



The relationship of knowledge management with total quality management: a literature review

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Abstract. The adoption of management philosophies or methodologies may be necessary for companies to ensure their long-term survival; within this context, total quality management (TQM) and knowledge management (KM) are philosophies that have gained importance in literature. Through a literature review of 76 articles, this paper identified intellectual themes that relate both management philosophies. The evolution of the literature, main journals, most relevant articles, fundamental themes impacted by the relationship between TQM and KM were analyzed. The results showed that the research area of study is widespread and there is a growing interest in the relationship between TQM and KM. The content analysis provided an overview of the main topics discussed in the literature subdividing them into Motor, Basic, Niche and Emerging Themes. This paper contributes to the literature presenting analysis and discussion about the relationship between TQM and KM and provides an initial guide for those seeking to explore it. Due to the exploratory character of the study, the analyses performed may be liable to subjectivity. Thus, for future research, is suggested to continue the conversation regarding the topics explored in the clusters and approach them from different perspectives.

Keywords: Knowledge Management, Total Quality Management, Content Analysis.

1 Introduction

As a result of technological advances, we witness an environment of constant change, in which consumers are increasingly aware of their needs and the expected quality of the services and products they seek, encouraging, in some cases, organizations to promote initiatives for continuous quality improvement in order to maintain competitiveness, marketability, and customer interest in their products and services. Thus, organizations need to adopt management philosophies that will ensure their long-term survival, such as total quality management (TQM) and knowledge management (KM), which are examples of quality-oriented philosophies (Alanazi, 2020; Shraah et al., 2021).

According to Loke et al. (2012) organizations can manage total quality through practices related to leadership, strategic planning, consumer focus, information analy-

sis, people management, and process management. However, parallel to the discussion about the role and impact of TQM, another concept has been increasing in importance in the literature: knowledge management. Zwain et al. (2017) define KM as a process that enables organizations to identify, acquire, convert, and apply important knowledge needed for some vital organizational activities, such as problem solving, dynamic learning, strategic planning, and decision making. However, many scholars, such as Honarpour et al. (2018), Hsu and Shen (2005) argue that TQM and KM have goals and principles that resemble each other. According to the latter two, the similarities include results orientation, people-based management, teamwork, leadership, and customer satisfaction.

Currently, some researchers have shown interest in the relationship of TQM and KM but have not reached a consensus to conceptualize this relationship. Despite the potential for association of both management philosophies, the literature lacks studies that systematize the scientific knowledge already produced on the relationship of TQM and KM, because such concepts are often addressed in the literature, but usually studied separately. However, the growing interest in the area justifies the need to update this study. In this context, this study proposes to fill the gap identified through a literature review by bringing an overview of the intellectual themes that relate both managerial philosophies – TQM and KM. To address such research gap, a descriptive and content analysis was performed to identify main journals, bibliographic evolution, most relevant articles, and fundamental themes impacted by the relationship between TQM and KM.

The paper is organized into five sections. Section 2 presents the literature background on the main constructs of the research topic on TQM and KM. Section 3 lists the research methods employed to collect and analyze the sample of articles. Section 4 presents the findings. Finally, section 5 presents the conclusion, contributions, and limitations of the present research.

2 Theoretical Framework

2.1 Total Quality Management

TQM is an integrated management philosophy whose key idea is that quality is included in the organizational management function (Boateng et al., 2016). It is considered a key component of an organization's survival and growth strategy as it focuses on achieving total quality involving the daily commitment of everyone (Abbas, 2019; Deming, 1982; Kanji, 1990). Understanding TQM in its entirety becomes more intuitive when its components are analyzed in isolation, namely: Total (T) corresponds to the involvement of everyone in the organization; Quality (Q) refers to the standard by which a perfect product is defined; and Management (M) corresponds to the business management strategy and compliance with the established steps (Kaur et al., 2018).

Quality management reflects a learning cycle and involves the accumulation, retention, and dissemination of knowledge, ensuring alignment with the fundamental objectives of KM: creating more organizational knowledge so that continuous improvement can occur (Linderman et al., 2004; Wang & Ahmed, 2002). In this way, TQM,

with the participation of employees and customers, leads to the continuous improvement of the quality of an organization. Therefore, TQM affects the way organizations learn, helping to create the necessary environment for learning (Zeng et al., 2015).

According to Jiménez-Jiménez et al. (2020) the dimensions of TQM are: leadership, strategic planning, supplier quality management, process management, product and service design, employee management, customer relationship management, as well as information and analysis. Even so, TQM is the dominant approach so that, with significant effort, the organization can make quality a directional factor in everything it does (Permana et al., 2021). In this context, the TQM approach can bring benefits to an organization's competitiveness, effectiveness, and flexibility, through the impact of ensuring that management adopts a strategic perspective in relation to quality (Wangai et al., 2021).

2.2 Knowledge Management

Knowledge can be acquired from different sources and associated with a variety of organizational issues (Stewart and Waddell, 2008). The integration of knowledge leads to the acquisition of new knowledge, as individuals combine the information that they have (Okhuysen and Eisenhardt, 2002). Knowledge is a resource that must be considered as a valuable asset for the organization, because in addition to permeating several areas, it enables a more efficient and effective, seeking to explore new ways of differentiation and maintenance in the market (Mahdi et al., 2011).

Studies on KM began to expand in the 1990s, due to the development and transformation of the information-based economy (Ragab and Arisha, 2013). From this, other areas began to use knowledge as a systemic process, which is of great importance to guarantee competitiveness to organizations, as well as promote strategic management (Massaro et al., 2016).

KM embodies new ways of thinking and a knowledge-based managerial focus (Martins et al., 2019). It seeks to organize the main policies, processes, management, and technological tools to better understand the processes of generation, identification, validation, dissemination, sharing and protection, as well as the use of strategic knowledge to generate results for the company and benefits for the workers (Wijaya et al., 2020).

3 Methods

To achieve the objective proposed in this paper, initially, bibliometric study was conducted on the subject of TQM as it relates to KM. For this purpose, the steps of a bibliometric study were performed in order to identify and synthesize the research findings on a particular theme, applying structured and transparent procedures for each phase of the process (Littell et al., 2008). To obtain the initial document sample, the Scopus and Web of Science (WoS) databases were selected due to the quality and quantity of publications in them. Thus, to select the most appropriate publications, the search string "Total quality management" AND "Knowledge management" was ap-

plied to titles, abstracts and author keywords fields. Table 1 summarizes the filters used to perform the search in each one of the databases.

Table 1. Bibliographic portfolio inclusion criteria

	Scopus	Web of Science
Document type		Article and Reviews
Category	Business, Management and Accounting, Engineering, Computer Science, Decision Sciences, Social Sciences, Economics, Econometrics and Finance, Multidisciplinary, Psychology	Management, Business, Economics, Engineering Industrial, Operations Research Management Science, Information Science Library Science, Computer Science Interdisciplinary Applications, Environmental Sciences, Engineering Manufacturing, Business Finance, Education Educational Research, Area Studies, Education Scientific Disciplines, Multidisciplinary Sciences, Social Sciences Interdisciplinary
Language		English, Portuguese and Spanish
Search string	TITLE-ABS-KEY("Total quality management") AND TITLE-ABS-KEY("Knowledge management")	TS=("Total quality management") AND TS=("Knowledge management")

After searching both databases, a total of 236 documents was obtained. However, a first filter was applied to identify 34 duplicated documents. The next step was to select relevant documents to the research area by reading their title and abstract. In view of this, a final sample of 76 documents was found. Table 2 summarizes the steps performed during the filtering process and the resulting number of documents obtained in each one of them.

Table 2. Filtering process

Web of Science	92 documents
Scopus	144 documents
First filter: duplicated documents	34 documents
Partial sample	202 documents
Second filter: documents not related with research field	126 documents
Final sample	76 documents

First, a descriptive analysis was carried out to identify most relevant journals, total publications per year and most cited documents. Following the descriptive analysis, a content analysis was performed by generating keyword network by means of VOSviewer software. Nevertheless, to comprehend the structure of the literature of KM and TQM and the impacted themes, a consolidated spreadsheet with the data

from the articles was included in the Bibliometrix R-tool and Biblioshiny. Then, a literature review was conducted based on a content analysis of the articles and their themes. The results and discussion of the studies analyzed are presented in the next section.

4 Findings

4.1 Descriptive Analysis

A descriptive analysis was performed with the 76 documents in the dataset to identify the most relevant journals, the publication per year and the most cited documents. Regarding the most cited journal, the TQM and business excellence was the main source of the documents addressing the topic of KM and TQM, with a total of 12 published documents.

Also, the theme has been revealed to be dispersed in the literature as it appears in 53 publication sources. Table 3 highlights information about the five most expressive journals of the sample, their Journal Impact Indicator, and the quantity of documents in the sample. The table summarizes relevant data of the journals and could be a reference for the academics that may be interested in publishing or researching within this theme.

Table 3. Journal information

Journal	Journal Impact Indicator (2020)	Quantity
Total Quality Management and Business Excellence	3.824	12
TQM Journal	N/A	6
International Journal of Quality and Reliability Management	0.61	5
Industrial Management & Data Systems	4.224	2
International Journal of Innovation and Learning	0.15	2

Fig. 1 shows the annual scientific production. Wilson and Asay (1999) produced the pioneering work associating KM and TQM. Even after a period in which there weren't publications between 2007 and 2008, there has been a tendency of an emerging interest in the association between KM and TQM. The most recent year (2021) in the sample shows a total of 10 published documents, which is the highest number of publications in the analyzed timespan. The increasing interest in the managerial philosophies is seen as a solution to survive in modern times with the ever-changing environment and to obtain competitive advantages (Al Sharaah et al., 2021; Barua, 2021). Besides, it indicates that the theme is relevant for the current situation of organizations.

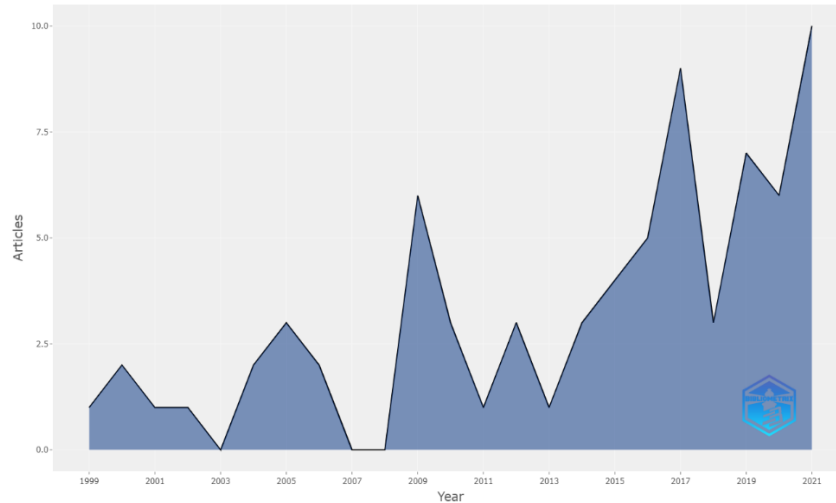


Fig. 1. Scientific production per year

To identify which documents of the sample were most influential in the literature, Table 4 was developed to illustrate the three most cited documents during the period considered. It is worth observing that only one of the three most cited documents were published in the journals cited in Table 3. This corroborates the fact that the association of KM and TQM can be addressed in several sources of publications and still be attractive to the scientific community.

Table 4. Most cited documents

Authors	Year	Title	Source	Citations
Wonk, K. Y.	2005	Critical success factors for implementing knowledge management in small and medium enterprises	Industrial Management & Data Systems	461
Linderman K., Schroeder R.G., Zaheer S., Liedtke C., Choo A.S.	2004	Integrating quality management practices with knowledge creation processes	Journal of Operations Management	196
Love P.E.D., Heng L.I., Irani Z., Faniran O.	2000	Total quality management and the learning organization: a dialogue for change in construction	Construction Management and Economics	133

4.2 Content Analysis

Qualitative content analysis is a systematic method to analyze qualitative data. It offers opportunities to analyze manifest and descriptive content, resulting in categories, as well as latent and interpretative content, resulting in themes (Graneheim et al., 2017). To capture the most relevant themes related to the association between KM and TQM a network analysis was performed. The first network was built with the co-occurrence of keywords because it can be used to identify relationships between subjects not yet explored in the literature and to point out trends to be studied by researchers. For the constructed map a minimum number of occurrences of a keyword was four and the network is shown in Fig. 2.

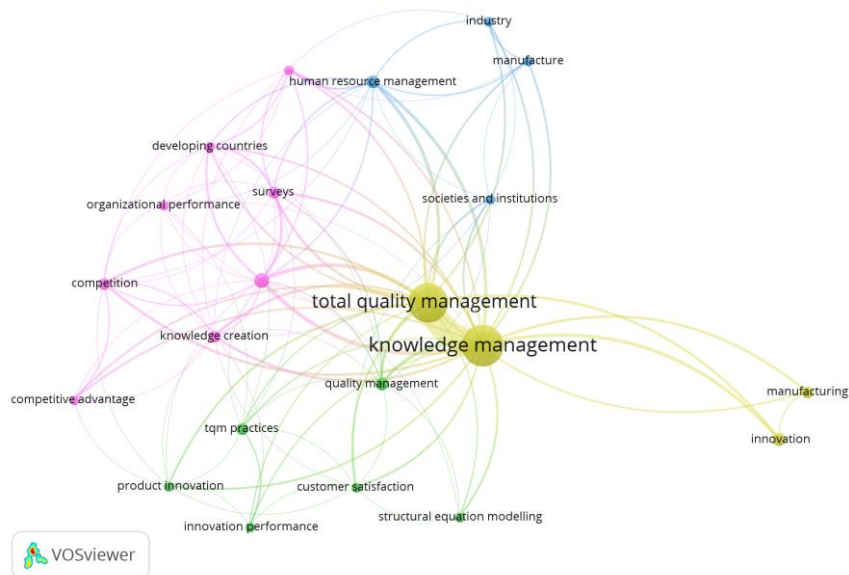


Fig. 2. Keywords network

The network indicates that there is an evident emphasis on the two expressions that correspond to the core of this work: KM and TQM. In this structure analysis, as closer the keywords are, greater is the number of articles that these words appear together; thus, indicating that the topic of KM is closely related to TQM in the sample studied. It also may be noted that the final sample is relevant to the area of interest.

To complement and guide the discussion toward the keywords network, it was used the Three Fields Plot in Fig. 3, which shows the relation between source of documents, authors, and keywords. The height of the rectangle represents the strength between variables (Srivastava, 2021); it means that as more relations a variable has, it has a higher rectangle. From this Figure, articles by Ooi K. (2014) stand out, which

publish majorly on “Knowledge Management”, “Total Quality management” “innovation” and “TQM”.

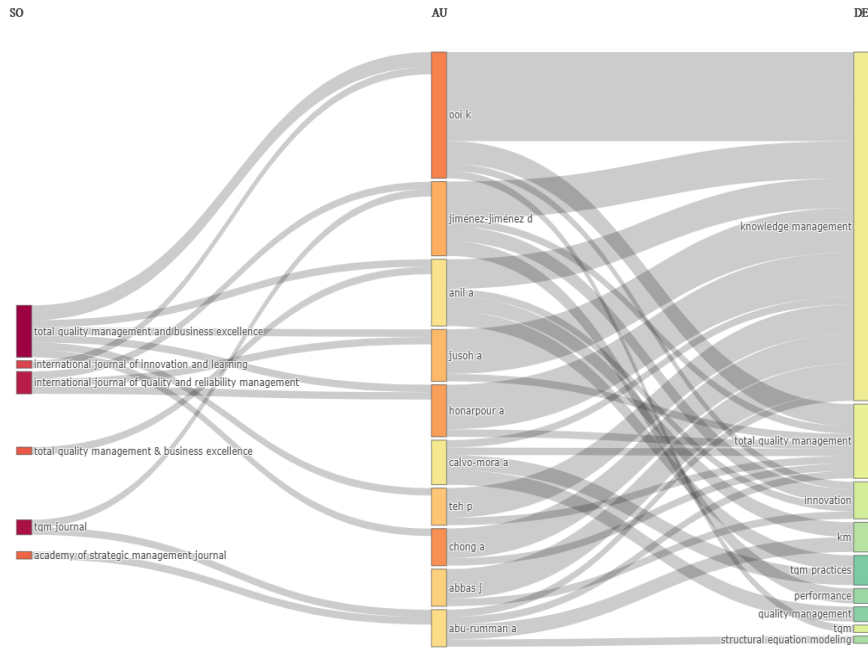


Fig. 3. Three Fields Plot

Furthermore, comparing the co-occurrence keywords network in Fig. 2 with the ones mentioned in Fig. 3, the complementarity of the analyses can be observed. In Fig. 3, the words ‘innovation’ and ‘TQM practices’ or ‘quality management practices’ appear as most cited after ‘knowledge management’ and ‘total quality management’. It indicates that within the area of KM and TQM there is a remarkable interest in the research for innovation and managerial practices. This relationship can be observed by the green cluster in Fig. 2, which shows a strand of TQM associated with KM in innovation processes and the synergistic effect that their relationship can have on these processes (Akgün et al. 2014; Hornarpour et al. 2012; Hung et al. 2010).

To analyze the trend of themes discussed in the sample, an analysis of thematic maps was also carried out. It examines density and centrality of topics, which were divided into 4 theme quadrants as shown in Fig. 4. These results were obtained by reviewing all keywords proposed by each paper of sample. Thematic map is a method of classifying keywords into four quadrants according to the strength of their development degree (density) and relevance degree (centrality) and it helps to extract more information about conceptual structure of the subject that has been investigated.

Motor themes refer to research field that is highly developed and able to influence others; Basic themes are associated to those topics that may influence other topics, but they are weakly internally established; Emerging topics are weakly developed or

emerging to be further developed; and lastly Niche quadrant includes especial topics amongst scholars (Oliveira, Carvalho and Reis, 2022). Those main clusters of Thematic Map are also represented on the keyword co-occurrence network.

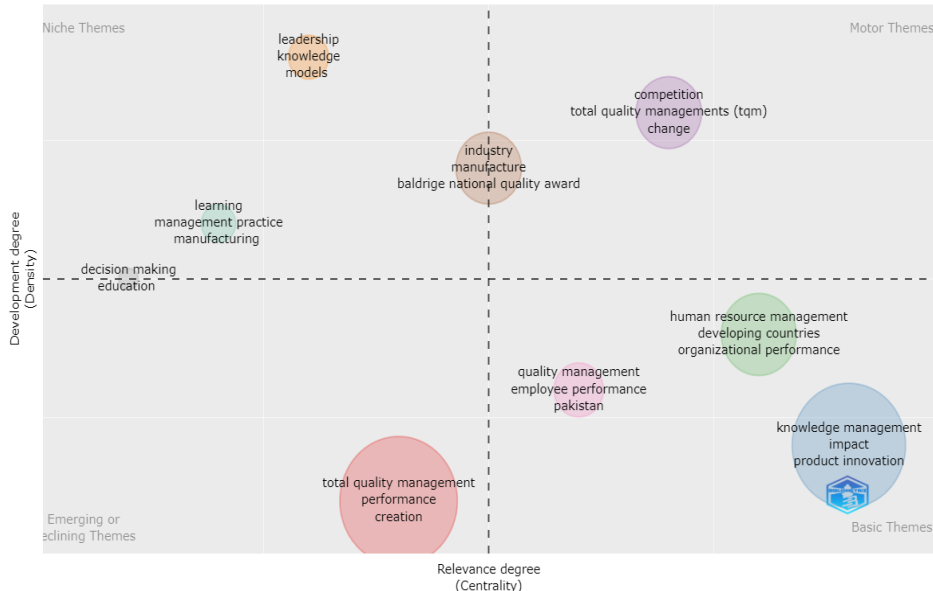


Fig. 4. Thematic Map

Motor Themes

As Motor Theme, we identified the cluster of competition and change, and it means that the literature has massively explored the relationship between quality management and KM as an important driver of change for organizations and to deal with increasingly fierce competition (Lin and Wei, 2004; Abbas, 2020). Ju et al. (2006) stated that to ensure sustainable competitiveness, an integration of TQM and KM can be one of the management approaches for many companies. According to Karami et al. (2021) TQM and KM play an important role in improving the situation of the organization, its long-term survival, as well as creating a competitive advantage for it. The authors studied the impacts of the TQM and KM on the companies of the pharmaceutical sector, and they stated that the impact on the performance caused by the integration of the two managerial philosophies is vital to that pharmaceutical companies.

For Ooi (2014), companies which incorporate both the important concepts of past TQM and existing KM into their business processes have an extra edge to outperform others and emerge as the market leaders. Therefore, the purple circle indicates that research with the theme of competition has gained attention and it has been a well-developed area inside the sample, which indicates that future studies that address the relationship between KM and TQM and their impact on competitive advantage may be interesting. However, it's also worth noting that most explored themes presented in



the upper right quadrant that presents the high relevance may suggest greater rigor and creativity for future publications.

Basic Themes

As Basic Themes, three clusters were identified: human resource management, product innovation and employee performance. The human resource sphere is intimately connected with the KM practices because the central role of KM is not information technology but human knowledge application. According to Hsu and Shen (2005), people play a critical role in acquiring, creating, and using knowledge. In view of this, KM and TQM are similar in many ways, because KM initiatives pursue individual quality in knowledge sharing and creation, organizational system quality for KM activity support supplier and customers' quality in continuously updating knowledge.

Despite of many articles exploring human resource management practices as relevant to KM and TQM activities (see: Ooi, The and Chong, 2009; Aboyassin, Alnsour and Alkloub, 2011; Ooi, 2014) discussing how much this relationship is favorable to innovation practices in organizations (Hung, Lien, Fang et al., 2010) those fields call for works to grow such discussion and add different perspectives.

Niche Themes

As Niche Themes, leadership and management practices and manufacturing compose two clusters. Some scholars currently agree that leadership plays an important role contributing to collaboration of quality management and KM (see: Ashraf, Lodhi and Farooq, 2014; Karami, Shirouyehzad and Asadpour, 2021). Gowen III et al. (2009) also support this idea by showing significant positive effects of transformational leadership and quality management on knowledge acquisition, dissemination, and responsiveness.

Furthermore, quality management practices such as continuous improvement aligned to organizational learning capabilities helps organizations to enhance superior operational performance (see: Linderman, Schroeder et al., 2004; Loke et al., 2012). Although Niche Themes are known as being extremely recognized between scholars due to high density, they do not influence other themes due to low centrality.

Emerging Themes

Lastly, themes with low values of density and centrality indicate they are weakly developed or emerging themes to be further developed. We identified a topic related to TQM and performance in a holistic way. Qasrawi, Almahamid and Qasrawi (2017) said that operational performance should be evaluated in addition to financial performance; it means that explore the performance of organizations in a generic way is not an opportunity that scholars must concentrate their efforts, but on the other hand, they could explore the thematic analyzing the impacts with related areas, such as operational performance. For instance, Abbas and Kumari (2021) studied the relationship between KM and TQM and how this nexus impacts operational and financial performance. The researchers found out that if a firm implements the TQM system in its true spirit, it can expect an effective KM system with an improved financial and operational performance. Nevertheless, these studies present results closely related to the

countries where they were developed. For future studies, it is recommended to broaden the spectrum by including other countries and sectors, because a wider target audience would improve the scope and reliability of the results.

5 Conclusion

In order to address the literature gap concerning the interdisciplinary aspects of TQM and KM, the present research aimed to identify and understand the intellectual structures that relate both managerial philosophies. The method used to reach the aim was the bibliometric analysis, through a descriptive and later a content analysis. Articles were extracted from the Web of Science Core Collection and Scopus databases. The final sample that served as the basis for the descriptive and content analysis was composed of 76 documents published between 1999 and 2021. Once the descriptive and content analyses were completed, it was observed that the objective of understanding the interdisciplinary aspects of TQM and KM was reached.

In the first part of this research, a descriptive analysis was carried out with the proposal to obtain an overview about the relationship between TQM and KM themes in the literature. It has been found that the subject is widespread in 53 academic journals, with emphasis on TQM and business excellence, showing that there are fields for research and publications. The association of TQM and KM was established as a consolidated research relationship since 2009, because after 2 years (2007 and 2008) without any article published in the sample, the number of publications showed a growing trend, culminating in 2021 with 10 publications. Another relevant aspect is the most cited documents. It should be noted that they were published before 2009 and are still references for academic research.

In the final part of the research, the content analysis of the sample documents selected, sought to map the main current topics discussed in the academic literature between quality management and KM. When categorizing the studies by keywords network, two thematic areas became evident regarding quality and knowledge management: innovation and managerial practices. To analyze the trend of themes discussed in the sample, an analysis of thematic maps was also carried out. It examines density and centrality of topics, which were divided into motor themes, basic themes, niche themes and emerging themes.

As Motor Theme, we identified the cluster of competition and change, and it means that the literature has massively explored the relationship between TQM and KM as an important driver of change for organizations and to deal with increasingly fierce competition. As Basic Themes, three clusters were identified: human resource management, product innovation and employee performance. As Niche Themes, leadership and management practices and manufacturing compose two clusters. Lastly, as Emerging Themes, we identified a topic related to TQM and performance in a holistic way.

This article contributes to the researchers of the area because through a literature review based on bibliometric and content analysis it was possible to qualify how TQM is approached in publications focused on the study of KM. However, as a limi-



tation, it is mentioned that the study has only an exploratory character, in which the descriptive analyses of the documents of the sample are liable to subjectivity. Given the limitation presented, further research is suggested to continue the conversation regarding the topic. In addition to applying a quantitative methodology, we suggest exploring the clusters identified to contribute to the debate regarding the topic, approaching it from different perspectives.

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