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**A study into the themes of Quality Management: early findings from a global research project and agenda for future research**

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# A study into the themes of Quality Management: early findings from a global research project and agenda for future research

## Abstract

**Purpose:** Quality Management (QM) plays a pivotal role in driving organizational efforts to enhance operational efficiency and customer satisfaction. This study aims to explore the most important themes in QM over the past three decades, identifying and analysing the top ten key themes that have shaped the field during this period. This study, involving leading academics and industry practitioners, lays the groundwork for a three-to-four-year exploration of the most influential QM themes worldwide.

**Method:** The authors conducted a comprehensive review of QM literature over the last three decades from top specialist journals on QM. This is followed by conducting a global pilot survey with leading academics and practitioners to pinpoint the top ten dominant themes of QM for organizations to leverage in gaining and maintaining a competitive edge.

**Key findings:** The top ten themes of QM, as identified by authors through input from academics and practitioners worldwide, offer valuable insights for companies of all sizes and sectors. These themes serve as a guide for the successful and sustainable implementation of QM practices and continuous improvement strategies.

**Limitations:** Despite a limited sample size, the initial findings provide a glimpse into critical themes. Over the next three years, as the study progresses, we anticipate potential changes in the results. Notably, the comparison of themes between manufacturing and services, as well as large and small enterprises, remains unexplored in the current investigation.

**Originality/Value:** The authors of this study assert that their research will pave the way for future themes in the digitalization era. Moreover, this research stands out as one of the most exhaustive examinations from both academic and practitioner viewpoints, offering a unique perspective not commonly found in existing literature.

**Keywords:** Quality Management; digitalization; Global research; Pilot survey

## 1.0 Introduction:

Quality Management (QM) plays a pivotal role in driving organizational efforts to enhance operational efficiency and customer satisfaction (Antony, Bhat et al., 2023). Over the past three

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3 decades, the focus of QM has evolved from mere compliance to embracing continuous  
4 improvement methodologies such as Total Quality Management (TQM), Six Sigma, and Lean  
5 practices (Antony et al., 2002a). Research indicates that these approaches have significantly  
6 boosted organizational performance across various industries (Benner and Tushman, 2015).  
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11 QM is essential for organisations to preserve and improve their competitive advantage.  
12 Organisations may gain a competitive edge by applying QM methods to enhance efficiency,  
13 deliver higher value to consumers, and improve quality performance (Ferdousi et al., 2019).  
14 An organisation may differentiate itself from competitors by utilising a dynamically driven  
15 QM system as a unique selling point (Els & Meyer, 2023). Robust Quality Management  
16 Systems (QMS) are crucial for maintaining an uninterrupted supply of top-notch products and  
17 services, which in turn enhances long-term competitiveness (De Melo et al., 2020).  
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26 QM's focus has expanded to encompass not just product quality but also larger areas, including  
27 environmental, health, and safety management systems. Researchers have studied how quality,  
28 environmental, and health and safety management systems may be integrated, highlighting  
29 both benefits and challenges in various industries (Santos et al., 2021). This transition to  
30 integrated management systems indicates a more comprehensive approach to QM. In recent  
31 years, organisations have faced increasing pressure to prioritise sustainability and  
32 accountability (Antony, Bhat, et al., 2024a). Organisations are now required to adhere to  
33 globally accepted criteria and transparently convey their environmental, ethical, and  
34 sustainability efforts (Santos et al., 2021). This focus on sustainability is in line with the  
35 evolving expectations of stakeholders and the broader social emphasis on ethical business  
36 practices (Antony, Bhat, et al., 2023).  
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46 Digital technology has brought forth a new era of QM, referred to as Quality 4.0 (Q4.0), in  
47 recent years (Chiarini & Kumar, 2022). This approach combines conventional QM concepts  
48 with modern digital technologies like the Internet of Things (IoT), big data analytics, and  
49 Artificial Intelligence (AI), revolutionising the management of quality in contemporary  
50 organisations (Antony *et al.*, 2022a; Kumar *et al.*, 2020). Digital technologies are being used  
51 in QM to boost operational efficiency, improve quality control procedures, and stimulate  
52 creativity (Elg et al., 2021). Also, organisations are using digital technologies to optimise QM  
53 procedures and adhere to standards (Antony et al., 2022b). Moreover, organisations may  
54 enhance transparency, real-time monitoring, and predictive quality control by using  
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3 digitalization in QM, resulting in enhanced performance and competitiveness in the dynamic  
4 business environment (Elg et al., 2021). Despite extensive scholarly attention, comprehensive  
5 insights into how QM themes have transitioned from past to present and what future trends are  
6 emerging remain sparse.  
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11 It is essential to comprehend the development of QM themes throughout time to predict future  
12 trends and issues in the discipline. Shifting towards integrating digital technology into QM  
13 procedures poses problems and possibilities (Antony, Kaul, et al., 2023). Thus, this research  
14 intends to investigate the development of QM themes over the past thirty years by utilising  
15 information obtained from a global survey of QM practitioners in different industries.  
16 Moreover, this is a global study to be carried out over the next 3 to 4 years by a team of research  
17 scholars from different parts of the world. This study delves into enduring and evolving themes  
18 in QM with a forward-looking approach to anticipate future shifts that could reshape the  
19 landscape. More specifically, the research is intended to answer the following research  
20 questions (RQ).  
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30 ***RQ1:** What have been the most important themes in QM over the past three decades?*

31 ***RQ2:** What are the top ten QM themes in the past three decades?*  
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36 The unique contribution of this research lies in its direct engagement with QM professionals  
37 whose experiences and insights provide a practical perspective on theoretical and strategic  
38 evolutions in QM. By documenting these transitions and projecting future developments, this  
39 study aspires to construct a dynamic framework for QM that supports ongoing adaptation and  
40 innovation in response to an increasingly complex business environment. The layout of the  
41 paper is as follows: Section 2 presents a literature review on QM themes derived from the  
42 literature; Section 3 details the research methodology used in this study; Section 4 reports the  
43 analysis and discussion of key findings. Finally, Section 5 highlights the conclusions,  
44 managerial implications, limitations, and suggestions for further research.  
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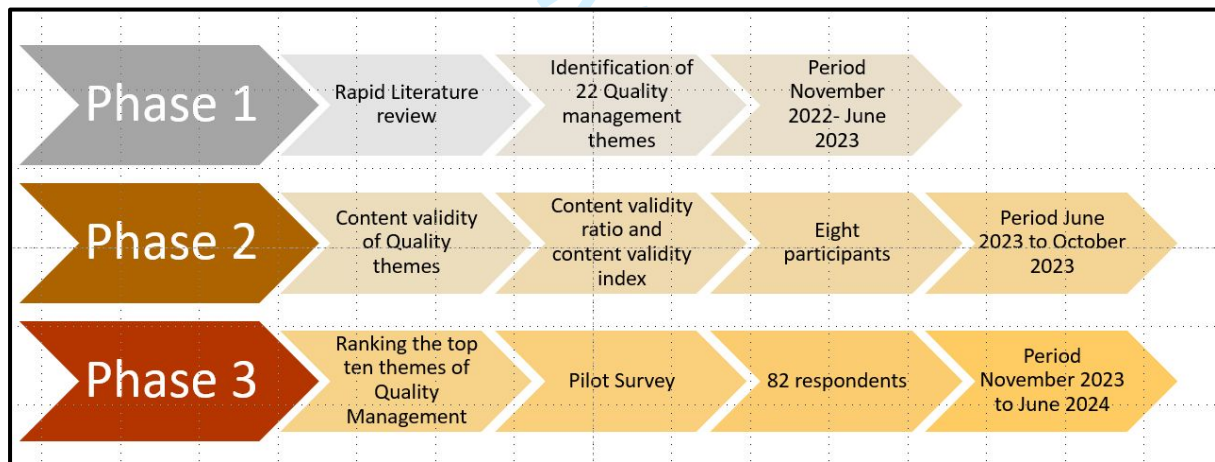
## 53 **2.0 Literature Review**

54 An extensive review of the QM literature revealed that QM has experienced significant growth  
55 in various dimensions over the years. In this literature, we highlight how we have, through the  
56 extensive study of literature, been able to establish the 22 themes for analysis by experts. Many  
57 authors have focussed on different aspects over the years. Oakland (2011) highlighted the top  
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management commitment and leadership in their discussion and highlighted that the role of leadership is important in enhancing the commitment to achieve quality. Further, the details about how the measurement of the quality of processes takes place were discussed by (Malik & Blumenfeld, 2012). They highlighted the ways and means by which continuous improvements can take place. Another important aspect that has emerged is the discussion on the training and education of employees in the organizations. (Kassicieh & Yourstone, 1998) highlighted how training is important for the QM field. (González-Benito et al., 2003) discussed that suppliers of the supply chain have a major role in achieving quality specifications for all products and services. This leads to the concept discussion of how quality aspects are embedded in the supply chain. In Table 1 (Refer to Appendix 1), we have tried to summarize the details of the 22 themes that have been identified with their description.

### 3.0 Research Methodology

This study underwent various phases to guarantee a thorough exploration and validation of QM themes, as depicted in Figure 1.



**Figure 1:** Three phases of the study (Source: Authors' own creation)

In phase 1, a literature review was carried out to uncover and review 22 QM themes. The research adopted the Rapid Literature Review (RLR). It is a streamlined approach to synthesizing existing research that prioritizes speed and efficiency, making it particularly useful in urgent contexts such as public health emergencies or policy-making (Tricco et al., 2015). RLRs typically involve a systematic yet abbreviated process, allowing researchers to quickly assess and summarize the available evidence on a specific topic, which can inform immediate decisions and actions (Haby et al., 2016; Kelly et al., 2016). The RLR is suitable

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3 for this research as it allows for the quick synthesis of key QM themes over the past  
4 three decades, ensuring timely and relevant insights. Since this approach provides a balance  
5 between comprehensiveness and efficiency, it is ideal for addressing the evolving nature of  
6 QM within a manageable timeframe (Khangura et al., 2012). Based on this methodology,  
7 the research articles were derived from the Scopus database through quality specialist  
8 journals such as the International Journal of Quality and Reliability Management, The  
9 TQM Journal, The TQM and Business Excellence Journal, Quality Management Journal,  
10 Managing Service Quality (now called Journal of Service Theory and Practice and  
11 International Journal of Quality and Service Sciences.

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20 We initially carried out a search from the beginning of when the concept of themes came about,  
21 from the early 1990s till the present day, 2024. Further, it must be highlighted that the five  
22 journals that are considered to evaluate the themes of QM are those that are predominantly  
23 published in the area of QM. Those that consider the broader perspective of operations  
24 management are omitted in the current study. The scope of journals would be extended in future  
25 studies. The articles that were identified from these journals were 100+ in order to highlight all  
26 the themes of QM. Once the themes were laid out on an Excel Sheet, the research team  
27 reviewed the themes from all sources, and duplicate themes were removed. In addition, themes  
28 that have appeared merely once have been omitted from the analysis. After two iterations with  
29 the global research team members, it was decided to use 22 themes of QM for the next stage  
30 of the research. The overall aim of the research at this stage is to identify the most important  
31 themes of QM for organisations to create and sustain competitive advantage.

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42 In phase 2, these themes were further subjected to preliminary analysis by all the authors to  
43 improve the validity of the themes. Face validity of the theme was done by each of the  
44 researchers. Face validity is about whether a test appears to measure what it is supposed to  
45 measure. It can give participants and researchers alike confidence that the results of the  
46 assessment are fair and equitable (Johnson, 2021). The team leader asked each global scholar  
47 to rate how relevant and important each theme of QM was to be considered for the next stage.  
48 The authors also calculated the content validity ratio of each of the themes. To measure this,  
49 each author rated each theme using a three-point scale not necessarily useful but not essential  
50 and essential. Further, we calculated the content validity ratio (CVR) using Lawshe's Method  
51 (Lawshe, 1975). This method is a linear transformation of a proportional level of agreement on  
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4 how many "experts" within a panel rate an item "essential". We used the equation  $CVR = \frac{n_e - \frac{N}{2}}{\frac{N}{2}}$ .

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6 Where  $n_e$  is the total number of members indicating essential, and  $N$  is the total number of  
7 raters. The CVR for all the themes was found to be greater than 0.95, far above the minimum  
8 acceptable level (Ayre & Scally, 2014; Lawshe, 1975). Polit et al. (2007) state that items with  
9 a CVR of 0.78 or higher with three experts or more experts can be considered good evidence  
10 of good content validity. Further, it should be clarified that the CVR tells us about the validity  
11 of individual items. If we want to know the content validity of the entire instrument or tool, we  
12 can calculate a Content Validity index (CVI)(Gilbert & Prion, 2016). The CVI is simply the  
13 mean of the CVR values for all items meeting the CVR threshold of 0.78 and retained for the  
14 final instrument(Gilbert & Prion, 2016). Davis (1992) suggests that a CVI exceeding 0.80 is  
15 preferred. The CVI of the tool was found to be 0.812 and was found to be acceptable. Hence,  
16 all the 22 themes were considered for the next phase.  
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27 In Phase 3 of the study, the focus shifted towards ranking the top ten themes of QM through a  
28 meticulously designed survey. This phase aimed to gather insights from a targeted group of  
29 respondents comprising seasoned professionals and esteemed academics deeply entrenched in  
30 the realm of QM. A purposive sampling strategy was employed to ensure the representation of  
31 experienced professionals with a minimum of 5 years in the industry on QM-related topics  
32 alongside academics with a distinguished record of publishing in the field. The survey  
33 questionnaire was sent to 125 quality professionals who were Vice Presidents of Quality,  
34 Quality Directors, and Senior Quality Managers. As the authors adopted a purposive sampling  
35 strategy for data collection, it was important to make sure that the respondents have a minimum  
36 of 5 years' experience in their role (Saunders et al., 2009). We also targeted leading academics  
37 who have published at least five peer-reviewed papers in top-tier journals in the field of QM.  
38 The data on industry professionals was obtained from LinkedIn, a popular networking  
39 site(Power, 2015), and data on academicians was obtained from google scholar. We received  
40 89 responses. Out of which, seven were incomplete and hence discarded. The final sample size  
41 was 82 for further analysis, and this sample size is adequate for setting the foundation of the  
42 research. (Antony et al., 2007, 2019; Bhat et al., 2022). The sample demographics are given in  
43 Table 1.  
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Table 1: Sample demographics (Source: Authors' own creation)

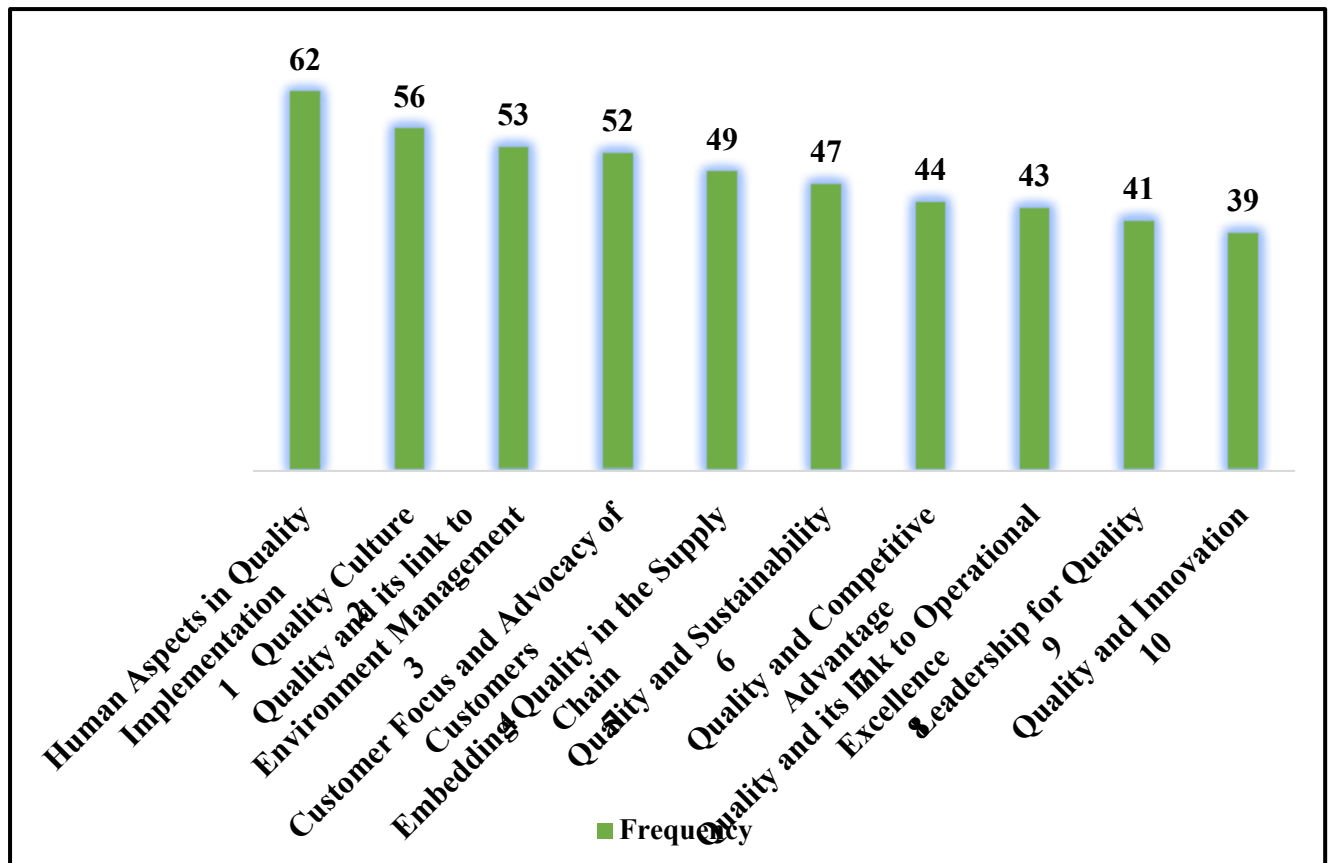
<b>Continent</b>	<b>Frequency</b>	<b>Percent</b>
Africa	1	1%
Asia	23	28%
Australia	3	4%
Europe	16	20%
North America	5	6%
South America	34	41%
Grand Total	82	100%
<b>Sector</b>		
<b>Sector</b>	<b>Frequency</b>	<b>Percent</b>
Manufacturing	44	54%
Public	19	23%
Service	19	23%
Grand Total	82	100%
<b>Type</b>		
<b>Type</b>	<b>Frequency</b>	<b>Percent</b>
Academic	20	24%
Industry	62	76%
Grand Total	82	100%

## 4.0 Analysis and Discussion of Key Findings

### 4.1 Descriptive Analysis

In order to unearth the top ten themes of QM, we used frequency analysis. The top ten themes of QM unearthed in this study are explicated in Figure 2.





**Figure 2:** Frequency analysis of top ten QM themes (Source: Authors' own creation)

## Quality Management Themes

### Theme 1: Quality and competitive advantage

In the theory of competitive advantage, two models, namely the market-based model and the resource-based model, have been suggested. The market-based model focuses on cost and differentiation and is based on external factors. The resource-based model is focused on internal factors. Through these resources, firms can provide operational superiority or help create a superior market position (Conner, 1991; Porter, 1980, 1985). The basis of competitive advantage is that competitors cannot imitate the resources (Barney, 1991). TQM, on the other hand, is defined as a business-level strategy that involves various content and processes (Reed et al., 1996). Many seminal works (Deming, 1982; Juran, 1985) suggest that the customer is the one who defines quality. Satisfaction with customers leads to an improved competitive position in the market. As we align the theory of competitive advantage and QM, it can be established that both have conceptually similar objectives. Developing content for the market and continuously improving the processes, principles, tools, and frameworks of QM can lead to superior process and product quality and, subsequently, a competitive advantage over the competitors.

## **Theme 2: Customer Centricity and Advocacy of Customers**

Historically, companies used a push strategy to market products. With the passage of time, the focus has become relationship marketing and emphasizing customer centricity. As customer choice grew, it became difficult to maintain effectiveness. A key strategy is transparency across processes and even recommending competitor products if they meet customer needs better. This type of customer advocacy builds loyalty and trust in the company (Urban, 2005a), further leading customers to recommend the company to their peers (Roy, 2013a). Due to advanced technologies and complex demands, organizations have had to adopt a customer-centric strategy to maintain a competitive edge and achieve a good quality output that can meet and exceed customer expectations (Risch Rodie & Martin, 2001; Yasin et al., 2004).

## **Theme 3: Quality and its link to Operational Excellence (OPEX)**

Quality is defined by various quality gurus differently. The common thread among these definitions of quality is the focus on meeting or exceeding customer requirements or expectations. OPEX, on the other hand, is the effective and consistent execution of a business strategy, surpassing competitors in reliability and consistency (A. Carvalho et al., 2017). OPEX goes beyond the traditional model of isolated improvements and instead fosters a long-term cultural shift within an organization (Rodgers & Antony, 2023). Companies striving for OPEX are characterized by two key elements: (i) a systematic approach to managing business and operational processes and (ii) the cultivation of an organizational culture that actively supports continuous improvement initiatives ( Tortorella et al., 2022). OPEX is also marked by an integrated performance across revenue, cost, and risk, prioritizing customer satisfaction through ongoing enhancements to operational processes and organizational culture (Gólcher-Barguil et al., 2019). Quality and OPEX are closely linked concepts that play a crucial role in the success of any organization (M. Kumar & Antony, 2008). Quality and OPEX have a symbiotic relationship with each other. Organizations that are committed to sustaining an OPEX initiative will always have a higher probability of delivering high-quality products or services to their customers. This means having efficient and effective processes in place to ensure world-class quality outputs through OPEX methodologies such as Lean and Six Sigma. (Found et al., 2018).

#### **Theme 4: Embedding Quality in the Supply Chain**

In recent years, quality issues have grown beyond product management to encompass supply chain management. Consequently, research on quality has evolved from internal product QM to encompass total QM across the supply chain, both upstream and downstream (W. Liu et al., 2023). Companies must now consider the entire supply chain when it comes to QM, as the quality of inputs and processes at each stage of the supply chain can directly impact the quality of the final product or service delivered by the respective OEMs. In order to maintain quality in the supply chain, organizations need to choose different management mechanisms for different supply chain stakeholders based on their relationships. These are based on factors such as information asymmetry, goal conflict, risk aversion of suppliers, length of relationship, and task characteristics (Zu & Kaynak, 2012). Another paradigmatic shift is the change in focus of organizations from cradle-to-gate or grave philosophy to cradle-to-cradle for the recovery of resources, recycling, and reuse. This warrants an organizational supply chain to maintain quality in resource recovery, recycling, and reuse so that organizations can reduce waste, minimize their environmental impact, and create more sustainable products and services (Batista et al., 2023). Thus, for organizations, the improvement of supply chain quality can result in long-term competitive advantage.

#### **Theme 5: Quality and Its link to Environment Management**

There exists a commonality between environmental and QM initiatives in organizations focusing on resource efficiency to reduce pollution, as noted in the quality revolution of the 1980s (M. E. Porter & Linde, 1995). TQM positively impacts corporate sustainability, including environmental, social, and economic aspects (Abbas, 2020b). Manufacturers adopt environmental strategies through quality initiatives like ISO 14001, cleaner production, green supply chain management, circular economy, and green lean practices (Garza-Reyes et al., 2017). Environmental sustainability was notably influenced by Lean Manufacturing Practices as well as TQM practices (Jum'a et al., 2023). Also, restructuring the supply chain in accordance with TQM principles helps attain environmental sustainability goals (Ho et al., 2022).

Product Q 4.0 leverages advanced materials and resource-efficient manufacturing, with Industry 4.0 and Q 4.0 integration optimizing processes, reducing waste, and improving energy efficiency (Ching et al., 2021). Empirical evidence shows companies gain performance advantages, including cost reduction, increased flexibility, and improved delivery, by

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3 combining environmental management practices with quality investments  
4 (Wiengarten&Pagell, 2012). Decision-makers should foster a culture supporting quality and  
5 lean practices to maintain environmental sustainability (Jum'a et al., 2023). These insights  
6 highlight the need for further research on applying QM practices and tools to meet  
7 environmental sustainability goals outlined by international frameworks like the Sustainable  
8 Development Goals and the European Green Deal.  
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### 15 **Theme 6: Human Aspects in QM**

16 QM is a holistic philosophy emphasizing continuous improvement across all organizational  
17 functions, involving both technical and human elements such as clients, vendors, staff, and  
18 supervisors (Haffar et al., 2019). Human aspects of QM are vital because they are hard for  
19 competitors to replicate, requiring an integrative approach for effective implementation. These  
20 practices contribute significantly to an organization's vision, employee involvement, and  
21 commitment to QM (Agar, 2019; Brunetti et al., 2020).  
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29 Organizations must prepare and empower employees for the Fourth Industrial Revolution,  
30 recognizing human investment as a crucial asset (Gutierrez-Gutierrez et al., 2018a). Learning  
31 Organizations benefit from training employees in problem-solving, with QM managers  
32 fostering motivation, experimentation, intellectual stimulation, and dialogue (Balouei  
33 Jamkhaneh et al., 2022a). Empowerment enhances communication and growth, which is  
34 essential for evolving human-machine interactions in the era of digitalization or Industry 4.0.  
35 This revolution demands adjustments in workforce organization, commitment, and job  
36 satisfaction due to innovations like big data analytics and robotic production (di nardo et al.,  
37 2020). Human resource activities must adapt to Industry 4.0, requiring preparation for digital  
38 advancements (Sivathanu & Pillai, 2018).  
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48 Establishing a smart society through the integration of smart industry (Industry 4.0) and smart  
49 quality (Q 4.0) is a key trend of the twenty-first century. However, there is an integration  
50 problem involving human beings as well as issues with sustainability, resilience, and quality  
51 of life, among other things. Happiness or quality of life is a major human factor when  
52 implementing QM practices (Kanazawa & Li, 2015). This is a crucial element of the Quality  
53 5.0 concept. Industry 5.0 and Quality 5.0 are related to how well workers comprehend, apply,  
54 and integrate cutting-edge technologies (Arsovski, 2023; Nahavandi, 2019). Thus, training  
55 employees is essential to prospering in Industry 5.0, closing the skills gap, and fostering  
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3 company expansion (Forum, 2016). Therefore, examining how these human-related QM  
4 practices align with current organizational initiatives is necessary.  
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### 8 **Theme 7: Quality and Culture**

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10 National Culture, defined by Hofstede (1998) as "mental coding," is experienced by every  
11 member of a society, organization, or group, enabling coherent action. Hofstede (1998) sees  
12 culture as attributes or behaviours manifested through symbols, heroes, values, and rituals  
13 (Hofstede & Hofstede, 2005; Alkailani et al., 2012). Edgar H. Schein describes organizational  
14 culture as "a pattern of shared basic assumptions" learned as a group solves its problems of  
15 external adaptation and internal integration, which are then taught to new members (Brahm &  
16 Poblete, 2024; Schein, 1996). Groups evolve by integrating individuals and adapting to the  
17 external environment, engaging in collective learning that creates shared assumptions and  
18 beliefs.  
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27 Quality, according to Sashkin & Sashkin (1993), is an organization's culture that supports  
28 constant customer satisfaction through tools, techniques, and training. Sternberg (1999)  
29 attributed the development of quality as a cultural attribute to the Japanese evolving into a  
30 belief system. Garvin (1988) identified shifts in organizational values and ideologies  
31 concerning quality, labeling them as "inspection culture," "statistical control culture," "quality  
32 assurance culture," and "strategic quality management culture".  
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39 Treating quality as a cultural phenomenon means approaching it as a set of values and  
40 organizational ideology rather than merely an application of problem-solving tools and  
41 techniques. George Bush (National Institute of Standards and Technology, 1992) emphasized  
42 this perspective, describing quality as "a new style of working" and "a way of life." For  
43 instance, Jack Welch of GE (past CEO) has labelled Six Sigma as a new way of working, and  
44 he accentuated the point that Six Sigma must be woven into every fabric of GE to create and  
45 sustain competitive advantage (Welch, J, 2003). For the past CEO of Motorola (Robert Galvin),  
46 "quality is a way of life and not an advertising term" (Sester, D., 2001). Quality culture, part of  
47 overall organizational culture, addresses quality challenges through tangible elements like  
48 management mechanisms and intangible elements like values and rituals (Welch & Byrne,  
49 2003).  
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### **Theme 8: Quality and Sustainability**

Sustainability encompasses the protection and improvement of environmental, social, and economic (ESG) factors (Shibin et al., 2018). Studies show a direct correlation between QM methods and the quality of products as well as innovation performance. From an ESG standpoint, QM helps enhance company sustainability by facilitating the incorporation of sustainability factors into everyday work processes and stakeholder management strategies (Siva et al., 2016a).

QM methods, like continuous improvement and waste reduction, reduce an organization's environmental impact and support sustainable development goals (SDGs) like responsible consumption, climate action, and life below water. Emphasizing process optimization and efficiency supports economic growth, industry innovation, and infrastructure (Antony, Bhat, et al., 2023, 2024b). Effective stakeholder engagement and strategic integration of QM projects with SDGs are crucial for achieving sustainable results. Analytical and statistical techniques can help organizations connect their projects with sustainability goals, influencing SDGs (Antony, Bhat, et al., 2024b). QM practices have shown positive outcomes for SDGs, including reduced environmental impact, increased operational efficiency, and improved quality of life (Antony, Bhat, et al., 2023).

### **Theme 9: Quality and Innovation**

Innovation is crucial for organizational success, and its correlation with QM needs further study. Implementing QM is essential, but combining it with knowledge management can improve innovation performance by optimizing processes (Yusr et al., 2017). The QM practices significantly impact innovation performance by enhancing quality performance, as they create a foundation of standardized processes and continuous improvement that fosters an environment conducive to innovation. Effective QM practices reduce defects, improve reliability, and streamline operations, which in turn allows organizations to allocate more resources and attention to innovative activities. Research indicates that organizations with robust QM systems are better equipped to integrate innovative ideas into their operations, leading to improved overall performance and competitive advantage (Kim et al., 2012; J. Liu et al., 2023). QM also plays a significant role in promoting green innovation in various industries (Pinto & Romero, 2020).

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3 QM methodologies can have a complex relationship with innovation within organizations  
4 (Salah, 2017). While some studies suggest that both hard and soft QM practices positively  
5 influence innovation performance by enhancing processes, leadership, and customer focus,  
6 others indicate potential limitations in fostering radical innovation or exploring new  
7 technological advancements (Antony et al., 2016; Choo et al., 2007; Escrig-Tena et al., 2018).  
8 The impact of QM methodologies on innovation may vary depending on the specific practices  
9 implemented and the organizational context (Yu et al., 2023). It is observed that integrating  
10 management systems like MIS and OI (Open Innovation) can enhance innovation efficiency in  
11 organisations (Hernandez-Vivanco et al., 2018). Also, applying knowledge management  
12 principles can enhance this integration and promote knowledge innovation inside the  
13 organisation.

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17 Therefore, organizations need to carefully balance quality improvement efforts with fostering  
18 a culture of innovation to ensure continuous improvement while also encouraging breakthrough  
19 innovations that drive long-term success. The research also suggests developing a  
20 comprehensive framework integrating QM with innovation management, especially in  
21 healthcare industries (Salah, 2017; Tonjang & Thawesaengskulthai, 2023).

### 22 23 24 25 26 27 28 29 30 31 32 33 34 **Theme 10: Leadership**

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36 Despite Leadership being a well-discussed topic since the times of the pioneers of QM such as  
37 (Crosby, 1996; Deming, 1994; Juran, 1989), limited research has been carried out on its role in  
38 achieving and sustaining quality until recently (Laureani et al., 2024). Leadership has been  
39 identified as a critical success factor for the deployment and sustainment of QM (L. J. Porter  
40 & Parker, 1993), and (Laureani et al., 2023) identified the leadership traits that are more  
41 conducive to a successful QM implementation to create meaningful purpose for employees,  
42 provide guidance, mentoring, and coaching, promoting education and training, competence and  
43 building a culture that supports quality.

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51 Although some of these traits are described in the wider leadership literature, there is no  
52 existing framework of leadership that comprehends all these traits for practitioners to follow  
53 (Latham, 2014). Similarly, there is no evidence in the literature of a maturity model for  
54 Leadership in implementing and sustaining quality (Laureani et al., 2024). Defining a new  
55 leadership paradigm and developing a self-assessment Leadership maturity model for  
56 sustainability of quality is necessary to enhance the understanding and impact that Leadership  
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3 can have on meeting today's and tomorrow's QM challenges: Leadership will be the most  
4 critical aspect in guiding the organisation through the Quality 4.0 evolution (Sony et al.,  
5 2020a). Moreover, the leadership model for quality in the era of digitalization can be quite  
6 different from the leadership model organisations have been using for many years.  
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11 Each of the above themes is not isolated; they are deeply interrelated. For instance, achieving  
12 OPEX often relies on customer-centric practices, while the competitive advantage is enhanced  
13 by embedding quality into both operational processes and customer experiences. Similarly, the  
14 shift towards digitalization (Q 4.0) has influenced not just operational efficiency but also  
15 supply chain quality, environmental sustainability, and innovation. Furthermore, the  
16 emergence of these themes can be traced back to various exogenous factors, including  
17 globalization, technological advancements, regulatory changes, and shifting consumer  
18 expectations. For example, the rise of digital technologies and Industry 4.0 has spurred the  
19 adoption of Q 4.0 practices, while increasing environmental concerns and the push for  
20 sustainability have led to a greater emphasis on environmental management in quality systems.  
21 These external drivers have shaped how organizations approach QM, necessitating an  
22 integrated view of the themes. Therefore, exploring these interconnections and the external  
23 influences that have shaped their evolution provides a more critical understanding of why these  
24 themes matter and how they collectively contribute to organizational success in today's  
25 dynamic business environment.  
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### 39 **5.0 Conclusion, Implications, Limitations, and Agenda for Further Research**

40 This research delves into the key themes of QM as perceived by industry leaders and academics  
41 with extensive experience in the field. The top ten themes identified from our initial research  
42 are leadership, quality and innovation, quality and sustainability, quality and culture, human  
43 aspects in QM, quality and its link to environmental management, embedding quality in the  
44 supply chain, quality and its link to OPEX, customer centricity and advocacy of customers and  
45 lastly quality and competitive advantage. The implications of this study are twofold: offering  
46 valuable insights for senior managers and quality leaders looking to enhance their practices  
47 sustainably. Academics can also leverage these findings to enrich the QM curriculum for  
48 postgraduate students. While the study acknowledges limitations in sample size, upcoming  
49 phases aim to address these gaps, exploring differences in QM themes across various  
50 organizational types and sizes.  
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58  
59  
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## References

- Abbas, J. (2020a). Impact of total quality management on corporate green performance through the mediating role of corporate social responsibility. *Journal of Cleaner Production*, 242, 118458. <https://doi.org/10.1016/j.jclepro.2019.118458>
- Agar, N. (2019). *How to Be Human in the Digital Economy*. MIT Press. <https://mitpress.mit.edu/9780262038744/how-to-be-human-in-the-digital-economy/>
- Alkailani, M., Azzam, I. A., & Athamneh, A. B. (2012). Replicating Hofstede in Jordan: Ungeneralized, Reevaluating the Jordanian Culture. *International Business Research*, 5(4), p71. <https://doi.org/10.5539/ibr.v5n4p71>
- Antony, J., Bhat, S., Fundin, A., Sony, M., Sorqvist, L., & Bader, M. (2023). Quality management as a means for micro-level sustainability development in organizations. *The TQM Journal*. <https://doi.org/10.1108/TQM-06-2023-0198>
- Antony, J., Bhat, S., Sony, M., Fundin, A., Sorqvist, L., & Molteni, R. (2024a). Sustainable development through quality management: A multiple-case study analysis of triumphs, trials and tribulations. *The TQM Journal*. <https://doi.org/10.1108/TQM-12-2023-0424>
- Antony, J., Bhat, S., Sony, M., Fundin, A., Sorqvist, L., & Molteni, R. (2024b). Sustainable development through quality management: A multiple-case study analysis of triumphs, trials and tribulations. *The TQM Journal*. <https://doi.org/10.1108/TQM-12-2023-0424>
- Antony, J., Jiju Antony, F., Kumar, M., & Rae Cho, B. (2007). Six sigma in service organisations: Benefits, challenges and difficulties, common myths, empirical observations and success factors. *International Journal of Quality & Reliability Management*, 24(3), 294–311.
- Antony, J., Kaul, A., Bhat, S., Sony, M., Kaul, V., Zulfiqar, M., & McDermott, O. (2023). Critical failure factors for Quality 4.0: An exploratory qualitative study. *International Journal of Quality & Reliability Management*. <https://doi.org/10.1108/IJQRM-07-2023-0240>
- Antony, J., Lizarelli, F. L., Fernandes, M. M., Dempsey, M., Brennan, A., & McFarlane, J. (2019). A study into the reasons for process improvement project failures: Results from a pilot survey. *International Journal of Quality & Reliability Management*, 36(10), 1699–1720.
- Antony, J., McDermott, O., & Sony, M. (2022). Quality 4.0 conceptualisation and theoretical understanding: A global exploratory qualitative study. *The TQM Journal*, 34(5), 1169–1188. <https://doi.org/10.1108/TQM-07-2021-0215>

- 1  
2  
3 Antony, J., McDermott, O., Sony, M., Toner, A., Bhat, S., Cudney, E. A., & Doulatbadi, M.  
4 (2022b). Benefits, challenges, critical success factors and motivations of Quality 4.0 –  
5 A qualitative global study. *Total Quality Management & Business Excellence*, 1–20.  
6 <https://doi.org/10.1080/14783363.2022.2113737>  
7  
8  
9  
10 Antony, J., Setijono, D., & Dahlgard, J. J. (2016). Lean Six Sigma and Innovation – an  
11 exploratory study among UK organisations. *Total Quality Management & Business*  
12 *Excellence*, 27(1–2), 124–140. <https://doi.org/10.1080/14783363.2014.959255>  
13  
14  
15 Antony, J., Sony, M., Jayaraman, R., Swarnakar, V., Tortorella, G. D. L., Garza-Reyes, J. A.,  
16 Rathi, R., Gutierrez, L., McDermott, O., & Lameijer, B. A. (2024). Global perspectives  
17 on operational excellence: Unveiling critical failure factors and sustainable pathways.  
18 *International Journal of Quality & Reliability Management*.  
19 <https://doi.org/10.1108/IJQRM-01-2024-0013>  
20  
21  
22  
23  
24 Antony, Jiju, Bhat, Shreeranga, Jayaraman, Raja, Sony, Michael, McDermott, Olivia, & Snee,  
25 Ronald. (2022a). The genealogy of Quality 4.0. *ISE Magazine*, 54(4), 34–39.  
26 <https://doi.org/10.6084/M9.FIGSHARE.19658469.V1>  
27  
28  
29 Arsovski, S. (2023). QUALITY 5.0: FROM CHALLENGES TO REALITY. *Journal of*  
30 *Innovations in Business and Industry*, 1(1), 13–21.  
31 <https://doi.org/10.61552/JIBI.2023.01.002>  
32  
33  
34 Asif, M., Joost De Bruijn, E., Douglas, A., & Fisscher, O. A. M. (2009). Why quality  
35 management programs fail: A strategic and operations management perspective.  
36 *International Journal of Quality & Reliability Management*, 26(8), 778–794.  
37 <https://doi.org/10.1108/02656710910984165>  
38  
39  
40  
41 Askey, J. M., & Malcolm, A. (1997). Quality management in the UK advertising industry.  
42 *International Journal of Quality & Reliability Management*, 14(2), 186–196.  
43 <https://doi.org/10.1108/02656719710165446>  
44  
45  
46 Ayre, C., & Scally, A. J. (2014). Critical values for Lawshe's content validity ratio: Revisiting  
47 the original methods of calculation. *Measurement and Evaluation in Counseling and*  
48 *Development*, 47(1), 79–86.  
49  
50  
51 Badri, M. A., Davis, D., & Davis, D. (1995). A study of measuring the critical factors of quality  
52 management. *International Journal of Quality & Reliability Management*, 12(2), 36–  
53 53. <https://doi.org/10.1108/02656719510080604>  
54  
55  
56 Baidoun, S., & Zairi, M. (2003). A proposed model of TQM implementation in the Palestinian  
57 context. *Total Quality Management & Business Excellence*, 14(10), 1193–1211.  
58 <https://doi.org/10.1080/1478336032000107744>  
59  
60

- 1  
2  
3 Balouei Jamkhaneh, H., Shahin, A., Parkouhi, S. V., & Shahin, R. (2022a). The new concept  
4 of quality in the digital era: A human resource empowerment perspective. *The TQM*  
5 *Journal*, 34(1), 125–144. <https://doi.org/10.1108/TQM-01-2021-0030>  
6  
7  
8 Balouei Jamkhaneh, H., Shahin, A., Parkouhi, S. V., & Shahin, R. (2022b). The new concept  
9 of quality in the digital era: A human resource empowerment perspective. *The TQM*  
10 *Journal*, 34(1), 125–144. <https://doi.org/10.1108/TQM-01-2021-0030>  
11  
12  
13 Bamford, D. R., & Greatbanks, R. W. (2005). The use of quality management tools and  
14 techniques: A study of application in everyday situations. *International Journal of*  
15 *Quality & Reliability Management*, 22(4), 376–392.  
16 <https://doi.org/10.1108/02656710510591219>  
17  
18  
19 Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of*  
20 *Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>  
21  
22  
23 Batista, L., Seuring, S., Genovese, A., Sarkis, J., & Sohal, A. (2023). Theorising circular  
24 economy and sustainable operations and supply chain management: A sustainability-  
25 dominant logic. *International Journal of Operations & Production Management*, 43(4),  
26 581–594.  
27  
28  
29 Bhat, S., Antony, J., Gijo, E., Koul, R., Cudney, E. A., & Chakraborty, A. (2022). A study on  
30 critical failure factors of Design for Six Sigma in Indian companies: Results from a  
31 pilot survey. *The TQM Journal*, ahead-of-print, Article ahead-of-print.  
32  
33  
34 Black, S. A., & Crumley, H. C. (1997). Self-assessment: What's in it for us? *Total Quality*  
35 *Management*, 8(2–3), 90–93. <https://doi.org/10.1080/0954412979776>  
36  
37  
38 Black, S. A., & Porter, L. J. (1996). Identification of the Critical Factors of TQM\*. *Decision*  
39 *Sciences*, 27(1), 1–21. <https://doi.org/10.1111/j.1540-5915.1996.tb00841.x>  
40  
41  
42 Brahm, F., & Poblete, J. (2024). Organizational Culture, Adaptation, and Performance.  
43 *Organization Science*, orsc.2022.16791. <https://doi.org/10.1287/orsc.2022.16791>  
44  
45  
46 Brunetti, F., Matt, D. T., Bonfanti, A., De Longhi, A., Pedrini, G., & Orzes, G. (2020). Digital  
47 transformation challenges: Strategies emerging from a multi-stakeholder approach. *The*  
48 *TQM Journal*, 32(4), 697–724. <https://doi.org/10.1108/TQM-12-2019-0309>  
49  
50  
51 Carvalho, A. M., Sampaio, P., Rebentisch, E., McManus, H., Carvalho, J. Á., & Saraiva, P.  
52 (2023). Operational excellence, organizational culture, and agility: Bridging the gap  
53 between quality and adaptability. *Total Quality Management & Business Excellence*,  
54 34(11–12), 1598–1628. <https://doi.org/10.1080/14783363.2023.2191844>  
55  
56  
57 Chapman, R. L., Hyland, P. W., Jenkins, R. J., & Sloan, T. R. (1997). Continuous improvement  
58 in Australian manufacturing firms: Findings of a survey in New South Wales.  
59  
60

- 1  
2  
3 *International Journal of Technology Management*, 14(1), 102.  
4 <https://doi.org/10.1504/IJTM.1997.001706>  
5  
6 Chiarini, A., & Kumar, M. (2021). Lean Six Sigma and Industry 4.0 integration for Operational  
7 Excellence: Evidence from Italian manufacturing companies. *Production Planning &*  
8 *Control*, 32(13), 1084–1101. <https://doi.org/10.1080/09537287.2020.1784485>  
9  
10 Chiarini, A., & Kumar, M. (2022). What is Quality 4.0? An exploratory sequential mixed  
11 methods study of Italian manufacturing companies. *International Journal of*  
12 *Production Research*, 60(16), 4890–4910.  
13 <https://doi.org/10.1080/00207543.2021.1942285>  
14  
15 Ching, N., Ghobakhloo, M., Iranmanesh, M., Maroufkhani, P., & Asadi, S. (2021). Industry  
16 4.0 applications for sustainable manufacturing: A systematic literature review and a  
17 roadmap to sustainable development. *Journal of Cleaner Production*, 334, 130133.  
18 <https://doi.org/10.1016/j.jclepro.2021.130133>  
19  
20 Choo, A. S., Linderman, K. W., & Schroeder, R. G. (2007). Method and context perspectives  
21 on learning and knowledge creation in quality management. *Journal of Operations*  
22 *Management*, 25(4), 918–931. <https://doi.org/10.1016/j.jom.2006.08.002>  
23  
24 Claver, E., & Tari, J. J. (2003). Levels of Quality Management in Certified Firms. *Total Quality*  
25 *Management & Business Excellence*, 14(9), 981–998.  
26 <https://doi.org/10.1080/1478336032000151439>  
27  
28 Conner, K. R. (1991). A Historical Comparison of Resource-Based Theory and Five Schools  
29 of Thought Within Industrial Organization Economics: Do We Have a New Theory of  
30 the Firm? *Journal of Management*, 17(1), 121–154.  
31 <https://doi.org/10.1177/014920639101700109>  
32  
33 Cronin, J. J., & Taylor, S. A. (1992). Measuring Service Quality: A Reexamination and  
34 Extension. *Journal of Marketing*, 56(3), 55–68.  
35 <https://doi.org/10.1177/002224299205600304>  
36  
37 Crosby, P. B. (1996). The leadership and quality nexus. *The Journal for Quality and*  
38 *Participation*, 19(3), 18–19.  
39  
40 Curkovic, S., Melnyk, S. A., Handfield, R. B., & Calantone, R. (2000). Investigating the  
41 linkage between total quality management and environmentally responsible  
42 manufacturing. *IEEE Transactions on Engineering Management*, 47(4), 444–464.  
43 <https://doi.org/10.1109/17.895340>  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 Dahlgaard-Park, S. M. (2011). The quality movement: Where are you going? *Total Quality*  
4 *Management & Business Excellence*, 22(5), 493–516.  
5 <https://doi.org/10.1080/14783363.2011.578481>  
6  
7  
8  
9 Davis, L. L. (1992). Instrument review: Getting the most from a panel of experts. *Applied*  
10 *Nursing Research*, 5(4), 194–197.  
11  
12 De Guimarães, J. C. F., Severo, E. A., Felix Júnior, L. A., Da Costa, W. P. L. B., & Salmoria,  
13 F. T. (2020). Governance and quality of life in smart cities: Towards sustainable  
14 development goals. *Journal of Cleaner Production*, 253, 119926.  
15 <https://doi.org/10.1016/j.jclepro.2019.119926>  
16  
17  
18 De Melo, R. M., Dos Santos, E. R., Lasserre Ferreira, M. H., & Silva Santos, L. P. D. (2020).  
19 Quality Management System in Educational Institutions: Integration of FMEA and  
20 PROMETHEE II. *Global Journal of Researches in Engineering*, 1–10.  
21 <https://doi.org/10.34257/GJREJVOL20IS2PG1>  
22  
23  
24 Deming, W. E. (1982). *Quality, Productivity, and Competitive Position*. Massachusetts  
25 Institute of Technology, Center for Advanced Engineering Study.  
26  
27  
28 Deming, W. E. (1994). Leadership for Quality. *Executive Excellence*, 11(6), 3–5.  
29  
30 di nardo, M., Forino, D., & Murino, T. (2020). The evolution of man–machine interaction: The  
31 role of human in Industry 4.0 paradigm. *Production & Manufacturing Research*, 8, 20–  
32 34. <https://doi.org/10.1080/21693277.2020.1737592>  
33  
34  
35 Domínguez-Escrig, E., Mallén Broch, F. F., Chiva, R., & Lapiedra Alcamí, R. (2023).  
36 Authentic leadership: Boosting organisational learning capability and innovation  
37 success. *The Learning Organization*, 30(1), 23–36. [https://doi.org/10.1108/TLO-01-](https://doi.org/10.1108/TLO-01-2021-0007)  
38 [2021-0007](https://doi.org/10.1108/TLO-01-2021-0007)  
39  
40  
41  
42 Elg, M., Birch-Jensen, A., Gremyr, I., Martin, J., & Melin, U. (2021). Digitalisation and quality  
43 management: Problems and prospects. *Production Planning & Control*, 32(12), 990–  
44 1003. <https://doi.org/10.1080/09537287.2020.1780509>  
45  
46  
47  
48 Els, R. C., & Meyer, H. W. (2023). The role of career development in ensuring effective quality  
49 management of training. *SA Journal of Human Resource Management*, 21.  
50 <https://doi.org/10.4102/sajhrm.v21i0.2126>  
51  
52  
53 Escrig-Tena, A. B., Segarra-Ciprés, M., García-Juan, B., & Beltrán-Martín, I. (2018). The  
54 impact of hard and soft quality management and proactive behaviour in determining  
55 innovation performance. *International Journal of Production Economics*, 200, 1–14.  
56 <https://doi.org/10.1016/j.ijpe.2018.03.011>  
57  
58  
59  
60

- 1  
2  
3 Ferdousi, F., Baird, K., Munir, R., & Su, S. (2019). Mediating role of quality performance on  
4 the association between organisational factors and competitive advantage.  
5 *International Journal of Productivity and Performance Management*, 68(3), 542–560.  
6 <https://doi.org/10.1108/IJPPM-12-2017-0343>  
7  
8  
9  
10 Forum, W. E. (2016). *The future of jobs: Employment, skills and workforce strategy for the*  
11 *Fourth Industrial Revolution | VOCEDplus, the international tertiary education and*  
12 *research database*. <https://www.voced.edu.au/content/ngv%3A71706>  
13  
14  
15 Found, P., Lahy, A., Williams, S., Hu, Q., & Mason, R. (2018). Towards a theory of operational  
16 excellence. *Total Quality Management & Business Excellence*, 1–13.  
17  
18  
19 Gadenne, D., & Sharma, B. (2009). An investigation of the hard and soft quality management  
20 factors of Australian SMEs and their association with firm performance. *International*  
21 *Journal of Quality & Reliability Management*, 26(9), 865–880.  
22 <https://doi.org/10.1108/02656710910995064>  
23  
24  
25 Garvin, D. A. (1988). *Managing quality: The strategic and competitive edge* (5. [print.]). Free  
26 Pr.  
27  
28  
29 Garza-Reyes, J. A., Yu, M., Kumar, V., & Upadhyay, A. (2017). Total Quality Environmental  
30 Management: Adoption Status in the Chinese Manufacturing Sector. *TQM Journal*, 30,  
31 2–19. <https://doi.org/10.1108/TQM-05-2017-0052>  
32  
33  
34 Germain, R., & Spears, N. (1999). Quality management and its relationship with organizational  
35 context and design. *International Journal of Quality & Reliability Management*, 16(4),  
36 371–392. <https://doi.org/10.1108/02656719910266541>  
37  
38  
39 Gilbert, G. E., & Prion, S. (2016). Making sense of methods and measurement: Lawshe's  
40 content validity index. *Clinical Simulation in Nursing*, 12(12), 530–531.  
41  
42  
43 Gnan, L., & Palumbo, R. (2024). Guest editorial: What does combining soft and hard TQM  
44 take to achieve organizational excellence? *The TQM Journal*, 36(3), 665–678.  
45 <https://doi.org/10.1108/TQM-03-2024-425>  
46  
47  
48 Gólcher-Barguil, L. A., Nadeem, S. P., & Garza-Reyes, J. A. (2019). Measuring operational  
49 excellence: An operational excellence profitability (OEP) approach. *Production*  
50 *Planning & Control*, 30(8), Article 8.  
51  
52  
53 González-Benito, J., Martínez-Lorente, A. R., & Dale, B. G. (2003). A study of the purchasing  
54 management system with respect to total quality management. *Industrial Marketing*  
55 *Management*, 32(6), 443–454. [https://doi.org/10.1016/S0019-8501\(02\)00231-6](https://doi.org/10.1016/S0019-8501(02)00231-6)  
56  
57  
58 Gutierrez-Gutierrez, L. J., Barrales-Molina, V., & Kaynak, H. (2018a). The role of human  
59 resource-related quality management practices in new product development: A  
60

- dynamic capability perspective. *International Journal of Operations & Production Management*, 38(1), 43–66. <https://doi.org/10.1108/IJOPM-07-2016-0387>
- Gutierrez-Gutierrez, L. J., Barrales-Molina, V., & Kaynak, H. (2018b). The role of human resource-related quality management practices in new product development: A dynamic capability perspective. *International Journal of Operations & Production Management*, 38(1), 43–66. <https://doi.org/10.1108/IJOPM-07-2016-0387>
- Haby, M. M., Chapman, E., Clark, R., Barreto, J., Reveiz, L., & Lavis, J. N. (2016). What are the best methodologies for rapid reviews of the research evidence for evidence-informed decision making in health policy and practice: A rapid review. *Health Research Policy and Systems*, 14(1), 83. <https://doi.org/10.1186/s12961-016-0155-7>
- Haffar, M., Al-Karaghoul, W., Irani, Z., Djebarni, R., & Gbadamosi, G. (2019). The influence of individual readiness for change dimensions on quality management implementation in Algerian manufacturing organisations. *International Journal of Production Economics*, 207, 247–260. <https://doi.org/10.1016/j.ijpe.2016.08.024>
- Hernandez-Vivanco, A., Cruz-Cázares, C., & Bernardo, M. (2018). Openness and management systems integration: Pursuing innovation benefits. *Journal of Engineering and Technology Management*, 49, 76–90. <https://doi.org/10.1016/j.jengtecman.2018.07.001>
- Higham, K., De Rassenfosse, G., & Jaffe, A. B. (2021). Patent Quality: Towards a Systematic Framework for Analysis and Measurement. *Research Policy*, 50(4), 104215. <https://doi.org/10.1016/j.respol.2021.104215>
- Ho, Y.-S., Cavacece, Y., Tartaglione, A., & Douglas, A. (2022). Publication performance and trends in Total Quality Management research: A bibliometric analysis. *Total Quality Management & Business Excellence*, 34, 1–34. <https://doi.org/10.1080/14783363.2022.2031962>
- Huang, M.-H., & Rust, R. T. (2021). Engaged to a Robot? The Role of AI in Service. *Journal of Service Research*, 24(1), 30–41. <https://doi.org/10.1177/1094670520902266>
- Huq, Z., & Stolen, J. D. (1998). Total quality management contrasts in manufacturing and service industries. *International Journal of Quality & Reliability Management*, 15(2), 138–161. <https://doi.org/10.1108/02656719810204757>
- Idris, M. A., & Zairi, M. (2006). Sustaining TQM: A Synthesis of Literature and Proposed Research Framework. *Total Quality Management & Business Excellence*, 17(9), 1245–1260. <https://doi.org/10.1080/14783360600750535>

- 1  
2  
3 Jackson, S. A., Gopalakrishna-Remani, V., Mishra, R., & Napier, R. (2016). Examining the  
4 impact of design for environment and the mediating effect of quality management  
5 innovation on firm performance. *International Journal of Production Economics*, *173*,  
6 142–152. <https://doi.org/10.1016/j.ijpe.2015.12.009>  
7  
8  
9  
10 Johnson, E. (2021). Face validity. In *Encyclopedia of autism spectrum disorders* (pp. 1957–  
11 1957). Springer International Publishing.  
12  
13 Jum'a, L., Alkalha, Z., Al Mandil, K., & Alaraj, M. (2023). Exploring the influence of lean  
14 manufacturing and total quality management practices on environmental sustainability:  
15 The moderating role of quality culture. *International Journal of Lean Six Sigma*, *14*(7),  
16 1626–1654. <https://doi.org/10.1108/IJLSS-11-2021-0203>  
17  
18  
19  
20 Juran, J. M. (1985). *Quality Control Handbook*. McGraw Hill Higher Education.  
21  
22 Juran, J. M. (1989). *Juran on leadership for quality*. The Free Press.  
23  
24 Kanazawa, S., & Li, N. (2015). Happiness in modern society: Why intelligence and ethnic  
25 composition matter. *Journal of Research in Personality*, *59*, 111–120.  
26 <https://doi.org/10.1016/j.jrp.2015.06.004>  
27  
28  
29 Kannan, V. R., & Tan, K.-C. (2002). Quality Management, Supply Chain Management, and  
30 Just in Time: A Model of their Impact on Business Performance. *Supply Chain Forum:*  
31 *An International Journal*, *3*(2), 58–72.  
32 <https://doi.org/10.1080/16258312.2002.11517105>  
33  
34  
35  
36 Karuppusami, G., & Gandhinathan, R. (2006). Pareto analysis of critical success factors of total  
37 quality management: A literature review and analysis. *The TQM Magazine*, *18*(4), 372–  
38 385. <https://doi.org/10.1108/09544780610671048>  
39  
40  
41 Kassiech, S. K., & Yourstone, S. A. (1998). Training, performance evaluation, rewards, and  
42 TQM implementation success. *Journal of Quality Management*, *3*(1), 25–38.  
43 [https://doi.org/10.1016/S1084-8568\(99\)80102-3](https://doi.org/10.1016/S1084-8568(99)80102-3)  
44  
45  
46 Kelly, S. E., Moher, D., & Clifford, T. J. (2016). Quality of conduct and reporting in rapid  
47 reviews: An exploration of compliance with PRISMA and AMSTAR guidelines.  
48 *Systematic Reviews*, *5*(1), 79. <https://doi.org/10.1186/s13643-016-0258-9>  
49  
50  
51 Kersten, W., & Koch, J. (2010). The effect of quality management on the service quality and  
52 business success of logistics service providers. *International Journal of Quality &*  
53 *Reliability Management*, *27*(2), 185–200. <https://doi.org/10.1108/02656711011014302>  
54  
55  
56 Khangura, S., Konnyu, K., Cushman, R., Grimshaw, J., & Moher, D. (2012). Evidence  
57 summaries: The evolution of a rapid review approach. *Systematic Reviews*, *1*(1), 10.  
58 <https://doi.org/10.1186/2046-4053-1-10>  
59  
60



- 1  
2  
3 Kim, D., Kumar, V., & Kumar, U. (2012). Relationship between quality management practices  
4 and innovation. *Journal of Operations Management*, 30(4), 295–315.  
5 <https://doi.org/10.1016/j.jom.2012.02.003>  
6  
7  
8 Kuei, C., & Lu, M. H. (2013). Integrating quality management principles into sustainability  
9 management. *Total Quality Management & Business Excellence*, 24(1–2), 62–78.  
10 <https://doi.org/10.1080/14783363.2012.669536>  
11  
12  
13 Kumar, M., & Antony, J. (2008). Comparing the quality management practices in UK SMEs.  
14 *Industrial Management & Data Systems*, 108(9), 1153–1166.  
15  
16  
17 Kumar, R., Singh, R. Kr., & Dwivedi, Y. Kr. (2020). Application of industry 4.0 technologies  
18 in SMEs for ethical and sustainable operations: Analysis of challenges. *Journal of*  
19 *Cleaner Production*, 275, 124063. <https://doi.org/10.1016/j.jclepro.2020.124063>  
20  
21  
22 Kumar, V., Han, Y., Truong, N., Hoang, N., & Upadhyay, A. (2020). Understanding the  
23 Interrelationship Between Culture of Quality, Employee, and Organizational  
24 Performance. *Operations and Supply Chain Management: An International Journal*,  
25 14–25. <https://doi.org/10.31387/oscm0440282>  
26  
27  
28  
29 Kumar, V., & Sharma, R. R. K. (2018). Leadership styles and their relationship with TQM  
30 focus for Indian firms: An empirical investigation. *International Journal of*  
31 *Productivity and Performance Management*, 67(6), 1063–1088.  
32 <https://doi.org/10.1108/IJPPM-03-2017-0071>  
33  
34  
35  
36 Lakhal, L. (2009). Impact of quality on competitive advantage and organizational performance.  
37 *Journal of the Operational Research Society*, 60(5), 637–645.  
38 <https://doi.org/10.1057/palgrave.jors.2602601>  
39  
40  
41  
42 Latham, J. R. (2014). Leadership for Quality and Innovation: Challenges, Theories, and a  
43 Framework for Future Research. *Quality Management Journal*, 21(1), 11–15.  
44 <https://doi.org/10.1080/10686967.2014.11918372>  
45  
46  
47 Laureani, A., Antony, J., Ramadan, M. A., Al Dhaheri, M. K., Fundin, A., & Sörqvist, L.  
48 (2023). Leadership characteristics for implementation and sustainability of quality: An  
49 exploratory study and directions for further research. *The TQM Journal*.  
50 <https://doi.org/10.1108/TQM-06-2023-0185>  
51  
52  
53  
54 Laureani, A., Antony, J., Sarabi, Y., & Gountcheva, N. (2024). Leadership for quality: A  
55 systematic review and future directions. *Total Quality Management & Business*  
56 *Excellence*, 1–44. <https://doi.org/10.1080/14783363.2024.2370486>  
57  
58  
59  
60 Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*,  
28(4), 563–575.

- 1  
2  
3 Leonard, D. (2010). Quality management practices in the US homebuilding industry. *The TQM*  
4 *Journal*, 22(1), 101–110. <https://doi.org/10.1108/17542731011009658>  
5  
6  
7 Lewis, W. G., Fai Pun, K., & Lalla, T. R. M. (2006). Empirical investigation of the hard and  
8 soft criteria of TQM in ISO 9001 certified small and medium-sized enterprises.  
9 *International Journal of Quality & Reliability Management*, 23(8), 964–985.  
10 <https://doi.org/10.1108/02656710610688167>  
11  
12  
13 Lillrank, P. (2015). Small and big quality in health care. *International Journal of Health Care*  
14 *Quality Assurance*, 28(4), 356–366. <https://doi.org/10.1108/IJHCQA-05-2014-0068>  
15  
16  
17 Liu, J., Zhuang, D., & Shen, W. (2023). The impact of quality management practices on  
18 manufacturing performance: An empirical study based on system theory. *Soft*  
19 *Computing*, 27(7), 4077–4092. <https://doi.org/10.1007/s00500-021-06606-3>  
20  
21  
22 Liu, W., Liu, X., & Choi, T.-M. (2023). Effects of supply chain quality event announcements  
23 on stock market reaction: An empirical study from China. *International Journal of*  
24 *Operations & Production Management*, 43(2), 197–234.  
25  
26  
27 López-Mielgo, N., Montes-Peón, J. M., & Vázquez-Ordás, C. J. (2009). Are quality and  
28 innovation management conflicting activities? *Technovation*, 29(8), 537–545.  
29 <https://doi.org/10.1016/j.technovation.2009.02.005>  
30  
31  
32 Luz Tortorella, G., Cauchick-Miguel, P. A., Li, W., Staines, J., & McFarlane, D. (2022). What  
33 does operational excellence mean in the Fourth Industrial Revolution era? *International*  
34 *Journal of Production Research*, 60(9), Article 9.  
35  
36  
37 Malik, A., & Blumenfeld, S. (2012). Six Sigma, quality management systems and the  
38 development of organisational learning capability: Evidence from four business process  
39 outsourcing organisations in India. *International Journal of Quality & Reliability*  
40 *Management*, 29(1), 71–91. <https://doi.org/10.1108/02656711211190882>  
41  
42  
43 Malik, A., Sinha, A., & Blumenfeld, S. (2012). Role of quality management capabilities in  
44 developing market-based organisational learning capabilities: Case study evidence  
45 from four Indian business process outsourcing firms. *Industrial Marketing*  
46 *Management*, 41(4), 639–648. <https://doi.org/10.1016/j.indmarman.2011.06.037>  
47  
48  
49 McAdam, R., & Armstrong, G. (2001). A symbiosis of quality and innovation in SMEs:  
50 A multiple case study analysis. *Managerial Auditing Journal*, 16(7), 394–399.  
51 <https://doi.org/10.1108/02686900110398296>  
52  
53  
54 Mittal, A., Gupta, P., Kumar, V., Antony, J., Cudney, E. A., & Furterer, S. L. (2023). TQM  
55 practices and their impact on organisational performance: The case of India's deming-  
56  
57  
58  
59  
60

- award industries. *Total Quality Management & Business Excellence*, 34(11–12), 1410–1437. <https://doi.org/10.1080/14783363.2023.2177148>
- Nahavandi, S. (2019). Industry 5.0—A Human-Centric Solution. *Sustainability*, 11(16), 1–13.
- Oakland, J. (2011). Leadership and policy deployment: The backbone of TQM. *Total Quality Management & Business Excellence*, 22(5), 517–534. <https://doi.org/10.1080/14783363.2011.579407>
- Peng, X., Prybutok, V., & Xie, H. (2020). Integration of supply chain management and quality management within a quality focused organizational framework. *International Journal of Production Research*, 58(2), 448–466. <https://doi.org/10.1080/00207543.2019.1593548>
- Pinto, C. M. L., & Romero, F. C. (2020). The Relationship Between Quality Management and Innovation. *China-USA Business Review*, 19(5). <https://doi.org/10.17265/1537-1514/2020.05.002>
- Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health*, 30(4), 459–467.
- Porter, L. J., & Parker, A. J. (1993). Total quality management—The critical success factors. *Total Quality Management*, 4(1), 13–22. <https://doi.org/10.1080/09544129300000003>
- Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press.
- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. Free Press.
- Porter, M. E., & Linde, C. van der. (1995, September 1). Green and Competitive: Ending the Stalemate. *Harvard Business Review*. <https://hbr.org/1995/09/green-and-competitive-ending-the-stalemate>
- Power, A. (2015). LinkedIn: Facebook for professionals? *British Journal of Midwifery*, 23(3), Article 3.
- Pradana, D. W., & Ekowati, D. (2024). Future organizational resilience capability structure: A systematic review, trend and future research directions. *Management Research Review*. <https://doi.org/10.1108/MRR-08-2023-0538>
- Psomas, E., Kafetzopoulos, D., & Gotzamani, K. (2018). Determinants of company innovation and market performance. *The TQM Journal*, 30(1), 54–73. <https://doi.org/10.1108/TQM-07-2017-0074>

- 1  
2  
3  
4  
5  
6  
7  
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49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60
- Punnakitikashem, P., Laosirihongthong, T., Adebajo, D., & McLean, M. W. (2010). A study of quality management practices in TQM and non-TQM firms: Findings from the ASEAN automotive industry. *International Journal of Quality & Reliability Management*, 27(9), 1021–1035. <https://doi.org/10.1108/02656711011084819>
- Redman, T., Mathews, B., Wilkinson, A., & Snape, E. (1995). Quality management in services: Is the public sector keeping pace? *International Journal of Public Sector Management*, 8(7), 21–34. <https://doi.org/10.1108/09513559510103166>
- Reed, R., Lemak, D. J., & Montgomery, J. C. (1996). Beyond Process: TQM Content and Firm Performance. *The Academy of Management Review*, 21(1), 173. <https://doi.org/10.2307/258633>
- Risch Rodie, A., & Martin, C. L. (2001). Competing in the service sector - The entrepreneurial challenge. *International Journal of Entrepreneurial Behavior & Research*, 7(1), 5–21. <https://doi.org/10.1108/13552550110385718>
- Rodgers, B., & Antony, J. (2023). In pursuit of a culture of continuous improvement: Scotland's national ambulance service. *International Journal of Public Administration*, 46(9), 636–646.
- Roy, S. K. (2013a). Consequences of customer advocacy. *Journal of Strategic Marketing*, 21(3), 260–276. <https://doi.org/10.1080/0965254X.2013.790468>
- Sader, S., Husti, I., & Daroczi, M. (2022). A review of quality 4.0: Definitions, features, technologies, applications, and challenges. *Total Quality Management & Business Excellence*, 33(9–10), 1164–1182. <https://doi.org/10.1080/14783363.2021.1944082>
- Saihi, A., Awad, M., & Ben-Daya, M. (2023). Quality 4.0: Leveraging Industry 4.0 technologies to improve quality management practices – a systematic review. *International Journal of Quality & Reliability Management*, 40(2), 628–650. <https://doi.org/10.1108/IJQRM-09-2021-0305>
- Salah, S. (2017). Lean Six Sigma and innovation: Comparison and relationship. *International Journal of Business Excellence*, 13(4), 479. <https://doi.org/10.1504/IJBEX.2017.087756>
- Saleh, R. A., Sweis, R. J., Saleh, F. I. M., Sarea, A. M., Eldin, I. M. S., & Obeid, D. N. (2018). Linking soft and hard total quality management practices: Evidence from Jordan. *International Journal of Business Excellence*, 14(1), 49. <https://doi.org/10.1504/IJBEX.2018.088315>

- 1  
2  
3 Santos, G., Sá, J. C., Félix, M. J., Barreto, L., Carvalho, F., Doiro, M., Zgodavová, K., &  
4 Stefanović, M. (2021). New Needed Quality Management Skills for Quality Managers  
5 4.0. *Sustainability*, 13(11), 6149. <https://doi.org/10.3390/su13116149>  
6  
7  
8 Sashkin, M., & Sashkin, M. (1993). *Putting total quality management to work: What TQM*  
9 *means, how to use it, & how to sustain it over the long run* (1st Berrett-Koehler ed).  
10 Berrett-Koehler.  
11  
12 Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students*.  
13 Pearson education.  
14  
15 Schein, E. H. (1996). Culture: The Missing Concept in Organization Studies. *Administrative*  
16 *Science Quarterly*, 41(2), 229. <https://doi.org/10.2307/2393715>  
17  
18 Shibin, K. T., Dubey, R., Gunasekaran, A., Luo, Z., Papadopoulos, T., & Roubaud, D. (2018).  
19 Frugal innovation for supply chain sustainability in SMEs: Multi-method research  
20 design. *Production Planning & Control*, 29(11), 908–927.  
21 <https://doi.org/10.1080/09537287.2018.1493139>  
22  
23 Siva, V., Gremyr, I., Bergquist, B., Garvare, R., Zobel, T., & Isaksson, R. (2016a). The support  
24 of Quality Management to sustainable development: A literature review. *Journal of*  
25 *Cleaner Production*, 138, 148–157. <https://doi.org/10.1016/j.jclepro.2016.01.020>  
26  
27 Siva, V., Gremyr, I., Bergquist, B., Garvare, R., Zobel, T., & Isaksson, R. (2016b). The support  
28 of Quality Management to sustainable development: A literature review. *Journal of*  
29 *Cleaner Production*, 138, 148–157. <https://doi.org/10.1016/j.jclepro.2016.01.020>  
30  
31 Sivathanu, B., & Pillai, R. (2018). Smart HR 4.0 – how industry 4.0 is disrupting HR. *Human*  
32 *Resource Management International Digest*, 26. [https://doi.org/10.1108/HRMID-04-](https://doi.org/10.1108/HRMID-04-2018-0059)  
33 [2018-0059](https://doi.org/10.1108/HRMID-04-2018-0059)  
34  
35 Solnet, D., Subramony, M., Ford, R. C., Golubovskaya, M., Kang, H. J. (Annette), & Hancer,  
36 M. (2019). Leveraging human touch in service interactions: Lessons from hospitality.  
37 *Journal of Service Management*, 30(3), 392–409. [https://doi.org/10.1108/JOSM-12-](https://doi.org/10.1108/JOSM-12-2018-0380)  
38 [2018-0380](https://doi.org/10.1108/JOSM-12-2018-0380)  
39  
40 Sony, M., Antony, J., & Douglas, J. A. (2020a). Essential ingredients for the implementation  
41 of Quality 4.0: A narrative review of literature and future directions for research. *The*  
42 *TQM Journal*, 32(4), 779–793. <https://doi.org/10.1108/TQM-12-2019-0275>  
43  
44 Sony, M., Antony, J., & Douglas, J. A. (2020b). Essential ingredients for the implementation  
45 of Quality 4.0: A narrative review of literature and future directions for research. *The*  
46 *TQM Journal*, 32(4), 779–793. <https://doi.org/10.1108/TQM-12-2019-0275>  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 Sternberg, R. J. (Ed.). (1999). Culture-Free versus Culture-Based Measures of Cognition. In R.  
4 Allen, A. Buchner, S. Ceci, M. Cole, E. H. Debruyn, R. Dunne, P. Frensch, E. L.  
5 Grigorenko, E. Hunt, P. Johnson-Laird, M. J. Kahana, J. F. Kihlstrom, G. Loftus, V.  
6 Makin, T. McNamara, T. Nelson, R. S. Nickerson, N. Oransky, E. A. Phelps, ... P.  
7 Carpenter, *The Nature of Cognition* (pp. 645–664). The MIT Press.  
8 <https://doi.org/10.7551/mitpress/4877.003.0025>  
9  
10 Thai Hoang, D., Igel, B., & Laosirihongthong, T. (2006). The impact of total quality  
11 management on innovation: Findings from a developing country. *International Journal*  
12 *of Quality & Reliability Management*, 23(9), 1092–1117.  
13 <https://doi.org/10.1108/02656710610704230>  
14  
15 Tonjang, S., & Thawesaengskulthai, N. (2023). TRIZ inventive principle in healthcare quality  
16 and innovation development. *International Journal of Quality & Reliability*  
17 *Management*, 40(10), 2664–2721. <https://doi.org/10.1108/IJQRM-11-2021-0389>  
18  
19 Tricco, A. C., Antony, J., Zarin, W., Striffler, L., Ghassemi, M., Ivory, J., Perrier, L., Hutton,  
20 B., Moher, D., & Straus, S. E. (2015). A scoping review of rapid review methods. *BMC*  
21 *Medicine*, 13(1), 224. <https://doi.org/10.1186/s12916-015-0465-6>  
22  
23 Urban, G. L. (2005). Customer Advocacy: A New Era in Marketing? *Journal of Public Policy*  
24 *& Marketing*, 24(1), 155–159. <https://doi.org/10.1509/jppm.24.1.155.63887>  
25  
26 Van Der Wiele, T., & Brown, A. (2002). Quality management over a decade: A longitudinal  
27 study. *International Journal of Quality & Reliability Management*, 19(5), 508–523.  
28 <https://doi.org/10.1108/02656710210427494>  
29  
30 Welch, J., & Byrne, J. A. (2003). *Jack: Straight from the gut* (1. ed., updated). Headline.  
31  
32 Wiengarten, F., & Pagell, M. (2012). The importance of quality management for the success  
33 of environmental management initiatives. *International Journal of Production*  
34 *Economics*, 140, 407–415. <https://doi.org/10.1016/j.ijpe.2012.06.024>  
35  
36 Yasin, M. M., Alavi, J., Kunt, M., & Zimmerer, T. W. (2004). TQM practices in service  
37 organizations: An exploratory study into the implementation, outcome and  
38 effectiveness. *Managing Service Quality: An International Journal*, 14(5), 377–389.  
39 <https://doi.org/10.1108/09604520410557985>  
40  
41 Yu, Y., & Huo, B. (2018). Supply chain quality integration: Relational antecedents and  
42 operational consequences. *Supply Chain Management: An International Journal*,  
43 23(3), 188–206. <https://doi.org/10.1108/SCM-08-2017-0280>  
44  
45 Yu, Y., Li, H., Xu, J., Zhang, M., Zhang, X., Zhang, J. Z., & Wu, Y. (2023). The effect of  
46 internal quality integration on financial performance: The mediating role of product  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 innovation. *Journal of Manufacturing Technology Management*, 34(7), 1235–1255.  
4 <https://doi.org/10.1108/JMTM-01-2023-0005>  
5

6 Yusr, M. M., Mokhtar, S. S. M., Othman, A. R., & Sulaiman, Y. (2017). Does interaction  
7 between TQM practices and knowledge management processes enhance the innovation  
8 performance? *International Journal of Quality & Reliability Management*, 34(7), 955–  
9 974. <https://doi.org/10.1108/IJQRM-09-2014-0138>  
10  
11

12 Zhao, Y., Xu, H., Liu, G., Zhou, Y., & Wang, Y. (2023). Can digital transformation improve  
13 the quality of enterprise innovation in China? *European Journal of Innovation*  
14 *Management*. <https://doi.org/10.1108/EJIM-05-2023-0358>  
15  
16

17 Zonnenshain, A., & Kenett, R. S. (2020). Quality 4.0—The challenging future of quality  
18 engineering. *Quality Engineering*, 32(4), 614–626.  
19 <https://doi.org/10.1080/08982112.2019.1706744>  
20  
21

22 Zu, X., & Kaynak, H. (2012). An agency theory perspective on supply chain quality  
23 management. *International Journal of Operations & Production Management*, 32(4),  
24 423–446.  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
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## Appendix 1

Sr No	Themes Identified	Description	Reference
1	<b>Training in Quality</b> <i>(Including digitization)</i>	Training quality is the excellence in executing training sessions to enhance problem-solving, motivation, critical thinking, and social skills, crucial for optimizing performance and product/service quality in Industry 4.0.	(Antony et al., 2002; Baidoun & Zairi, 2003; Balouei Jamkhaneh et al., 2022b, 2022b; Claver & Tari, 2003; Idris & Zairi, 2006; Kannan & Tan, 2002; Malik et al., 2012)
2	<b>Quality and Resilience</b> <i>(Including robust QM systems using digital technologies to maintain high-quality standards and quickly recover from disruptions)</i>	Resilience in Quality involves adapting to changes and recovering from crises using robust digital quality management systems to enhance organizational agility.	(Pradana & Ekowati, 2024; Punnakitikashe m et al., 2010)
3	<b>Quality and Competitive Advantage</b> <i>(Including disruptive technology to enhance product quality, optimize processes, and deliver</i>	Higher functional quality boosts efficiency and market competitiveness, building customer loyalty and strengthening brands. Companies gain a strategic edge by using disruptive technology to deliver superior value, enhance product quality, optimize	(Asif et al., 2009; Lakhal, 2009; Saleh et al., 2018; Zonnenshain & Kenett, 2020)



Sr No	Themes Identified	Description	Reference
	<i>personalized customer experiences)</i>	processes, and offer personalized customer experiences.	
4	<b>Customer Focus and Advocacy of Customers</b> ( <i>Including robust feedback loops and communication channels that actively involve customers</i> )	Customer advocacy involves prioritizing customer needs and delivering solution-based assistance through products and services. By consistently meeting expectations, maintaining robust feedback loops, and actively communicating, businesses foster stronger loyalty and positive word-of-mouth.	(Antony et al., 2002; Gadenne & Sharma, 2009; Roy, 2013b; Urban, 2005)
5	<b>Quality and Data Science</b> ( <i>Including Data Analytics and Big Data</i> )	Use of Data-driven insights leveraging Industry 4.0 technologies such as Internet of Things (IoT), Big Data Analytics, and Artificial Intelligence (AI) can revolutionize quality management in contemporary organizations	(Antony et al., 2022; V. Kumar et al., 2020)
6	<b>Quality Culture</b> ( <i>Including a digital culture</i> )	A quality culture is an environment where team members prioritize high standards in their work and decision-making. Organizations with this culture deeply integrate quality into their values and behaviors while also embracing digital transformations and innovations.	(Van Der Wiele & Brown, 2002; Kannan & Tan, 2002; Saleh et al., 2018)
7	<b>Embedding Quality in the Supply Chain</b> ( <i>1st tier, 2nd tier and 3rd tier suppliers</i> )	Building quality assurance into a supply chain ensures a repeatable and sustainable manufacturing process, improving supply chain performance to fully satisfy client expectations. Supply chain quality integration (SCQI) positively impacts organizational operational performance.	(Yu & Huo, 2018; Peng et al., 2020)
8	<b>Quality and Sustainability</b>	Quality Management (QM) methods, tools, and practices are used to enhance sustainable	(Kuei & Lu, 2013; Siva et

Sr No	Themes Identified	Description	Reference
	<i>(Including Operational, Financial, Environmental, Social, Governance &amp; Strategic Performance)</i>	development, creating value-adding and result-oriented systems. QM promotes sustainability and supports achieving the Sustainable Development Goals (SDGs) by reducing environmental impact, increasing operational efficiency, and improving quality of life.	al., 2016; V. Kumar et al., 2020; Antony et al., 2024)
9	<b>Quality and Innovation</b> <i>(Innovation in Product, Process, Service)</i>	Quality practices foster innovation and are essential for scaling it. While quality was once a competitive tool, the focus has shifted to innovation. Quality clarifies an innovation's value proposition and aids in operationalizing business models	(Thai Hoang et al., 2006; Jackson et al., 2016; V. Kumar & Sharma, 2018; Psomas et al., 2018)
10	<b>Quality 4.0</b> <i>(Principles, Tools, Curriculum, Skills and Competencies, Roadmap for Implementation, etc.)</i>	Quality 4.0 integrates digital technologies, smart data analytics, and traditional quality practices (QC, QA, TQM) to promote innovation and continuous organizational improvement.	(Sony et al., 2020; Zonnenshain & Kenett, 2020; Sader et al., 2022; Mittal et al., 2023)
11	<b>Definition of Quality</b> <i>(Including redefinition of quality not only from the perspective of traditional aspects but also broader considerations such as sustainability, ethical production, and social impact.)</i>	Effects of relationships, mechanisms, and economic consequences of traditional and modern Quality practices, including digital transformations to improve enterprise innovation quality considering sustainable, ethical, and societal outcomes	(Zhao et al., 2023)

Sr No	Themes Identified	Description	Reference
12	<b>Quality Management in the Public and Voluntary sector</b> <i>(Including focus on transparency, accountability, and stakeholder engagement)</i>	Quality improvement practices in public, non-profit, and voluntary sectors enhance care quality, operational stability, and organizational performance. Advocating quality management and improvement methods globally raises service user outcomes.	(Redman et al., 1995; Lakhal, 2009)
13	<b>Quality Management Practices</b> [Including Hard Practices (e.g., SQC) + Soft Practices (e.g., Teamwork)]	Quality Management Practices fall into three categories: management, infrastructure, and core practices. They blend tangible techniques (hard QM) for process reliability and intangible practices (soft QM) to foster an empowering workplace, enhancing employee engagement and teamwork.	(Lewis et al., 2006; Chiarini & Kumar, 2021; Saihi et al., 2023; Gnan & Palumbo, 2024)
14	<b>Leadership for Quality</b> <i>(Including the requirements from the perspective of Quality 4.0)</i>	Leadership in quality management provides direction, motivation, and guidance for quality improvement. Effective leadership enhances organizational learning and radical innovation, driving sustainable development and competitiveness in a globalized, turbulent environment.	(Antony et al., 2002; Leonard, 2010; Domínguez-Escrig et al., 2023)
15	<b>Tools of Quality Management</b> <i>(Including classification of tools into basic, advanced, and very advanced)</i>	Over the years, many models, frameworks, tools, and techniques like Lean, Six Sigma, TQM, Internal Audits, QFD, and Flow Charts have been developed to enhance quality management practices in organisations.	(Antony et al., 2002; Bamford & Greatbanks, 2005; Karuppusami & Gandhinathan, 2006)

Sr No	Themes Identified	Description	Reference
16	<b>Quality Awards and Frameworks</b> <i>(Including emerging trends such as sustainability, digital transformation, social responsibility, etc.)</i>	Quality Awards and Frameworks vary widely and require measurable metrics for evidence-based policy. Strategic Quality Management (SQM) ensures continuous improvement and performance excellence through these awards and standards.	(Kannan & Tan, 2002; Lewis et al., 2006; Higham et al., 2021)
17	<b>Big Q and Small Q of Quality</b> <i>(Company-wide process improvement vs. specific process improvement)</i>	While Small Q quality management is static and transactional, Big Q quality management is proactive and strategic in reducing risk.	(Lillrank, 2015)
18	<b>Quality Governance</b> <i>(Including establishing a framework of policies, procedures, and responsibilities)</i>	Quality governance combines structures, processes, and frameworks to ensure compliance, industry standards, and continuous improvement. It identifies strengths, plans improvements, benchmarks performance, and promotes learning, enhancing managerial processes and business management.	(Black & Crumley, 1997; López-Mielgo et al., 2009; De Guimarães et al., 2020)
19	<b>Human Aspects in Quality Implementation</b> <i>(E.g., Empowering employees, fostering a continuous improvement culture, promoting Teamwork, etc.)</i>	HR-related QM practices train employees in problem-solving, interaction, and creating a learning environment, enhancing team performance. This benefits individuals, organizations, and society as a whole.	(Askey & Malcolm, 1997; Gutierrez-Gutierrez et al., 2018b)

Sr No	Themes Identified	Description	Reference
20	<b>Service Quality</b> <i>(Including AI and data analytics to personalize interactions, streamline service delivery, and proactively address customer needs for enhanced satisfaction)</i>	Service quality measures how well an organization understands and meets user needs. AI adoption must balance the human touch with technological efficiency. Evaluating service task quality, offerings, and processes is essential before using AI for client interactions.	(Kersten & Koch, 2010; Solnet et al., 2019; Huang & Rust, 2021)
21	<b>Quality and its link to Environment Management</b> <i>(Including waste reduction, carbon footprint reduction, renewable resource promotion, etc.)</i>	Quality Management paradigms—such as ISO 9001 and Total Quality Management—facilitate the acceptance of environmental practices and are aimed at efforts to eliminate pollution and waste through environmental management.	(Curkovic et al., 2000; Abbas, 2020)
22	<b>Quality and its link to Operational Excellence</b> <i>(Including the utilization of advanced analytics and automation tools)</i>	Operational Excellence (OpEx) is defined as the endeavor of organizations to consistently enhance performance and the cultural paradigm in the management of quality through the use of 21st-century technological advancements.	(Dahlgaard-Park, 2011; Sony et al., 2020; Carvalho et al., 2023)