The Impact of Quality Management Practices on Purchasing Performance Within Supply Chain Relationships in Service Organizations

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Abstract The primary purpose of this study has been to investigate the association between Quality Management Practices in Purchasing (QMPPs) and purchasing performance within supply chain relationships in the service industry. A set of hypotheses derived from the key aspects of quality management practices in purchasing and purchasing information system practices, as envisaged in past research in the areas of quality management, purchasing, and supply chain management, has been tested on a sample of 100 purchasing managers drawn from the hotel industry in Thailand. The findings indicate that quality management practices in purchasing have a significant direct impact on the use of purchasing information service practices and the purchasing performance, as well as an indirect impact on purchasing performance of service organizations mediated through purchasing information system pratices. Numerous theoretical and managerial implications of the findings of this study have been presented, that would not only be instrumental in furthering research in supply chain networks and service industry domains but would also offer useful insights to the industry practitioners enabling them to manage service operations competitively.

1 Introduction

An acute need to draw a sustained competitive advantage in today's hypercompetitive global marketplace has profoundly induced management to change its philosophy from company-orientation to supply chain orientation (Ugochukwu et al. 2012). The critical role of the supply chain management (SCM) in galvanizing company performance could not be undermined by the firms. For companies to remain profitable these days, the attention of management needs to be directed to an effective management of supply chains

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(Gutierrez-Gutierrez et al. 2018; Uluskan et al. 2016). Firms are pursuing a variety of ameliorated SCM practices to improve product and/or service quality while simultaneously reducing costs (Anil and Satish 2019; Baraniecka 2016). They are a lot more open to integrate instrumental tools and techniques all along the supply chain networks to enhance its efficacy in accelerating company performance. The integration of quality management initiatives is one of them (Peng et al. 2016; Tizroo et al. 2017). Various scholars have strongly advocated such an integration of QM systems to enhance firms' competitiveness through enhancing their supply chain performance (Foster et al. 2011; Gutierrez-Gutierrez et al. 2018; Kaynak and Hartley 2008).

Quality management corresponds to the management of all functions and activities necessary to determine and achieve quality. In pragmatic terms, it means providing a product or service, which is satisfactory to the consumer, at a price commensurate with that satisfaction, in the most cost effective and efficient manner. According to Soltani et al. (2011), and Wiengarten et al. (2015), quality management offers more scope for achieving and maintaining a company's competitive advantage than other management techniques. The integration of quality management tools and techniques into SCM has been designated as "Supply Chain Quality Management" (SCQM) in the literature (Lo and Yeung 2006; Sila et al. 2006; Foster et al. 2011; Uluskan et al. 2016; Tsai and Hung 2016). A profound need to diverge from conventional firm or product centric view to a collaborative SCM in an age of network approach to business has inspired academicians and practitioners to solidify this much needed overlap between QM and SCM (Ross 1998; Sila et al. 2006; Lo and Yeung 2006; Foster 2008; Foster et al. 2011; Prajogo et al. 2012; Tsai and Hung 2016; Uluskan et al. 2016). An organization-wide approach to managing quality across the entire supply chain network can invigorate its performance in a competitive environment through promoting greater understanding, alignment, mutuality, cooperation, coordination, and knowledge sharing among the key SC stakeholders for the maximization of co-created value (Huo et al. 2014; Humphries and Gibbs 2010; Kamal and Irani 2014; Soares et al. 2012; Zhang et al. 2011). Several studies have attested to the performance enhancement effects of the integration of quality management practices in SCM (Fernandes et al. 2017; Jayaram et al. 2013; Quang et al. 2016; Sampaio et al. 2016).

Purchasing (or in a broader sense procurement) is one of the key SCM activities that occupies a crucial role in amplifying competitive position and performance of a firm not only through cost reduction but also through value creation and/or enhancement (Ik and Azeez 2020; Bezecný et al. 2019). Purchasing, as an essential function, is primarily responsible for materials being moved from suppliers/vendors to manufacturing facilities. An organization's profit is determined and defined by its purchases to a notable extent, and purchasing performance is one of the key drivers of a company's growth, even survival. According to one estimate, between 50 and 70% of a manufacturing and/or service company's potential value is in purchased items (Mihaly 1999). Some authors (e.g., Dowst 1987) have noted that half of the quality problems arise due to the defects in purchased supplies (aka garbage in, garbage out) leading to an unwanted rise in cost of production, hampering firms'

competitiveness especially in international markets. According to Zsidisin and Smith (2005) and Andresen (2009), a crucial challenge for effective purchasing is not only to ensure continuity of supplies but also to block cost escalations in the face of supply chain disruptions caused by any natural or man-made disasters, or the outbreak of pandemics such as Covid-19—the integration of QM into purchasing can profoundly help it in the successful realization of these goals. Prajogo et al. (2012) and Uluskan et al. (2016) noted that the efficacy of purchasing and supply chain management could significantly be enhanced through committing substantial quality-enhancement-centered investments in purchasing practices. Cavinato and Kauffman (2000) also revealed implementation of QM in purchasing as an effective step towards an acceleration of firm performance.

Åhlström and Nordin (2006) and Smeltzer and Ogden (2006) contend that purchasing (materials and services) for service organizations is more complex than doing the same for manufacturing firms. The complexity primarily stems from factors like the dispersed rather than centralized nature of procurement, the absence of a clear link between inputs, processing, and outputs, low priority given to the procurement expertise of personnel, end user rather than process focus, loss of control over suppliers and customers due to excessive outsourcing, writing poor contracts, etc. (Abouzeid 2019; Åhlström and Nordin 2006). Despite such a complexity, the dynamics of purchasing performance for service organizations remains an under-researched area (Abouzeid 2019). Realizing this deficiency in literature, we have focused on investigating dynamics of purchasing performance in service organizations, more specifically the (direct as well as indirect) impact of quality management purchasing practices (hereafter QMPPs) on purchasing performance in hotel industry. The hotel business is one area where there is intense competition. Each hotel continuously seeks to develop and modify its services to stay competitive. The purchasing function is a broad-based and key business activity in hotel industry. It is a critical support activity that ensures that operations run smoothly and efficiently. A hotel's operational efficiency has a direct impact on economic gains through both the quality-enhancement and cost reduction avenues.

Though several studies have investigated impact of the adoption and implementation of quality management systems in purchasing on the supply chain performance and/or the overall performance of the firm, there has been scarcity of research examining the (direct or indirect) impact of such a QM integration on purchasing performance, especially in service organizations (Abouzeid 2019; Cua et al. 2001; Anil and Satish 2019; Baraniecka 2016; Gutierrez-Gutierrez et al. 2018; Zeng et al. 2017). This research makes up for this deficiency by explaining how the integration of QM systems in purchasing practices enhance purchasing performance directly as well as through inducement and consequent adoption and implementation of purchasing information system services, in service organizations. The intended contributions of this study are manifold. First, we seek to contribute to the existing body of knowledge in QM, purchasing, technology management, and SCM by exploring the QMPPs—purchasing performance link by considering the mediating effects of the purchasing information system services. Putting it differently, this study contributes to the purchasing and SCM literature by investigating the impact of QMPPs on

purchasing performance through inducing/implementing purchasing information systems. Second, by focusing on service sector, this study makes up for a critical deficiency in purchasing management and SCM literature where focus of most research has been on purchasing in manufacturing businesses. Third, owing to the (perceived) pivotal role of effective procurement during abrupt crises, this study seeks to offer some useful insights for enhancing firms' adaptive response to the organizational crises stemming from environmental disruptions. Finally, the study has been conducted in ASEAN region, the findings of the study bolster the generalizability of etic theories developed in the west to other cultural and/or geographical contexts.

The subsequent sections of this paper are structured as follows. The second, third, and fourth sections, besides presenting an account of the problem background, relevent literature review, highlight some research gaps and subsequently outline a theoretical framework to bridge these research gaps. Section 5 explains methodology of the empirical study. Section 6 presents an analysis of the data as well as the results ensuing from this analysis. Section 7 presents a discussion on the (empirically substantiated) cause and effect relationships among the subject constructs. The final section discusses some theoretical and managerial contributions of the study, besides concluding the entire discussion.

2 Theoretical Background

2.1 The Hospitality Industry Today

In today's shrinking, fast-moving world-airlines, passenger ships, trains, buses, and automobiles carry travelers all over the globe on either pleasure or business trips. These travelers require food, lodgings, and services of a good standard, at reasonable prices. In every country, new hotels offer improved standards of accommodation, restaurants, bars, banqueting halls, and facilities for meetings, conventions, and recreation. The United States is the tourist capital of the world, and the dollar value of travel amounts to billions every year. Hotel management today is controlled by computers and data processors, which spew out a continuous stream of useful information on unit costs, budgets, payroll control systems, market research analysis, and statistics. This data could be helpful not only in correctly understanding the concurrent situation but could also help hotels to make sound projections about the future and be ready to adjust to the future contingencies. It is a fiercely competitive business: every operator aims for maximum occupancy and profitability. This goal could be achieved by continuously improving efficiency within the establishment and by offering the highest standards of accommodation, facilities, and service at competitive prices. The phenomenal growth and expansion of the industry since 1960s have created a constant demand for trained, skilled staff. With modern management and new business techniques, the future will bring an increasing

demand for intelligent, well-educated young people trained in science and technology.

2.1.1 Purchasing in the Hospitality Industry

Purchasing in the hospitality industry can be described as obtaining the *right product, at the right place, at the right time*. This statement sounds extremely simple, but when it is applied to the 1000 to 2000 items a hotel purchases, it presents a great challenge for the purchasing manager. The hotel purchase function supports virtually every department within the property, whether purchasing chemicals for the housekeeper or stewarding office, supplies for marketing, computer supplies for accounting, or food and beverage products for the restaurant service. Hospitality purchasing professionals are usually referred to as purchasing managers or purchasing agents. These individuals are responsible for acquiring material resources for a hospitality enterprise in a timely and cost-efficient manner. A process called sourcing is how purchasing professionals identify the vendors that provide resources that meet the specifications of a specific hospitality organization. The purchaser will base procurement volumes on operational forecasts used to determine resource use. Once the volume levels have been determined, the purchaser will secure pricing bids from some vendors. The purchaser then will issue a purchase order to each selected vendor. The purchase order is an authorization for accounts payable for a specific invoice after the goods are received by the hospitality organization (Andrew and John 2001).

3 Literature Review

3.1 Quality Management Practices in Purchasing (QMPPs)

Total quality management (hereafter TQM) has been defined as a "philosophy" or an "approach to management" made up of a set of mutually reinforcing principles, each of which is supported by a set of practices and techniques (Dean and Bowen 1994). According to Hoyle (2007), successful implementation of TQM enhances performance through enhancing process controls, reducing wastage, decreasing costs, increasing market share, instilling greater staff involvement, and setting a virtuous mission and vision of a company and directions to be followed. Peng et al. (2016) contend that competencies achieved through the adoption of TQM may have tremendous effects on organizational performance. Ameer (2018) found that inadequacies of the current SC models in realizing desired performance levels are partly due to a lack of adoption and implementation of TQM programs. Kawalla et al. (2019), while reckoning quality as a key strategic goal, urge the need for quality certification all along the supply chain networks to gain superior economic and social gains. Peng et al. (2020) showed how SC performance is impacted through

enhanced collaboration among SC partners when TQM is instituted. Consequently, a vast number of scholars have advocated a stronger need to integrate QM tools and techniques in all functions and areas of value chains, including purchasing (Wee and Wu 2009; Fletcher et al. 2016; Tsai and Hung 2016; Tsanos and Zografos 2016; Sancha et al. 2015).

The adoption of quality management practices in purchasing has attracted attention of numerous authors. The literature discusses such issues as the need to establish cooperative relationships with suppliers, barriers to implementation, and performance. A review of the literature also finds a number of studies that have adopted a broader view of the implementation of quality management in purchasing, including the need to manage purchasing personnel based on quality, the need to enhance the coordination of purchasing with other functional areas of the company, the strength of purchasing managers' commitment towards quality, and benchmarking in purchasing (Hemsworth and Sanchez-Rodriguez 2003).

The first set of practices included in the quality management practices in purchasing (QMPPs) construct deals with involvement of the suppliers in quality management. Several studies have recognized the importance of supplier quality management (hereafter SQM) to a buyer's success in achieving quality (Humphries and Gibbs 2010; Ketchen et al. 2008; Kannan and Choon Tan 2006; Soares et al. 2012; Tsai and Hung 2016). SQM could be regarded as reducing size of supplier portfolio, appraising performance of the suppliers, outlining effective improvement goals for the suppliers and acknowledgement of such improvement, facilitating suppliers' involvement and development, etc. (Trent and Monczka 1999, 2002; Tsai and Hung 2016).

The implementation of QMPPs is, however, not limited to supplier management practices but also involves coordination of the purchasing function with other functional areas, such as the collaboration between purchasing and marketing in new product design processes or the collaboration between purchasing and manufacturing in quality-related problems (Burt 1989; Carter and Narasimhan 1994; Otley 2016; Soares et al. 2012). The literature has also identified purchasing personnel management as a key implementation issue in purchasing for companies with a total quality management (TQM) system, including personnel autonomy, commitment to empowerment, and teamwork (Abouzeid 2019; Giunipero and Vogt 1997; Prahalad and Hamel 1990; Uyarra et al. 2014). The implementation of certain QM practices is necessitated to encourage purchasing personnel to participate actively in the firm strategy that facilitates the firm in securing a continuous strategic alignment. Other key elements of the implementation of a quality management system are the commitment of managers towards quality improvement, and benchmarking (Prajogo et al. 2012; Uluskan et al. 2016). Thus, the QMPPs construct adopted for this study includes measures of supplier quality management, cross-functional coordination in purchasing, purchasing personnel management, the commitment of purchasing managers, and benchmarking in purchasing.

3.2 Purchasing Information System Services (PISS)

The most significant development during the last couple of decades could be the emergence of an information-driven economy (Kefel 2010; O'Donovan 2020). The formation of such an information-driven economies could inevitably be associated with the digitalization of firms, organizations, and institutions. In the so-called digital age, information has become the key resource for the firms to attain competitive advantage. Ilcus (2018) argues that digitalization is creating a new competitive environment through the transformation of business strategies, models, and processes. Consequently, an overpowering capability to collect, process, and use information is considered vital in all areas of business, including purchasing and SCM (Neamțu et al. 2019). Companies across the world are adopting digital technologies to create efficient, transparent, and resilient systems. In future, competitive advantages would be available only to those companies whose business processes will be based on, or strongly integrated with digital technologies (Verhoef et al. 2021).

As Cousins (2005), asserts that purchasing function and strategy need to be strongly resource-enabled to achieve a sustained performance. One such enablement could be the adoption and integration of real-time digital technologies. Xu (2011) views communication and information sharing using IT-enabled digital technologies as a prerequisite for optimizing performance of multi-echelon supply chain networks. Many other studies (e.g., Chang 2017; Dumond and Newman 1990; Gregory et al. 2017) have identified the integration of information technology as a potent enabling condition for effective management of purchasing and SCM in the face of challenges stemming from environmental dynamism. In consonance with these contentions, we have used purchasing-related information system practices construct as the mediating and/or enabling condition for superior purchasing performance through instituting quality management in purchasing practices.

In this study, the PIS construct comprises of investments of a firm in two key enabling technologies, i.e., Electronic Data Interchange (EDI) and the Internet (-enabled technologies). Effective QMPPs rely on the ability to use real-time information. As such, investments in information system practices such as EDI, the Internet enabled technologies and sharing information with suppliers all play a pivotal role in actualizing quality enhancement, as they provide the vehicle whereby frequent, accurate, and secure information can be compiled, manipulated, and exchanged (Gregory et al. 2017; Sriram et al. 1997; Xu 2011).

3.3 Purchasing Performance (PP)

Even though there were times when purchasing function has been subordinated by activities like production or SCM (Cousins et al. 2008; Ponce and Prida 2006), in present times it is considered a vital support activity comprising a crucial and integral part of firms' value chains. Even though primary considerations in purchasing may

be continuity and cost reduction, however it must in principle be carried out with the aim of buying safe and quality assured supplies. Since purchasing-related issues like (adverse) selection of a wrong supplier, writing a disadvantageous contract, poor quality of social embeddedness due to lack of trust and commitment, and the moral hazards ensuing from it all may have dire consequences for the company's well-being, purchasing performance becomes quite critical for an organization (Eckstein et al. 2015; Yaqub 2013). Superior management of supplier relationship and purchasing could put a firm in an advantageous position vis a viz competitors and becomes quite handy especially during turbulent times (Bezecný et al. 2019; Ik and Azeez 2020; Kemboi 2016; Yaqub 2009).

The ultimate exogenous construct, i.e., purchasing performance, was adpated from Chao et al. (1993). Its individual indicators included materials' quality, physical inventory performance (Leenders et al. 2002), timeliness of delivery, and discrepancy between desired and actual costs. We have postulated the integration of quality management in purchasing practices as a direct as well as indirect antecedents of purchasing performance. The following section elaborates upon the hypothesized cause-and-effect relationships among our subject constructs.

4 Hypotheses of Study and the Conceptual Model

Figure 1 depicts our conceptual model.

It has been hypothesized that the QM purchasing practices have a direct impact on purchasing performance as well as an indirect effect mediated through purchasing-related information system services. The following paragraphs would elaborate upon the theoretical basis for this conceptualization.

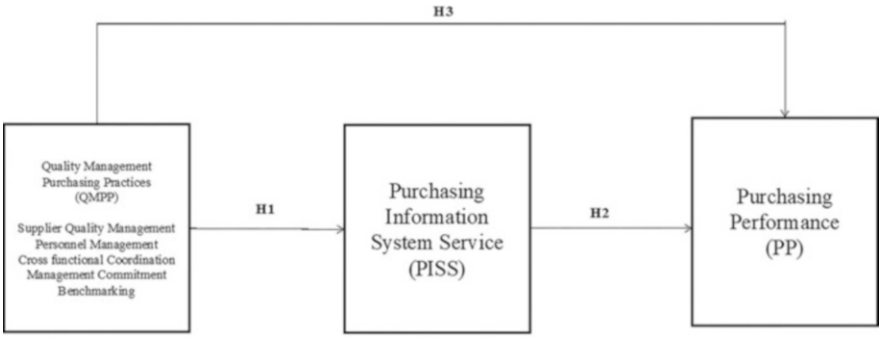

Fig. 1 The conceptual model

4.1 QMPPs and Purchasing Information System Services (PISS)

In the recent times, we have witnessed an increasing trend in the firms putting in place one or more productivity-enhancing program such as Total Quality Management, Business Process Re-engineering, Just-In-Time Management, Industry 4.0 integration (Dewhurst et al. 2003; Gutierrez-Gutierrez et al. 2018; Queiroz et al. 2020; Uluskan et al. 2016). It has been argued that the success of all these tools and/or interventions rely on investments in information systems to get rapid and more accurate information, improve communication links, and facilitate the implementation of advanced tools, systems, and modeling techniques. Information systems support quality programs and more specifically, efforts in management leadership in quality, customer relationships, supplier relationships, workforce management, quality data and reporting, process flow management, and product design processes (Lubis et al. 2019; Xu 2011). The QMPPs are designed to maintain close collaboration internally with other functions and externally with the SC network partners. The need for timely and accurate sharing of information, intense communication, and close monitoring are crucial aspects for the success of quality-oriented purchasing practices. Also, the total quality management program causes an increase in IS investment for purchasing activities and for communications with vendors. Thus, effective QMPPs rely on the ability to use real-time information. As such, investments in information system practices such as EDI, the Internet, and sharing information with suppliers and other stakholders in SC networks all play a pivotal role in implementing these programs because they provide the vehicle whereby frequent, accurate, and secure information can be compiled, manipulated, and exchanged (Parast and Golmohammadi 2016; Sriram et al. 1997). Hence, the following hypothesis is formulated:

H1: Implementation of quality management practices in purchasing has a positive impact on the use of purchasing information system services.

4.2 PISS and Purchasing Performance

It is frequently argued that investment in information system practices is an important factor in increasing productivity and internal customer satisfaction, as well as reducing costs—there is evidence of positive and significant returns from IS investments (Bessen 2002; Hemsworth et al. 2007; Keitemoge and Narh 2020). Some studies have analyzed the impact of individual purchasing-related information system practices on specific purchasing performance indicators. For example, researchers (such as Banerjee and Sriram 1995; Lou et al. 2015) found that implementation of EDI systems improves supplier-buyer efficiencies and reliability, lowers costs and order cycle times, and increases customer satisfaction. Research

has also found that Internet order purchasing, and production scheduling directly enhance efficiency of the purchasing function (Lancioni et al. 2000). Timely and accurate information is also crucial for buyer-supplier decision-making and ultimately the supplier performance (Handfield et al. 2000; Mazzuto and Ciarapica 2019). However, some other studies show contradictory results that information system practices do not increase productivity and reduce costs and have failed to find a significant impact on financial performance or competitive advantage arising from information systems (Dwivedi et al. 2015; Lucus 1981). With respect to purchasing information system practices (e.g., order processing, online purchasing, production scheduling, clerical effort, security, tracking and control, as well as intra- and inter-company communication) and financial performance link, Craig (1989), and Dwivedi and Henriksen (2017) found that information technology investment geared at enhancing strategic IS investments generally produced poor results in the short term. Whereas there is plethora of research signifying the financial impact of such investments, there has been shortage of research to corroborate its impact at functional performance levels. Hence, to make it up, the following hypothesis is proposed and, subsequently examined:

H2: The implementation of purchasing information system practices has a positive impact on purchasing performance.

4.3 QMPPs and Purchasing Performance (Direct Effects)

Regarding QMPPs, several other studies have also reported that SQM lowers material costs, increases the quality of materials, reduces delays in deliveries from suppliers, and eliminates mistake in quantities ordered and received (Fernandes et al. 2017; Jayaram et al. 2013; Quang et al. 2016). Noordewier et al. (1990) found positive relationship between QMPPs and four indicators of purchasing performance. Researchers such as Bergman and Klefsjö (2010), and Cavinato and Kauffman (2000) have also made similar assertions. Quite concomitant with such literature, it would be reasonable to postulate that the adoption of QMPPs could be directly associated with superior purchasing performance, and hence the following hypothesis is formulated:

H3: Quality management practices in purchasing have a direct positive impact on purchasing performance.

4.4 The Mediating-Effects Hypothesis

Also, the effect of QMPPs on performance could also be indirect through the influence of purchasing information system practices on purchasing performance (H2). This link is consistent with recent literature that recognizes the critical

importance of information system practices as an enabler of quality improvement programs on performance. This relationship represents an important gap in the current literature since few studies have explicitly considered the role of information system practices on quality management practices when considering purchasing performance outcomes. Based on this reasoning, the fourth hypothesis has been generated as following:

H4: Quality management practices in purchasing have an indirect positive impact on purchasing performance mediated through the effect of purchasing information system services.

5 Research Methodology

The research has been designed to provide an exploratory analysis investigating the purchasing functions/departments of hotels in Thailand, with interest in the measurement of purchasing performance. We also validated the model through confirmatory factor analysis, followed by testing through structural equation modeling. In this way, it sought to establish a causal relationship between QMPPs and its impact on Purchasing Performance (PP).

To carry out this research, a questionnaire-based survey approach has been adopted. The questionnaire contained a series of questions (see Table 2) that were answered by the purchasing managers who had sufficient knowledge in this field. The survey instrument measured a total of 31 items adapted from the scales used for these constructs in previous research: 22 items referred to QMPPs, 5 items related to IS practices, and 4 items corresponded to purchasing performance. The survey has been distributed to the 3 to 5 stars hotels in Thailand which had earned the certificate from the Thailand Hotel Standard Association.

The hypothesized model was tested by structural equation modeling (SEM) using AMOS. SEM is a pertinent tool for analysis where multiple regression equations encapsulating association among various constructs reflecting upon various first and/or higher-order measurement levels are calibrated simultaneously (Hair et al. 1995). Besides, yielding useful estimates on the measurement quality, it also generates measures on the strength of individual connections, as well as the overall fit of the entire model.

6 Results and Findings

A brief profile of the survey respondents is contained in Table 1.

Factor analyses (FA) and tests of the alpha coefficient were conducted to address the validity, reliability, and unidimensionality of the constructs in this study (see Table 2).

Table 1 Profile of respondents

Location	Level	Respondents
Bangkok and Central Region	Five stars	6
	Four stars	20
	Three stars	16
Eastern Region	Five stars	4
	Four stars	5
	Three stars	3
Northern Region	Five stars	5
	Four stars	5
	Three stars	4
North-eastern Region	Five stars	1
	Four stars	2
	Three stars	0
Western Region	Five stars	1
	Four stars	2
	Three stars	3
Southern Region	Five stars	8
	Four stars	8
	Three stars	7
Total		100

Table 2 Results of confirmatory factor analysis

Code	Construct/item	Standardized Loading	CR	*t*-values
SQM	*Supplier quality management*	−1.280	−0.829	<1.96
PM	*Personnel management*	0.077	–	–
CFC	*Cross-functional coordination*	0.097	0.906	<1.96
MC	*Management commitment*	−0.100	−0.918	<1.96
BM	*Benchmarking*	0.024	0.346	<1.96
IS	***Information system***			
Q.23	We use EDI with suppliers	0.755	6.638	>1.96
Q.24	We use the Internet with suppliers	0.664	–	–
Q.25	We use computers to process orders to suppliers	0.793	6.911	>1.96
Q.26	Suppliers have access to our production schedule	0.675	6.023	>1.96
Q.27	Purchasing has access to suppliers' internal information	0.764	6.700	>1.96
PP	***Purchasing performance***			
Q.28	Purchasing meets its material target cost	0.731	3.770	>1.96
Q.29	Most raw materials and parts received conform to specifications	0.468	–	–
Q.30	All raw materials and parts arrival within delivery date	0.678	3.721	>1.96
Q.31	The quantity of materials purchased in inventory meets the quantity performance objective	0.613	3.590	>1.96

Referring to Table 2, SQM (supplier quality management) scale consists of Q1 to Q6 of the questionnaire and represents the C.R < 1.96, which means that it is not significant. Moreover, all the standardized loadings of Q1 to Q6 $= -1.280$ also represent weak relationships between each variable. The PM (personnel management) construct consists of Q7 to Q12 and represents the C.R < 1.96 which means that it is not significant either. Moreover, all the standardized loadings of Q7 to Q12 $= 0.077$ also represent weak relationships between each variable. CFC (cross-functional coordination) scale measured through Q13 to Q16 represents C.R. < 1.96 which means that it is not significant. Moreover, all the standardized loadings of Q13 to Q16 also represent weak relationships with the dependent variables. MC (management commitment) scale consisted of Q17 to Q19 and represents the C.R < 1.96 which means that it is not significant. Moreover, all the standardized loadings of Q17 to Q19 also represent weak relationships. BM (benchmarking) scale consists of Q20 to Q22 and represents the C.R < 1.96 which means that it is not significant Moreover, all the standardized loadings of Q20 to Q22 also represent weak relationships between the variables. IS (Information system) scale consisting of Q23 to Q27 represents the C.R > 1.96 which is significant. Moreover, all the standardized loadings of Q23 to Q27 also represent strong relationships between the variables. Lastly, PP (purchasing performance) scale consists of Q28 to Q31 and represents the C.R > 1.96 which is significant. Moreover, all the standardized loadings of Q28 to Q31 also represent strong relationships between the relevant variables.

6.1 Summary of CFA Fit Indices

We performed Confirmatory Factor Analyses (CFA) to assess measurement quality through reliability, validity, and unidimensional nature of the constructs (Anderson and Gerbing 1998). The results are contained in Table 3. For the constructs, namely benchmarking and commitment, the structure could not be ascertained for the reason of loss of degrees of freedom due to the model being over-specified. The two

Table 3 Summary of results from CFA

Fit measure	Recommended threshold values	Constructs					
		SQM	PM	CO	MC BA	IS	PP
χ^2	–	33.704	25.151	0.234	102.119	17.149	10.251
p-value	≥0.05	0.000	003	0.890	0.000	0.004	0.006
d.f.		9	9	2	9	5	2
RMSEA	≤0.05	0.167	0.135	0.000	0.323	0.157	0.204
RMR	≤0.05	0.044	0.041	0.006	0.204	0.036	0.047
NFI	≥0.90	0.899	0.920	0.998	0.433	0.919	0.878
CFI	≥0.90	0.922	0.946	1.000	0.436	0.939	0.894
GFI	≥0.90	0.900	0.921	0.999	0.765	0.937	0.958
AGFI	≥0.90	0.768	0.815	0.994	0.452	0.812	0.788

constructs thus were paired. Subsequently, after determining validity and reliability of the five individual indicators of QMMP, an average composite score was measured. As such, QMPP has been measured as a higher-order construct.

A convergent validity reflects that the individual indicators measuring the construct encapsulate the essence of that construct. Here, the convergent validity was assessed by examining significance of the factor loadings, all of which were found to be significant, attesting to the sufficiency of convergent validity. The coefficients for all indicators in the five quality management constructs (SQM, PM, CFC, MC, and BM) were large and significant ($p < 0.01$), providing strong evidence of convergent validity. Similarly, the coefficients for the indicators in the constructs for QMPPs, IS, and PP are also large and significant ($p < 0.01$). Also, since each of the CFA models demonstrated good fit, each of the constructs is unidimensional.

6.2 Hypothesis Testing

The results of the structural model estimation suggest that the chi-square statistic of the model was significant (CMIN = 89.619; df = 73; and $p = 0.091$; $p \geq 0.05$). The model tested in this research indicated a good fit. The ratio CMIN/d.f and RMSEA with values 1.228 and 0.048 respectively were below the recommended maximum of 3.00 and 0.10. Similarly, the index RMR was below the acceptable level of 0.10, with the value of 0.049. Also, the fit indices NFI = 0.93, CFI = 0.95, GFI = 0.90, and IFI = 0.96 were above the minimum threshold level of 0.90 recommended by Chau (1997). Thus, there is strong evidence to indicate that the hypothesized model fits well with the sample data. Hence, the hypothesized model permits an examination of the direct effects of QMPPs and related information system (IS) practices on purchasing performance as well as the indirect effect of QMPPs, as mediated by IS on purchasing performance.

6.3 Findings

The first hypothesis (H1) asserts that the implementation of QMPPs has a positive impact on purchasing-related information systems. Based on the results, the path relating these two constructs was negative and non-significant (standardized QMPPs → IS = −1.650, CR = 0.692; <1.96, $P = 0.489$; $P > 0.05$). This provides no evidence to support H1. This indicated that the adoption of QMPPs rather reduces the usage of PIS.

The second hypothesis (H2) states that PIS practices positively affect the purchasing performance. The association between both was found to be significant (standardized IS → PP = 0.281; CR = 2.856; meaning that the path is significant at the 99% level). This provides strong evidence that information system practices have a direct, positive impact on purchasing performance (PP).

The third hypothesis (H3) states that QMPPs have a positive and direct impact on purchasing performance (PP). This hypothesis was tested and evaluated in the direct and indirect effect of QMPPs on purchasing performance. According to the results, the direct path relating QMPPs and purchasing performance (PP) was positive and significant (standardized QMPPs → PP = 0.048; CR = 3.626; meaning that the path is significant at the 99% level). This provides strong evidence of the direct effect of quality management practices on purchasing performance and thereby supports H3.

The fourth hypothesis (H4) speculates that QMPPs have an indirect positive impact on purchasing performance mediated through the effect of the information system (IS). The indirect effect of QMPPs on purchasing performance (PP) is calculated from the direct effect of QMPPs on IS (H1, standardized = −1.650; CR = 0.692; P = 0.489), mediated by the impact of IS on PP (H2, standardized = 0.281; CR = 2.856; $P > 2.5$). This produces a significant indirect positive effect of QMPPs on purchasing performance.

Thus, the total effect (direct: H3 + indirect effect: H4) of QMPPs on purchasing performance is 0.511 (0.048 + 0.463). These results provide strong support to indicate that the adoption of QMPPs increases the level of purchasing performance (PP) both directly and indirectly through purchasing-related information system practices (IS).

7 Discussion

7.1 Insights Stemming from the Measurement Model Testing

In the measurement model, 31 indicators were used to measure the three constructs investigated in this research. The first construct, QMPPs, was measured using five scales: supplier quality management (SQM), personnel management (PM), cross-functional coordination (CFC), management commitment (MC), and benchmarking (BM). The findings suggest that benchmarking emerged as the indicator with the highest loading, followed by personnel management, management's commitment, cross-functional coordination, and supplier quality management. These results confirm the critical importance of benchmarking in managing quality in the purchasing function and support previous research by Ahire et al. (1996) and Erdil and Erbıyık (2019).

Regarding second construct (i.e., purchasing information system), results from auxiliary model analysis showed standardized loadings for the use of the Internet with suppliers, access to quality information suppliers; supplier-buyer integrated ordering, and supplier access to buyer production scheduling. Sharing internal information with suppliers had the lowest loading on the IS factor. These results implicate that purchaser face difficulties in gaining access to the suppliers' internal information. These results are consistent with studies by Sriram and Stump (2004) and Vickery et al. (2003) and support the critical importance of applications (e.g.,

sharing information) when designing integrated purchasing-related information systems.

Regarding various facets of purchasing performance, we found that cost of material had the highest standardized loading on the purchasing performance factor. These results support previous research by Anil and Satish (2019), Baraniecka (2016), and Hendrick and Ruch (1988) and confirm the amplified relevance of the cost of material performance when measuring purchasing performance.

7.2 Insights Stemming from the Structural Model Testing

The structural model tested association among the three constructs: QMPPs, PISS, and PP. The results provide strong support for all the proposed hypotheses, except H1. The direct and indirect effects of QMPPs were empirically substantiated. The proposed mediated model fits the data collected from the system under investigation and gives us insight into the most pertinent areas of QMPPs and PISS and their potential to increase purchasing performance. This research expands on results reported in the previous literature which traditionally focused on the impact of individual IS applications related to purchasing, e.g., Banerjee and Sriram (1995) and Sriram et al. (1997). This research has focused on a group of related IS practices in purchasing and identified the realization of valuable benefits from their joint implementation.

7.3 General Discussion

Supply chain management (SCM) is increasingly becoming recognized as a cornerstone of business success, and effective management of supplier chain networks and purchasing is progressively turning out to be the keys for supply chain as well as firms' success. Purchasing is not only important from a functional standpoint but also an essential strategic instrument that may profoundly ameliorate overall performance of the firm. In this information and digitization driven age, where outsourcing is at the forefront of competitive business landscape, the heterogeneity of firm performance could fairly be attributed to the heterogeneity in purchasing and SCM performance. However, uninterrupted challenges, in the form of opportunities and threats constantly emanating from environmental dynamism, always keep the relevance, appropriateness, and efficacy of purchasing and SCM under continual strategic alignments pressures.

Total quality management and digital transformation, the most notable developments in the last couple of decades, have also presented significant alignment challenges for the firms to sustain their purchasing and supply chain performance as they have over the year offered enormous potential for productivity and value enhancement through a consistent rollout of disruptive systems, instruments, and

technologies. Firms that were able to timely and effectually integrate the tool, techniques, and instruments offered by the quality and digital revolutions were generally able to draw sustained competitive advantage over those who are reluctant or sluggish in making proportionate investments in these systems and/or technologies, that have already disrupted and/or destroyed competition in various industries.

This study investigated contributions of adoption and integration of the latest developments in quality management and purchasing information systems in enhancing purchasing performance in service organizations. The results showed that both antecedents exhibited a significant positive impact on purchasing performance. QM purchasing practices impact purchasing performance both directly and indirectly. However, the premise that a desire to adopt and implement QM purchasing practices induces greater investments in purchasing information system services could not be empirically substantiated, which means that plenty of other factors impact the decisions relating to the adoption and/or enhancement of IS architecture and/or capabilities. However, irrespective of its origin, purchasing information systems strongly mediate the impact of QM purchasing practices on purchasing performance, thus qualifying as an important contingency for the QMPPs to create desired impact on the purchasing performance. Hence, both the quality management and technology management decisions merit significant managerial involvement and investments of time, effort, energies, and resources from the firms for better economic gains.

7.4 Managerial Implications

This study contributes to developing a better understanding of the interaction between quality management practices and IS practices in enhancing purchasing performance, implicating managers in the purchasing and/or supply chain domains to vigorously contemplate investments in quality and technological enhancements. To keep securing an alignment with environmental changes by integrating continual developments in quality and technological transformations is need of the time even to survive, let alone progress in today's high velocity markets. The emergence of Industry 4.0 technologies like blockchain, Internet of things, big data analytics, etc. offers enormous potential for value maximization through improved decision-making in a real-time environment ending up providing much needed flexibility, agility, and resilience in business processes, including purchasing and SCM. So, a proactive and *sooner the better* approach is always a welcoming predisposition in this regard. Finally, an adoption and implementation of the state-of-the-art quality management tools and digital technologies require significant resources, which organizations especially SMEs seldom have. Therefore, it's advisable to carry out any such investments with greater precision—sooner is better, more is not, always. Nonetheless, psychological and resource entablements gained through such investments pay off significantly both in the short run and the long term.

8 Conclusions, Limitations, and Suggestions for Future Research

By testing the relationship between QMPPs, purchasing information system services, and purchasing performance in service organizations, this research not only enhances our understanding of the complexities surrounding the purchasing activities but also explores ways in which purchasing performance could be improved. These findings provide insights that can help guide managers in their future investments and implementation of QM systems and IS technologies in their quest to improve purchasing performance.

The study contributes towards developing a fine-grained understanding about the interaction among the first order indicators of the subject constructs, specifically, while it reveals that role of benchmarking and supplier performance is critical in enabling QMPPs to produce desirable effects on purchasing performance. This finding is particularly important given that firms might not have sufficient resources to invest in all aspects of QM, a comprehension of the relative impact of these capabilities could help firms enhance the precision of their effort by prioritizing their capacity-enhancement investments.

Although both the QMPPs and IS turned out to be significant antecedents and/or mediators in our study, there could be certain other factors that could potently mediate the cause-and-effect relationship between QMPPs and the firm performance, even between IS and the purchasing performance. Future research may enhance the explanatory power of this model by integrating more mediators, focusing especially on the IS-purchasing performance connection as envisaged in this model. We used EDI and internet as the key IS technologies. In the face of explosive developments in digital transformation, the internet-enabled technologies need to be further elaborated and augmented with state-of-the-art real-time technologies such as blockchain technology, big data analytics, and internet of things that may have significant implications for purchasing performance enhancement. Future research may also investigate the impacts of integrating specific QM instruments, such as Kaizen and Lean Six Sigma, that may have stronger implication for purchasing and SC performance, both form individual as well as a collaborative network perspective. Besides, the model presented in this study has far reaching managerial and administrative implications for enhancing firms' efficacies of managing through pandemics, that could profoundly be ameliorated by integrating leading QM and IS concepts and technologies like Kaizens, Lean Six Sigma, blockchain technology, big data analytics, internet of things, etc. Future research may also investigate the contributions of QMPPs and IS in enhancing social and ecological gains, rather than limiting it just to the economic performance.

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