

ABSTRACT

The purpose of this paper is to provide a review of supply chain quality management (SCQM), examining its theorizing and application at both intra- and inter-firm levels. It extends theorizing of quality beyond the functional silos of quality assurance and procurement/delivery (supply chain), encompassing cross-border operations and global implications for managing quality across the supply chain. Drawing upon the notion of organisation as a total system or systems theory that views organisations as an open, complex and adaptive systems with interdependent and interconnected sub-systems (functions), the review suggests that despite their distinct practices, processes, and underlying assumptions, these two domains are interconnected, and it is their synergy that contributes to efficient operations management of both manufacturing and service firms – especially in the context of global operations.

Keywords: *SCQM, Global Service/Manufacturing Operations Management; Literature review*

1. Introduction

Recently operations management scholars have suggested that members of supply networks need to implement quality management (QM) as an integrated system – as opposed to just a loose set of quality practices – if a service or manufacturing organisation is to create a quality infrastructure that satisfies the end customers (Parast, 2019; Foster, 2022). Kaynak and Hartley (2008) argue that managers should extend their vision beyond their own firms into the supply chain to manage quality. Others have been highlighting the problems of poor quality at global supply network level and its adverse impact on all parties and suggest that instead of holding a company's quality control department responsible for poor service and product quality, every company should be taking a hard look at making improvements to the entire intra- and inter-firm value chain (Oakland et al., 2020).

Although the importance of quality in the context of supply chain management (SCM) has been identified as an urgent line of inquiry by operations management scholars, the pertinent literature offers little insights into this important issue in the wider context of global market (see Ross, 1997; Robinson and Malhotra, 2005; Foster, 2008; Flynn and Zhao, 2014).

This paper advances knowledge in quality management by addressing the evident gap in QM and SCM research – aiming to contribute to the emerging field of supply chain quality management – SCQM (Robinson and Malhotra, 2005; Foster et al., 2011; Gunasekaran et al., 2019; Chau et al., 2021). It advances the understanding of the intricacies and interdependencies between QM and SCM, particularly in the current context of global operations (Barnes, 2018). This necessitates the adoption of a systems theory approach (Von Bertalanffy, 1973; Laszlo, 1969; Conti, 2006) towards SCQM, particularly in the current global business environment (see Manz and Stewart, 1997; Wang, 2005; Mele, 2010). In a world where firms need to cater to customers with diverse preferences across different geographical locations, managing QM and SCM in a unified and interconnected manner (i.e., SCQM) becomes crucial. In short, the current article highlights the importance of acknowledging the reciprocal and two-way influence of all subsystems, emphasizing the need to manage them as a unified system to achieve organizational effectiveness and efficiency (Ivanov et al., 2021; Gunasekaran and Ngai, 2012; Prasad and Babbar, 2000).

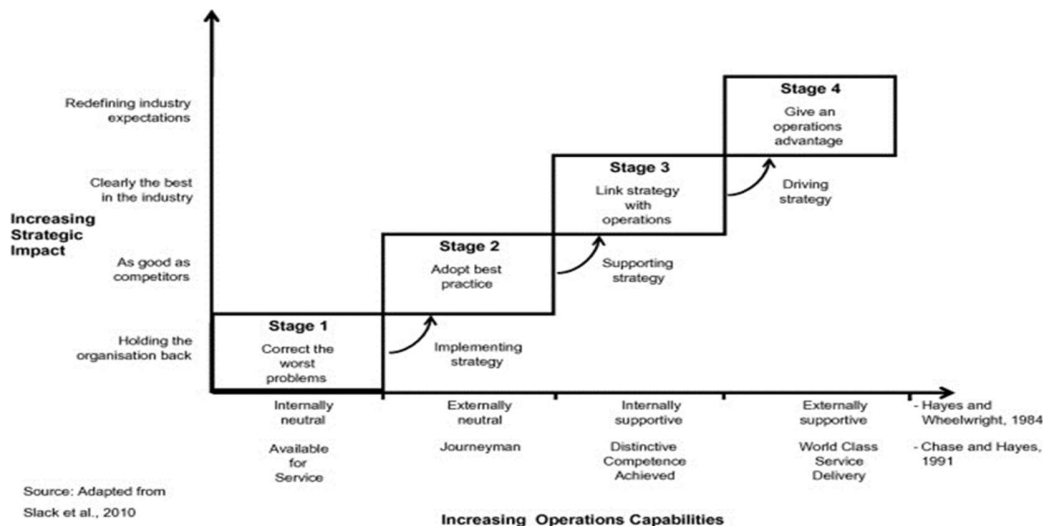
This article is structured as follows. Section 2 offers a review of the literature pertinent to the management of supply networks. In sections 3 and 4, a review of QM and SCM literature in terms of their definitional dimensions and guiding precepts is presented. Section 5 presents a review of

the concept of organizations as total systems and emphasizes the significance of perceiving different functional areas (i.e., QM and SCM) as interconnected components within the broader system. The final section makes an attempt to combine QM and SCM into a unified field of study known as SCQM (Kuei et al., 2008; Foster et al., 2011; Soares et al., 2017). The article concludes by providing suggestions for further research in this area.

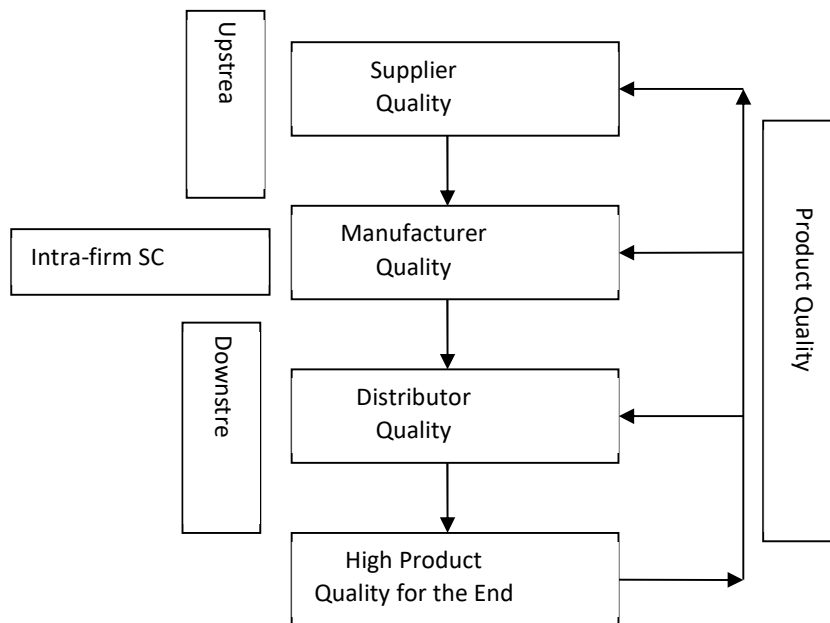
2. Managing supply networks and quality: A review of the assumptions and common goal

It is widely recognised that operations managers have to look beyond an internal view and individual operation processes if they want to manage their operations effectively and therefore achieve competitive advantage through quality (Barnes, 2018; Foster and Gardner, 2022;). This implies that the interconnection of internal and external environments or processes of a business can be regarded as a major determinant of not only a firm's product quality with a consequence of providing value to the end customer, but also operations' contribution to the overall firm's performance (see Sila, 2007; Sitkin et al., 1994). This view has also close affinity with those of system dynamics theory as a well-established approach to explain, analyse and understand operations management activities and practices at both intra- and inter-firm levels (Größler et al., 2008). Such popular views of effective management of operations, which conform to Hayes and Wheelwright's (1984) along with Chase and Hayes' (1991) model of operations contribution, requires a holistic approach to managing across firm boundaries (see Figure 1). As Figure 1 shows, operations performance objectives such as quality could give a competitive advantage, if it is deemed strategically vital to the firm (internally supportive) and its supply chain partners (externally supportive) – thereby achieving world class service and manufacturing excellence (Slack et al., 2013, p. 72).

Figure 1: Operations function's contribution to organisational competitiveness (Hayes and Wheelwright, 1984).



The close relationship between a firm's focus on internal processes and the importance of the external view focusing on business partners with an aim to satisfy the end customer has resulted in operations management scholars to rethink models, constructs, and frameworks for managing quality in supply chain relationships between manufacturers, suppliers and distributors (Durach et al., 2020; Wu and Choi, 2005; Choi and Wu, 2009; Wissuwa et al., 2022; Soares et al., 2017; Foster, 2022). For operations management scholars (e.g., Jeong and Phillips, 2001; Mouzas, 2006; Wong et al., 2015; Yasin, 1999; Barnes, 2018; Slack and Brandon-Jones, 2019; Foster and Gardner, 2022), operations efficiency is a function of improvement in both supply chain and quality management performance which is achieved by: focusing on supplier quality management practices, partnering with other firms in chains of upstream and downstream relationships, and managing quality beyond a firm's internal processes. A schematic picture of such discussion is presented in Figure 2.

Figure 2. Achieving product quality through chains of upstream and downstream relationships

Sources: Kaynak and Hartley (2008), Foster (2008), Ross (1997), Robinson and Malhorta (2005), Fish (2011), Kuei et al. (2008)

As Figure 2 indicates, quality could serve as the glue that binds all internal and external supply chain partners, aiming to satisfy the needs of the end customer. To this end, SCQM extends the scope of SCM to encompass an end-to-end approach to managing quality – rather than as add-on activity at the end or post-production /delivery (Kuei et al., 2008; Chibba, 2017).

Definitional dimensions and guiding precepts of quality management

A review of the literature on QM finds that there has been a significant theoretical and practitioner interest on its application in different economic sectors since 1980s. As an operations performance criterion, it is regarded as a key concern for all organisations not least because it has the potential to provide an organisation a considerable competitive edge (Powell, 1995). This is achieved through minimising the costs of rework, waste, complaints and recalls, generating satisfied customers, and improving the bottom-line (Slack and Brandon-Jones, 2019; Oakland et al., 2020). Like other organisational and managerial practices, research in the domain of QM has explored,

among others, various definitions and perspectives towards its implementation (see Hietschold et al., 2014; Chen et al., 2022; Soltani et al., 2008; Idris and Zairi, 2006).

With regard to the definitional aspects of quality, the extant literature shows that there is no agreed or clear definition of what quality means. Garvin (1988) drew upon earlier QM gurus' writings who delved into deeper layers of quality meaning and categorised many of the various definitions into five approaches to quality:

- **the transcendent approach**
- **the manufacturing-based approach**
- **the user-based approach**
- **the product-based approach, and**
- **the value-based approach**

Of particular interest in this genre are the stream of studies suggesting that an integration of these five definitions can make it possible for any organisation to proper and develop its capabilities far beyond its internal processes. Such perspective is theorised to be particularly pertinent to the most significant approach to managing operations improvement: total quality management (TQM). TQM is defined as a comprehensive approach to improving the effectiveness and flexibility of business as a whole, aiming at fulfilling (internal and external) customer requirements (Oakland et al., 2020). Quality gurus (e.g., Deming, 1986; see also Foster and Gardner, 2022) theorise that TQM covers both 'hard' (production / operations management type of view) and 'soft' practices (people-based management type of view). Based on the writings of quality gurus, Garvin (1986) argues that TQM can be viewed functionally as an integration of two basic functions –i.e., total quality control and quality management. In a similar vein, Oakland et al. (2020) propose a mixture of both hard and soft approaches to depict TQM as a pyramid representing five distinct components as follows (see Figure 3):

- (1) management commitment (apex of the model)
- (2) customer-supplier chain
- (3) quality systems
- (4) statistical process control (SPC) tools, and
- (5) teamwork.

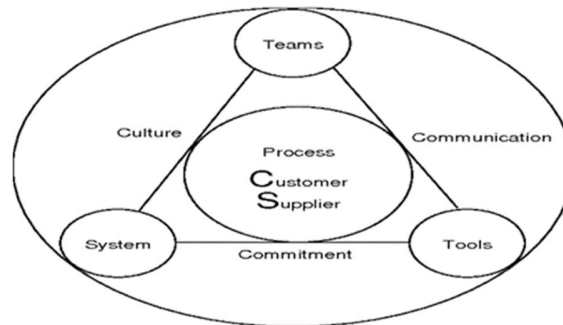


Figure 3. Oakland's total quality management model

While the preceding discussion highlights the distinct approaches to quality and variations in perception and understanding of its essence, it raises the question of how these different principles converge in practice. This leads to a discussion of how these various perspectives can be unified and merged – if TQM is to succeed.

In respect of the second stream of research on QM, the focus has been on reconciliation of different views on quality to facilitate its smooth implementation at both intra- and inter-firm levels (Deming, 1986; Crosby, 1979; Ishikawa, 1985; Figenbaum and Feigenbaum 2004; Hackman and Wageman, 1995). As previously mentioned, various definitions which have resulted in a range of different perspectives (see Oakland et al., 2020; Sitkin et al., 1994; Asif and de Vries, 2015; Manz and Stewart, 1997; Ali and Johl, 2022; Kanapathy et al., 2017), have brought about two main views on quality: the operation's view versus the customer's view (Johnston and Clark, 2005).

While the operation's view sees quality as consistent conformance to customers' expectations, the customer's view of quality is what a customer perceives the product or service to be. As a result of difference between the two views, a number of researchers have made an attempt to create a unified view of quality in that quality is defined as the degree of fit between customers' expectations and customer perception of the product of service (see Parasuraman et al., 1991; Roth and Menor, 2003; Reid and Sanders, 2023; Benjaafar and Hu, 2020). Reconciling the operation's and the customer's views of quality implies that there is a need on the part of the operations of all organisations to synthesize internal processes and views of external customers. Creating such a unified view is consistent with the word 'totality' in TQM, meaning that everyone throughout the supply network –i.e., both internal and external – is held responsible for providing high quality products and services to the end customer. Similarly, it has been observed that a holistic view to QM or systems-based view of organisation processes play a major role in the successful

implementation of TQM not least because higher quality is only achieved by focusing on and exploiting the potential and capabilities of all organisations engaged in the supply chain.

The nature and function of supply chain management

Similar to QM, SCM has been in use for several decades (see Jacobs and Chase, 2009; Rushton et al., 2022;; Stadtler, 2014; Zekhnini et al., 2020; Lambert and Cooper, 2000). While for some researchers SCM has close affinity with logistics, its major difference seems to be that it is the preferred name for the actualisation of “integrated logistics” theory (Muller, 1990; Gattorna and Walters, 1996, p. 12; Min et al., 2019). It is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers (Harland, 1996). It encompasses the planning and management of all activities involved in sourcing, procurement, conversion, logistics management activities. Such characteristics are echoed by Mentzer et al. (2001) who summarises various definitions of SCM into three categories, namely,

- (i) a management philosophy
- (ii) the implementation of a management philosophy, and
- (iii) a set of management processes

To successfully compete in networked economy (Gunasekaran et al., 2008), it is commonly noted that an organisation’s SCM must be effective in that (Drucker, 1998; Svensson, 2007; Gereffi and Lee, 2012; Koberg and Longoni, 2019):

- it should have a cross-functional approach to manage the internal processes for the benefit of external customers
- it should strive to focus on core competencies and higher flexibility
- it must establish a great sense of trust and collaboration among supply chain partners one that extends beyond traditional boundaries

Indeed, the recent experience of Dell and Hewlett Packard, which can be called inter-organisational supply network, in that they successfully operated collaborative supply networks and that their business partners focus on only a few key strategic activities (Scott and Westbrook, 1991), highlights the importance of an effective supply networks in order to successfully compete in the volatile global market (Katsaliaki et al., 2021). Other researchers such as Svensson (2007) provide more specific account of SCM issues and compare the traditional view to more modern

view to SCM. This line of reasoning is interesting, given that it has been theorised that the more the interactions among the supply chain partners gets complicated, it is highly likely that the network structure fails to fit both market and hierarchy categories (Powell, 1990).

Operations management scholars also question the nature and extent of collaboration among the supply chain partners and the resultant implications for the firm's performance (e.g., Ketchen and Hult, 2007; Nassar et al., 2020; Fynes et al., 2005; Duong and Chong, 2020). More recent studies highlight changes in the business environment in terms of globalisation, emerging economies, the proliferation of international firms, and technological changes to play a significant role in establishing the need to close coordination among the members of supply chain network (Ivanov and Dolgui, 2021; Hofmann et al., 2019; Kano et al., 2020 and Chang et al. 2020). The brief preceding review of literature on QM and SCM prompts us to connect QM and SCM, considering and merging them to discuss Supply Chain Quality Management (SCQM) as a unified field of study.

Quality management across the supply chain

Despite their basic differences in terms of fulfilling different organisational needs, their own devoted and allocated resources, their initial backgrounds, it can be argued that the two concepts are complementary and serve the same purpose on several fronts:

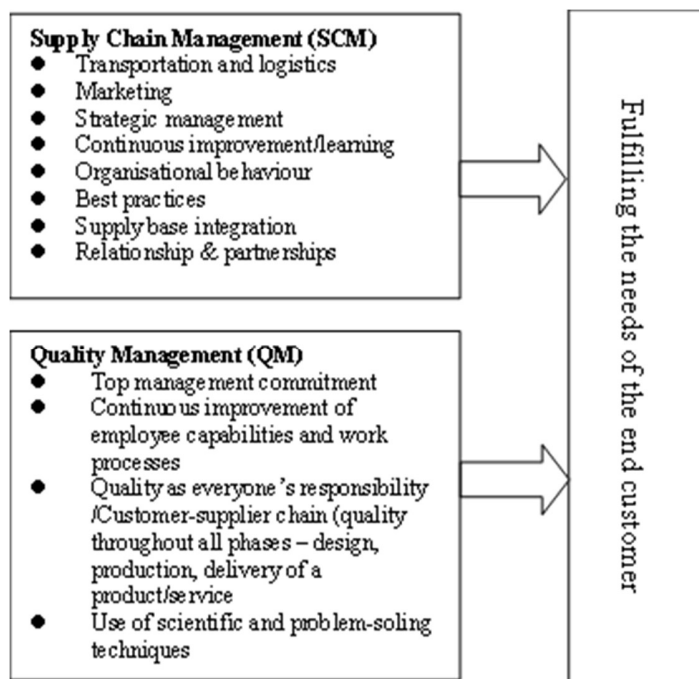
- they start and end with the (internal and external) customer
- they require a holistic or systems-based approach to managing organisational processes to fulfil the needs of the end customer, and
- they are both sub-functions of operations function of any organisation.

Given such commonalities, some attempts have recently been made to operationalise and understand the effect of increased emphasis on SCM on the practice of QM and therefore synthesize these two concepts. In this light, supply chain quality management (SCQM) has been identified as a new field of study.

Foster (2008, p. 461) defines SCQM as “a systems-based approach to performance improvement that leverages opportunities created by upstream and downstream linkages with suppliers and customers”. Taking a process centric view of SCQM and insights from previous writings on the topic (e.g., Ross, 1997), Robinson and Malhorta (2005, 319) defined SCQM as “the formal coordination and integration of business processes involving all partners organisations in the supply channel to measure, analyse, and continually improve products, services, and processes in order

to create value and achieve satisfaction of intermediate and final customer in the marketplace” (see also Fish, 2011). As Figure 4 indicates, while both QM and SCM can be synthesised in a sense that they share a common goal, they are operating in parallel to fulfil various organisational needs and therefore remain complementary and supplementary sub-functions of operations functions (see Robinson and Malhorta, 2005; Soltani et al., 2011; Foster et al., 2011; Waldman, 1994).

Figure 4. The underlying assumptions of SCM and QM and their common goal

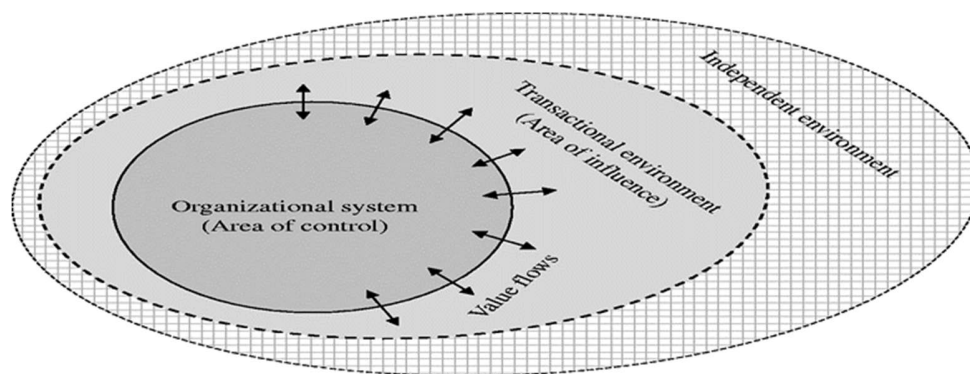


Source: Robinson and Malhorta, 2005; Soltani et al., 2011; Foster et al., 2011; Waldman, 1994

Altogether, the complementary nature of QM and SCM suggests that neither can operate in isolation if a firm is to complete on quality as order-winner (Hill, 2000) – especially in the current globalised and geographically dispersed market with suppliers around the world and a geographically dispersed customer base. This reinforces the notion of organisation as a total system, requiring “hard-nosed assessment of how the entire chain of service or good production contributes to serving customers” (Sitkin et al., 1994, p. 542; Snell and Dean, 1992).

A systems theory perspective of SCQM

The interaction and interrelatedness of functional areas of an organization (e.g., quality management and supply chain management) and particularly their shared goal of meeting customer needs (Foster, 2022; Soares et al, 2017), can be justified through the lens of systems theory of organization. Despite its roots in biology and systems science, it has been widely used in organisational studies based on the idea that organizations and their operations are not alien to the mechanic world. That is, they are open, living organisms which should not be studied in isolation but rather as a whole with interconnected subs-systems influencing other systems and being influenced by internal and external factors (Von Bertalanffy, 1973). As Figure 5 shows, the notion of organisation as an open system implies that it interacts with and is influenced by its (internal and external environment) in which it operates, both independently and adaptively. Striking an appropriate balance an organisation and its external environment is vital for organisations to thrive and maintain sustainability in the globally dispersed and geographically scattered business environment (Gharajedaghi 1999).



Source: Gharajedaghi (1999)

Figure 5: The organization as an open systems and its environment

As Laszlo noted:

“A new view of the world is taking shape in the minds of advanced scientific thinkers the world over, and it offers the best hope of understanding and controlling the processes that affect the lives of us all. Let us not delay, then, in doing our best to come to a clear understanding of it”. (Laszlo, 1969, viii)

The implication of Laszlo’s observation along with other scholars (e.g. von Bertalanffy, 1968; Ackoff and Emery, 1972; Churchman, 1979) and its emphasis on the convergence point between

sciences and its potential to interpret nature and mastering the ever increasing complexity of the products of human intelligence is that we need to adopt a system thinking approach to the study of QM with an aim to extend quality (and other managerial functions) to socio-political systems at all (intra- and inter-firm) levels. The influence of this approach is particularly evident in the work of quality gurus and their advocates. As Conti (2006, p. 307) put it succinctly,

“... reinforce the claim for the extension of quality and quality management concepts to socio-political systems, at all levels. A goal that may look naive, or at least too ambitious, but certainly badly needed, given the exponential rise of political problems, particularly at the international level, due to the opening of once closed socio-political systems and the internationalization of everything, the so-called “globalisation”.

Reflections on recent research and avenues for further exploration

While it is commonly acknowledged that QM and SCM make significant contribution to any firm, it is surprising to see that some aspects of the two topics have not received greater scrutiny in mainstream operations management studies. Despite the significant theoretical and practitioner interest on local SCM and QM operations, the dearth of research has been particularly marked in mainstream global SCQM studies (see Koberg and Longoni, 2019; Shen and Chen, 2020). For some operations management scholars (Barnes, 2018), restricting operations management to the consideration of factory-based activities alone is increasingly recognised as being ultimately limiting in an important way. The performance of the operations is affected by what goes on outside the factory as much as by what goes on within it (see also Demeter, 2017). This view asserts that the performance of suppliers and other supply network partners (e.g., manufacturer, distributor) can significantly influence the extent to which an organisation’s operations can satisfy its customer, and that supply network relations are increasingly recognised as being vitally important in operations management. Hence, the dearth of research beyond intra-firm management of quality to encompass its practice across the entire supply chain at a global level constitutes a further research agenda (see Zhang et al., 2020; Parast, 2019; Duong and Chong, 2020).

A review of the operations management literature finds that there is significant theoretical and practitioner interest on collaborative buyer-supplier relationships (see Zhang et al., 2008; Morgan et al., 2007; Hartley et al., 1997; Shamsollahi et al., 2021; Alghababsheh and Gallear, 2020; Villena et al., 2021; Yang et al., 2022). These literatures posit that close and more collaborative

relationships allow buyers and sellers to share resources and obtain mutually beneficial economic outcomes that are superior to those that each party may be able to achieve separately (see Morgan et al., 2007, p. 513). However, there has been little mention of the dynamics of SCQM processes in the context of global supply networks where the greater use of global sourcing – as opposed to local sourcing – is considered to offer the prospect of greater added value – Albeit with its inherent risks as well. Furthermore, the very few studies that discuss SCQM in the context of local supply chain networks have tended to primarily focus on supplier-manufacturer or supplier-supplier partnership (see Freeman and Liedtka 1997; Durach et al., 2020; Wu and Choi, 2005; Wu, et al. 2010; Choi and Wu, 2009; Wissuwa et al., 2022). Such limitation has in turn restricted understanding of the third key element in the supply chain networks –i.e., distribution channel – as well as the end customer’s perception of the product quality which both SCM and QM share the view of fulfilling their requirements.

Another area of research that requires further attention is the focus on SCQM in the service sector. This is particularly important due to the continuous growth of the service industry in the global economy (see Ochel and Wegner, 2019). Exploring the management of quality in the global supply chain with a specific focus on services would advance knowledge and enhance our understanding of this subject. One reason for this is that services, being characterized by human interaction and intangible nature, can result in diverse service experiences and perceptions, influenced in part by the cultural backgrounds of customers. Understanding the variations in customers' assessment of different global services is crucial (see Victorino et al., 2018; Pine and Gilmore, 2011; Bitner and Brown, 2008).

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