figure 2: The times cited of the 68 Publications timeline (source: [5])

Moreover, from the indicators suggested by [3], we selected the types of bibliometric analyses that aligned with our work objective: the *authors and keywords analysis*. Many *authors* (175 according to WoS [5]) have researched business process capabilities and published their findings in scientific journals. WoS indexes scientific journals of different research areas as BPM, Marketing, Information Systems and Sustainability, revealing that distinct journals, from different areas, have published research studies on business process capabilities.

Analyzing the most cited authors is helpful to understand the authors who are references in this area. 13 authors published more than one paper on business process capabilities. Jing Zhao is the author with the highest number of published papers in this segment (4 papers). However, Zhao and his co-authors only published until 2013. The authors who published three papers in this thread were Amy Van Looy, E. R. Mahendrawathi, Sami Bhiri, Shan Liu, and Wassim Derguech. The H-Index in this topic (considering the 68 publications) is 19. Of all the authors who published more than one paper, Amy Van Looy [8] and Shan Liu [9]–[11] are co-authors of papers with more than 19 citations. In the last five years (between 2018 and 2022), 78 authors published 26 papers. The author who published the most in this period was Mahendrawathi, E.R. [12]–[14], followed by her co-author Nurmadewi, D. [12], [13] and Van Looy, A. [15], [16].

In the WoS Core Collection, *Author Keywords* are included in records of papers and conference proceedings. *KeyWords Plus*® are index terms automatically generated from the titles of cited papers. Its terms must have appeared more than once in the bibliography and were ordered from multi-word phrases to single terms. KeyWords Plus augments traditional Keyword or title retrieval [5]. *Author Keywords* were grouped, as well as *KeyWords Plus*.

3.3. Analyzing the Bibliometric Data

The main concepts (highlighted in **bold**) founded in the bibliometric analysis, basis for this paper, are introduced following. **Capability** is the ability and capacity that enable an organization to achieve a business goal in a specific context [17]. **Capability management** is a research area focusing on managing organizations' ability and capacity.

A **process** is a series of interconnected activities that takes input, adds value, and produces output. It is how organizations work their day-to-day routines. **Business processes** are at the heart of each organization. They describe how organizations operate and impact how organizations perform [18]. **Business processes** play an essential role in capability management, so it is vital to consider the notion of capability when managing business processes [17]. The **business process capability** is an essential mediator in potentially realizing organization performance from the knowledge resources [19].

Also, it is a valuable resource that enables organizations to sustain competitive advantage, as they are best protected by isolated mechanisms such as social complexity, path dependency and unique historical conditions [20]. **Business process management** (BPM) consolidates how to best manage the (re-)design of individual business processes and how to develop a foundational Business Process Management capability in organizations catering for a variety of purposes and contexts [21].

When through development or acquisition, an organization possesses **resources** that are valuable, inimitable, rare, and non-substitutable, a competitive advantage can be achieved and sustained, allowing the organization to implement value-creating and difficult-to-duplicate strategies [22]. The **resource-based view (RBV)** asserts that organizations gain and sustain competitive advantages by deploying valuable resources and capabilities that are inelastic. The resources alone cannot be a source of competitive advantage. Resources can only be a source of competitive advantage if they are used to do something, i.e., if those resources are exploited through business processes [7].

Furthermore, the **business strategy goal** is to create competitive advantages in the industry in which an organization operates. For that, a business strategy should effectively connect unique knowledge resources. Knowledge management must reflect the business strategy to create customers' value, earn profit for the organization, and manage employees, directly influencing the knowledge management process. The **knowledge management process** is defined as the degree to which the organization creates, shares, and utilizes knowledge resources across functional boundaries. The knowledge management process uses a variety of infrastructure capabilities, such as knowledge-based culture, structure, technology, and human resource [23].

Additionally, the organizations must continue to interact with multiple partners in digital or conventional supply chains. The negotiation's organizational model serves as a means of effectively managing organizational boundaries. **Boundaries** are defined as transitional areas between inside and outside. These boundaries, in which it is difficult to distinguish organizations from the external environment, circumscribe resources and capabilities over which organizations extend their governance and control [22].

3.4. Mapping the State of Art

According to [3], after analyzing gaps in the selected papers and reviews, it is possible to group the main issues addressed in the universe studied. Moreover, for these authors, another way to identify literature gaps is by analyzing papers' most used keywords on a given topic, and one should be aware if a keyword often used in the papers is no longer observed with such frequency and regularity because it can be a sign of possible exhaustion of a theme in the literature.

From the 68 papers, we identified 51 papers which studies clarify the concept of business process capabilities, considering our proposal of developing a business process capabilities conceptual model.

We consolidated five clusters of keywords and generated a timeline to analyze the topic (see Table 1), dividing the 51 papers by published years in four periods: 2004-9 (3 papers selected), 2010-14 (16 papers selected), 2015-19 (22 papers selected), 2020-2024 (today 10 papers).

In the first period (2004-2009), there were fewer productions, only three papers, all related to competitive advantage and knowledge resources. In the second period (2010-14), the papers started to explore the strategy, types of capabilities, organizational capabilities, outsourcing, alliances, and supply chain processes. The third period (2015-19) had more paper production than the two periods before. Besides, in this period, the papers presented new keywords such as Ambidextrous BPM, Risk, and Boundary Strategy. The keywords **ambidextrous BPM** and **risk** were not identified in the next period. The fourth period (2020-2024) has more papers than the other periods, except for 2020, which has only one paper.

Table 1

The 51 papers analyzed timeline to the business process capability topic (source: authors)

Year	Business process capability &					Year Qty
	Competitive Advantage	**Knowledge Resources**	**Strategy**	**Business Process Capability types**	**Organization and Boundaries**	
2004	[7]	[7]				**1**
2005						
2006						
2007	[24]	[24]				**1**
2008	[25]	[25]				**1**
2009						
2010	[26], [27]	[26], [27], [28], [29], [30]	[27], [28], [30]	[27], [30]	[28]	**5**
2011		[23], [31], [32]	[23]	[32]		**3**
2012	[33]	[33]		[33]		**1**
2013		[34]		[34]		**1**
2014	[20], [35]	[20], [35], [36], [37], [38]	[35]	[36], [38]	[20], [35], [39]	**6**
2015		[11], [40], [41]		[11], [40]	[40], [41], [42]	**4**
2016	[19], [43]	[19], [43], [44], [45]	[44], [45]	[43], [44]	[43], [44]	**4**
2017		[9], [46]		[9]		**2**
2018	[47]	[47], [10], [48], [49], [50]	[50]	[10]	[47], [48], [50], [51]	**6**
2019	[22], [52]	[14], [15], [22], [52], [53], [54]	[22], [52], [53], [54]	[22]	[22], [52], [54]	**6**
2020		[18]	[18]		[18]	**1**
2021	[55]	[12], [55], [56], [57]	[21], [55], [57]	[57], [58]	[55], [57]	**6**
2022	[59]	[16], [59], [60]	[60]	[59]	[16], [59]	**3**

We group the topics in the bibliometric study in research subareas, conducting the timeline analysis, and searching for similarities between the various clusters are essential steps followed to identify gaps, trends in research, and the connection between the business process capability and organization, boundaries, capability's types, strategy, performance, knowledge resources and competitive advantage creating a map of business process capabilities connected concepts (see Figure 3).

(i) The **business process capability, organization, and boundaries** cluster. Organizations are increasingly focusing on their business processes to excel [39]. Sometimes, organizations are considered a set of interlinked business processes that meaningfully influence organizational strategy and performance [47]. Besides the internal business processes, the organization have taken into account the supply chain business process, to support a broader perspective to identify new integration and coordination opportunities among organizations' value chains and external partners as outsourcing [22].

(ii) The **business process capability types of** clusters. It is related to the types of business process capabilities and their applications: (a) *Ordinary x dynamic capabilities*. Ordinary capabilities enable an organization to operate its business efficiently, while dynamic capabilities enable it to change its operations by improving existing capabilities or creating new ones. The dynamic capabilities perspective further suggests that dynamic capabilities play an essential role in organizational performance during periods of change within the business environment [18]. Dynamic capabilities are

rooted in the organization's resource-based view (RBV). This perspective is seen from the concept of the organization as a collection of resources that are difficult to imitate, creating a sustainable competitive advantage and contributing to the difference in the company's performance. Dynamic capability is a "high-order capability", which is very different from the "ordinary", "regular", or "substantive", which refers to the ability of the company to solve the problem [42].

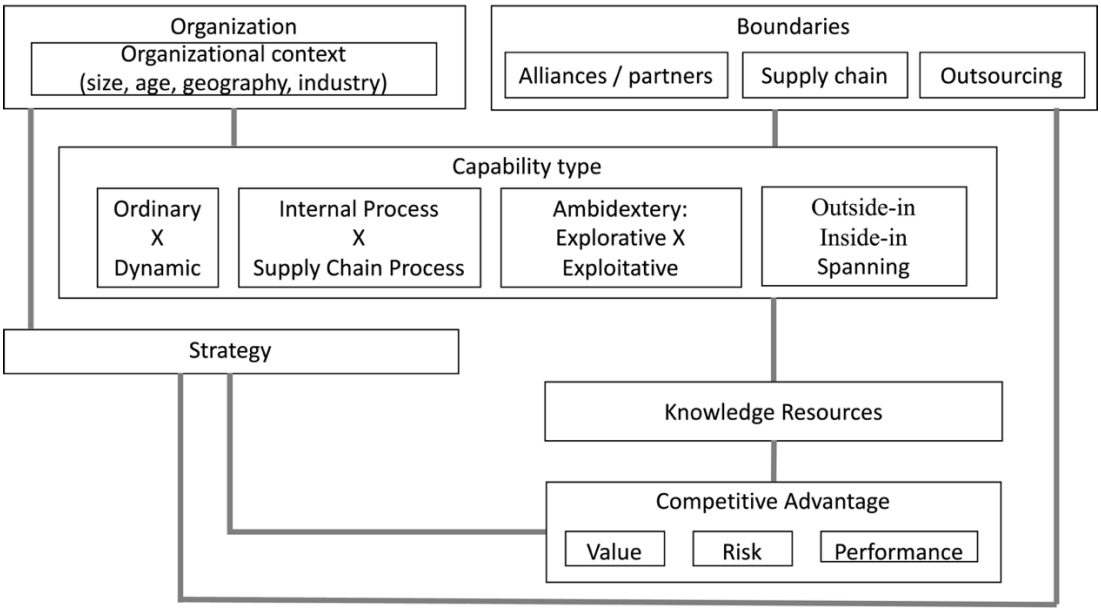

Figure 3: Business process capabilities connected concepts (source: authors)

(b) *Internal x supply chain management business process*. Supply chain management is an integrative philosophy to manage the total flow of a distribution channel from supplier to the ultimate user. From a business process perspective, supply chain management refers to managing the relationships with suppliers and ensuring the quality of the supply chain. On the other hand, internal business process management refers to how functional areas are managed to satisfy customer needs, including process optimization and flexibility, product quality, brand management, and marketing, operating cost reduction, cross-departmental collaborations, and problem-solving ability. In other words, it refers to any business processes not related to activities dealing with external supplies and customers [19]. (c) *Exploitative x explorative capabilities*. Emerging research on management innovation has hypothesized a combination between novel BPM competencies and organizational ambidexterity [50]. Ambidexterity refers to an organization's ability to manage current demands (exploitation) while being adaptable to environmental changes (exploration). It has long been recognized that organizations should engage in enough exploitation to ensure the organization's viability and engage in enough exploration to ensure its future viability [33]. Indeed, organizational ambidexterity has been linked to technological innovation, organizational learning, competitive advantage, and organizational survival [51]. Moreover, business process capability can also be classified in many other forms as for example outside-in capability (e.g., the organization can anticipate market demands and create stable relationships with external stakeholders), inside-in capability (e.g., the organization can improve product/service innovation and financial management and cost control), spanning capability (e.g., the organization can develop business strategies and execute inter- and intra-organization collaboration) [20].

(iii) The **business process capability and strategy** cluster. The strategy should align internal and external business processes to improve overall efficiency while preventing external supply chain actors from acquiring critical information through their relationships with the organization [21]. The business strategy goal is to create competitive advantages in the industry in which an organization operates. For that, a business strategy should effectively connect unique knowledge resources. Knowledge management must reflect the business strategy to create customers' value, earn profit for the organization, and manage employees, directly influencing the knowledge management process. The knowledge management process is defined as the degree to which the organization creates, shares, and

utilizes knowledge resources across functional boundaries. The knowledge management process uses a variety of infrastructure capabilities, such as knowledge-based culture, structure, technology, and human resource [23].

(iv) The **business process capability and knowledge resources** cluster. Knowledge has long been regarded as a strategic resource that must be managed to improve an organization's competitive performance. The knowledge-based organizations need to employ knowledge management as their primary source of competitiveness. The knowledge management processes capabilities that make up the dynamic fabric of these organizations are the most critical factors in establishing competitiveness [55]. Besides, it is essential to recognize that resources cannot be a source of competitive advantage. Resources can only be a source of competitive advantage if they are used to do something, i.e., if those resources are exploited through business processes [7].

(v) The **business process capability and competitive advantage** cluster. The business process capability is an essential and valuable resource that enables organizations to sustain competitive advantage, as they are best protected by isolated mechanisms such as social complexity, path dependency and unique historical conditions [20].

4. Discussion

The objective of this study was to organize and rationalize the published flow of knowledge under the business process capabilities concept. We have evaluated and presented the literature structure under business process capabilities and further derived the critical research areas and streams to ensure that this study's research objectives are met. In this section, we will discuss the implications of the study.

The year-wise chronological analysis of publications points out four periods of five years, first between 2004-9, second between 2010-14, third from 2015-19, and four from 2020 onwards till date, with a growing pattern globally. The study identified the most contributing and influential authors by analyzing the number of documents published and the average citations per document received by each author is the seminal work: the paper "Capabilities, business processes, and competitive advantage: Choosing the dependent variable in empirical tests of the resource-based view" [7].

The study had substantial implications on academic and managerial aspects. In the context of theoretical contributions, the study contributed to the current body of knowledge by analyzing the progression of research under the business process capability topic. Through citation analysis, it derived and consolidated the insights on influential authors and prominent keywords, which had significantly sculpted the research under business process capability. One additional contribution from this study was applying the concept of bibliometric analysis, which researchers can apply to gain insights on critical issues and emerging research trends from other fields of interest.

For the practitioner community, our study provided relevant insights into the status of research and future trends. Managers could leverage this acquired knowledge in many practical aspects. For example, by assessing the present organizational status of business process capabilities, strategically deciding the suitable business process capability portfolio, evaluating their maturity and organizational implications, associated risks, mitigation plans, partner selection, and policy formulation to secure the success of their business process capability initiatives.

5. Limitations and Future Research Directions

The study was restricted to one database (WoS) for data extraction, and the inferences drawn were based on these papers. Although the database is considered the most exhaustive, it represents a representative subset of full publications. Similarly, we extracted the papers based on specific keywords from the social science citation index. There could be different results with varying search databases, Indexes, or keywords. Therefore, results should be carefully generalized. Additionally, we have segregated the research into clusters to derive research streams. Different tools, techniques, and authors' understandings may yield distinct groups and different research steams. Also, the citation analysis was based on quantity, it did not emphasize quality.

Overall, business process capabilities efforts were picking up in practice. We found limited author keywords referencing potential terms such as digital, portfolio, and maturity from 2015. We proposed

that future studies evaluate these views. We found papers related to terms such as ambidexterity and risk only in 2017-18. Finally, we suggest that this research theme should also be explored for future research.

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