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► **To cite this version:**

Marina Zizakov, Stana Vasic, Milan Delic, Marko Orosnjak, Srdjan Vulcanovic. The Interdependencies of Quality Management, Knowledge Management and Innovation Performance. A Literature Review. IFIP International Conference on Advances in Production Management Systems (APMS), Aug 2020, Novi Sad, Serbia. pp.575-582, 10.1007/978-3-030-57993-7_65 . hal-03630876

HAL Id: hal-03630876

<https://inria.hal.science/hal-03630876v1>

Submitted on 5 Apr 2022

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The interdependencies of Quality Management, Knowledge Management and Innovation Performance. A literature review

Marina Zizakov¹[0000-0003-0519-197X], Stana Vasic²[0000-0001-8176-8422], Milan Delic³[0000-0002-3307-8942], Marko Orosnjak⁴[0000-0003-0929-1425], Srdjan Vulcanovic⁵[0000-0002-0527-505X]

^{1, 2, 3, 4, 5} University of Novi Sad, Faculty of Technical Sciences, 21 000 Novi Sad, Serbia
vasic.stana@uns.ac.rs

Abstract. Quality management should represent one of the most common approaches to improving quality and innovation performance. Still, it is shown that this is not always the case. To find the real cause of the contradictory results, a literature review was conducted. Some authors propose that knowledge management might present the missing link between quality management and innovation performance. Therefore, in this research, the importance of knowledge management will be considered, as a key mediator between quality management on innovation performance. Thus, this paper aims to provide answers to: "What does quality management need to provide, to support innovation performance?", "How does knowledge management contribute to innovation performance?" and "How does knowledge management mediate the relationship between quality management and innovation performance?". Knowledge management provides benefits for innovation performance, under certain organizational conditions and mechanisms. The lack of proper knowledge management among employees can be the cause of shortcomings in the relation between quality management and innovation performance.

Keywords: Quality management; Knowledge management; Innovation performance.

1 Introduction and theoretical background

In the last two decades, quality management has been one of the most common approaches for improving quality and innovation performance [1]. Further, quality management is perceived as a philosophy that strives for continuous organizational improvement. Quality management can include establishing quality policies and quality objectives, and processes, to achieve these quality objectives through quality planning, quality assurance, quality control, and quality improvement [2]. Accordingly, organizations with a higher level of quality management maturity may benefit from: higher product/service quality, increased customer and employee satisfaction, lowered costs, as well as improved financial and innovation performance. This implies that a high level of maturity in quality culture may foster positive effects on the organizational

competitive advantage and innovational capabilities [3]. Moreover, it encourages the conquest of new and existing markets [4].

However, some studies claim the opposite. Namely, quality management does not always produce the expected results. Such findings contradict previously mentioned theoretical bases [5], [6], [7], [8], [9], [10]. Hence, it could be argued that power of quality management, in creating an adequate environment and culture of supporting innovations, is still a subject of debate by many authors [7], [9], [11], [12].

Subsequently, it is necessary to find a real cause of such contradictions, and, accordingly, to explore certain fostering organizational aspects, which should contribute to the positive impact of quality management on the innovation performance. Some authors propose that knowledge management might present the missing link between these two [1], [3], [13], [14], [15].

The ISO 9001: 2015 puts a great emphasis on learning. Consequently, the organization should identify needs and trends and accordingly constantly improve the competence of employees [16]. By involving employees in the improvement of the work process, assigning responsibilities and providing opportunities for training, positive effect on motivation, awareness and attitudes towards changes is created [14], [17], [18], [19]. Therefore, in this research, the importance of knowledge management will be considered, as a key mediator of a positive influence between quality management and innovation performance.

Knowledge management is the systematic management of an organization's knowledge assets to create value and meet tactical and strategic requirements [1], [14], [15], [20], [21]. Knowledge management could influence the adequate application of knowledge in processes, development of employee awareness, and quality culture [1], [15], [20], [22]. Accordingly, many researchers have concluded that knowledge management should encourage the maintenance of existing and new knowledge, and, thus, contribute to the innovation performance, overall [1], [14], [15], [19], [20]. Innovation performance could be defined by new ideas or creativity to improve the products, processes, procedures that increase the significance, usefulness and performance of the products, services and process [14], [15], [23].

The question is, "What does quality management need to provide, to support innovation performance?" Further, it is also necessary to determine "How does knowledge management contribute to innovation performance?" and "How does knowledge management mediate the relationship between quality management and innovation performance?".

2 Methodology

The research methodology in this paper builds upon a Systematic literature review (SLR).

Firstly, the research questions were defined, according to the previously mentioned theoretical assumptions. These are:

- RQ1: "What does quality management need to provide, to support innovation performance?"
- RQ2: "How does knowledge management contribute to innovation performance?"

- RQ3: "How does knowledge management mediate the relationship between quality management and innovation performance?"

After that, we need to define research keywords in accordance with research questions. The keywords are defined as follows:

"QUALITY MANAGEMENT" OR "QUALITY MANAGEMENT SYSTEM" OR "*QM" OR "TOTAL QUALITY MANAGEMENT" OR "ISO 9001" AND "KNOWLEDGE MANAGEMENT" AND "INNOVATION" OR "INNOVATION PERFORMANCE"

These keywords were used to define search queries, within SCOPUS indexed database. The query has returned 108 papers.

To get more accurate results, the search query was refined. The first phase of the search was performed on titles, abstracts and keywords, to above-mentioned "inclusion criteria" (Table 1). The re-definition of search results has returned 42 papers, in total.

Then, papers were assessed by their title, abstract and their content. Some papers were found to be non-related to our scope of review. Thus, they were removed from further analysis. (i.e. "Non-related criteria" - Table 1.) Finally, based on NR exclusion criteria (Table 1.), out of 42, 20 papers were retained.

In the second phase, the authors removed seven more papers. The reason that papers were excluded from the further analysis is that they were not technically available through portals and index databases, as well as accessible for downloads. In overall, 13 papers were subdued for detail analysis.

Further, considering the forward and backward citation criteria, a total sum of 17 articles were added, increasing our final list of papers to 30.

Table 1. Inclusion and exclusion criteria

I/E Criteria	Sub-criteria	Criteria Explanation
Inclusion criteria	Full-text papers (FTP)	Selected studies that are only abstracts, presentations or posters will not be included in the study.
	Language (LAN)	Full text of the article must be written in English.
	Time frame (TF)	Selected studies must be published between 2010-2020 to be included in the SLR
	Selected studies (SS)	Studies included journal articles, conference papers
Exclusion criteria	Subject area (SA)	"Engineering", "Business, Management and Accounting", "Decision Sciences", "Social Sciences"
	Non-related (NR)	NR1: Paper is not related to manufacturing organizations.
		NR2: Paper relates to health care organizations, biotechnology, pharmacy, hospital industry or aerospace industry.
NR3: Paper relates to university and government.		

3 Results and discussion

The results of the literature review are presented in this section. Regarding the type of analyzed papers, there are 25 academic journals (83%) and only 5 conference papers (17%), of which 23 are based on empirical research (questionnaire/interview/survey) (72%), and 9 on literature review and research framework (28%). The papers are mostly from 2010 (20%), 2017 (23%) and 2019 (23%), and slightly less from 2011 (7%), 2012 (10%), 2015 (4%), 2016 (9%) and 2018 (4%). The research originates mainly from Asia (52%), Europe (24%), Africa (10%), America (9%) and Australia (5%) and was conducted in the manufacturing industry. Only two papers come from Serbia and the wider region in a transitional economy.

The greatest focus of the literature review was on the identification of constructs, by which the examined factors were operationalized, and on the nature of the relationship between these factors (Table 2). Summarizing the results, we conclude that the factors of QM with the highest frequency are: customer focus (16), leadership (14), employee management (12), and process approach (10). Factors with slightly lower frequency are: continuous improvement (8), supplier management (7), learning (7), strategic and systematic approach (5), teamwork and quality chain (4), effective communications (and culture) (4), information (measurement) and analysis (4). In the case of knowledge management, factors that stand out the most are: knowledge application (6), knowledge dissemination (6), and knowledge acquisition (5), whereas knowledge transfer/sharing (4), knowledge creation (3), and knowledge storage (2) are factors with slightly lower frequency. While, for innovation performance, the factors are product and service innovation (6), and process innovation (6).

Based on this, the proposed research framework is presented in Fig. 1.

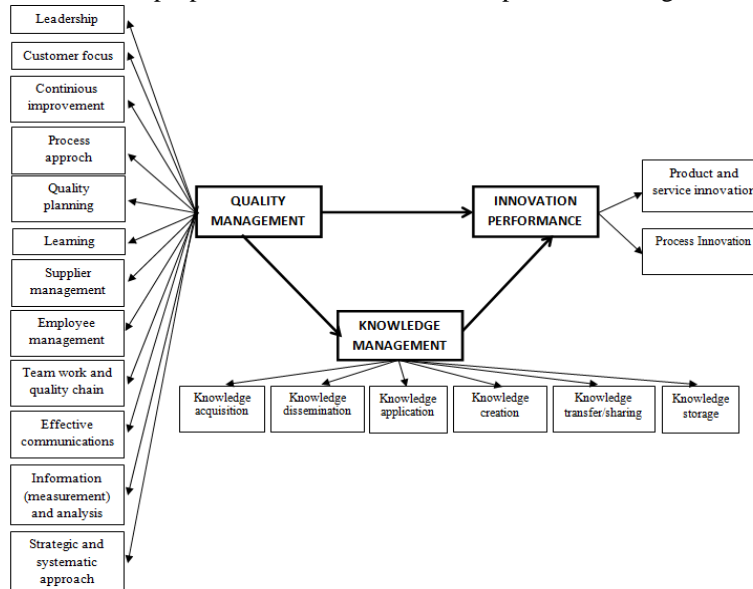


Fig. 1. The proposed research framework

When it comes to the relationship between factors, the vast majority of studies examine relationships between quality management and innovation performance. This is shown in Table 2. The nature of relationships between used constructs in these studies is also given (i.e. positive (+)/negative (-)/both (+/-)). The table includes papers in which knowledge management represents a mediating connection between quality management and innovation performance and five of these mediating effects are positive.

Table 2. The nature of relationships between quality management, knowledge management, innovation performance (+ positive, - negative, +- both)

	(Total) Quality management	Knowledge management	Innovation Performance
(Total) Quality management		14(+)	22(+), 1(-), 5(+/-)
Knowledge management	8(+)		18(+)
Innovation performance	2(+)		

Based on the literature review, it could be argued that, in most cases, quality management produces positive results on innovation performance, with the strong positive mediator influence of knowledge management. Also, the majority of shortcomings in a strong positive mediator relationship between quality management and innovation performance are related to the lack of human awareness and knowledge in quality culture (i.e. 5(+/-)) [1], [8], [10], [12], [13], [14], [15], [18], [20], [23], [24].

3.1 Answer to RQ1: "What does quality management need to provide, to support innovation performance?"

Quality management should create a work environment that fosters creativity, motivates employees to be innovative thinkers and take risks, thus, enhancing innovation performance [14], [18]. Leadership has primary responsibility for developing adequate climate, by setting innovational goals, on all organizational levels. Leadership must provide the necessary resources and establish an atmosphere of trust, teamwork, empowerment and people management. The autonomy of decisions and the idea of sharing knowledge among employees should lead to innovation [1], [7], [13], [14], [18], [25]. For achieving this, a higher level of employee awareness is necessary, where knowledge management plays a predominant role. This brings to the forefront the importance of learning climate among employees. Learning is a key factor in creating innovations and developing awareness [26]. Thus, employees must continually acquire new knowledge and share it among themselves. Subsequently, the acquisition of knowledge may lead to the development of an adequate quality culture [1].

3.2 Answer to RQ2: "How does knowledge management contribute to innovation performance?"

Through the papers of the literature review, results show a positive relationship between knowledge management and innovation performance (Table 2.) Knowledge manage-

ment can significantly contribute to the development of innovation performance, if organizations have the capacity to acquire, develop and share knowledge [14]. Acquiring knowledge from inside and outside of the organization leads to knowledge modification of employees, and increasing creating values, including new product development and innovation performance enhancement [12], [15], [20], [27].

3.3 Answer to RQ3: "How does knowledge management mediate the relationship between quality management and innovation performance?"

Some authors recognize quality management to be a precursor of knowledge management, while others claim the opposite [15], [27]. Nevertheless, in both cases, they should have a positive impact on innovation performance [1], [3], [15], [20], [22], [27]. By implementing quality management, besides internal organizational benefits, organizations are also encouraged to improve relationships with suppliers and customers, which, eventually, leads to the development of organizational innovations [28]. To achieve the expected results, they must acquire as much knowledge as possible about the needs and expectations of stakeholders, and, also, develop strong ties with them. This is where knowledge management has a predominant role. Also, to respond to users' needs and expectations on time, they need to expand their existing knowledge [29]. This underlines the purpose of knowledge management as well, and, at the same time, a contribution to innovations are, clearly evident. Moreover, many authors found that quality management practices facilitate the creation and expansion of knowledge within an organization [15], [17], [18], [19], [30].

One of the basic principles of quality management is learning, employee involvement and teamwork. It is believed that through the application of knowledge management and quality management, simultaneously, companies can improve both innovation and efficiency. Consequently, the implementation of quality management should increase organizational efficiency and reduce costs [31], [32], [33]. In conclusion, organizations aiming to improve innovation performance should work on achieving the synergistic effect between knowledge and quality management.

4 Conclusion

We conclude the following, if the leadership is fully committed to quality management, involves employees and encourages them to acquire and create knowledge, transfer / share and storage knowledge through various trainings and motivations, in this case, quality management benefits innovation performance through knowledge management. Also, the shortcomings of the relationship between quality management and innovation performance are mostly caused by the lack of proper knowledge management among employees.

The main limitation of this study is the use of one database – Scopus. This leaves space for further research in other literature sources. More to say, there are only two studies on this subject, that were carried out in a transitional economy of Serbia and the wider region. Thus, future empirical research is planned to be conducted in this region. The lack of research data implies the need for further work, in resolving shortcomings of quality management, especially in relation to innovation performance.

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