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**Quality Management and Supply Chain Management Practices
towards Operational Performance: A Study of the Rubber
Manufacturing Industry of Sri Lanka**

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Abstract

Rubber industry, one of the growing industries in the world creates a vacuum to exploit foreign markets especially for countries like Sri Lanka. However, lack of strategic relationships and low quality products with higher cost keep Sri Lanka's rubber industry performance away from the global market. Since supply chain management (SCM) is implicated in the issue of external relationships and quality management (QM) is implicated in low product quality, the key aim of this study was to test the relationships between SCM, QM and organisational performance, in the context of the rubber industry in Sri Lanka. In particular, it empirically tested the mediating role played by SCM in the relationship between QM and operational performance (OP) of rubber manufacturing organisations though this relationship has already been established in theoretical literature. Data was gathered through a questionnaire from managers of 44 firms in the rubber products manufacturing sector in Sri Lanka. Data was analysed with the descriptive and inferential statistical analyses. The results indicated that QM practices and SCM practices improve OP while SCM practices are partially mediating the effect of QM practices on OP. The results of this study help the rubber products manufacturing

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organisations in Sri Lanka to formulate successful strategies by enhancing the OP via QM and SCM practices.

Keywords: Operational Performance, Quality Management Practices, Rubber Products Manufacturing Firms, Supply Chain Management Practices

Introduction

The rubber industry which is one of the attractive industries in the world is run by key players such as Turkey, China, India, Brazil and South Korea. These countries are expected to record some of the strongest market gains, spurred by rising personal income levels, an acceleration in economic growth and ongoing industrialisation efforts (Jayalath, 2006).

Sri Lanka's rubber and rubber products manufacturers produce a wide range of value-added rubber and rubber based products by processing raw rubber. The globally linked rubber industry in Sri Lanka showed an excellent potential for exponential growth with the global industry from 442 USD in 2005 to 1091 USD in 2011. However, after 2011, the contribution from the rubber and rubber based products has started declining and in 2014 the contribution was 935 USD which shows the increased competition in export markets (Export Development Board, 2014). As per Jayalath (2006) this is an issue of quality. Similarly, Sri Lanka Rubber Secretariat, Ministry of Plantation Industries, Sri Lanka (2016) highlighted the importance of focusing on quality, quantity and cost in order to make the rubber industry globally competitive in the next decade.

Moreover, according to Robinson and Malhotra (2005) quality itself is not enough for success in a dynamic international market nonetheless delivery at the right time, place and cost are also critical in order to achieve the competitive advantage. The Resource Based View (RBV) explains competitive advantage as core resources and capabilities that supply chain members provide in a given environment (Barney, 1995). Therefore, firms should develop and utilise their core resources to improve the capabilities such as low cost and high quality in a manner that inhibits duplication by competitors (Dutta, Narasimhan, & Rajiv, 1999). Further, as per Li and Lin (2006) prevailing global firms' competition is no longer between the firms; it is between firms' supply chains. As a result, most of the leading firms have adopted Supply Chain Management (SCM) and Quality

Management (QM) practices in order to achieve higher firm performance. Similarly, Sri Lanka Rubber Secretariat, Ministry of Plantation Industries, Sri Lanka (2016) highlighted the importance of introducing whole-of the-supply-chain approach to the rubber industry of Sri Lanka. On the other hand, the development of new technologies creates a connection between different industries and as a result the rubber industry is also interconnected with many other industries such as automotive, agriculture, mining, engineering, medical, leisure and etc. Therefore, Sri Lanka's export rubber is an intermediary product and developments and relationship between these industries impact the future of the rubber industry. However, a simultaneous implementation of both SCM and QM systems is challenging and needs a considerable amount of resources due to the extended scope that covers not only internal functions but also the operations of external business partners. If simultaneous implementation can be achieved, the firm should end up with great benefits as a result of synergy and less barriers (Vanichchinda & Igel, 2009).

As per the present body of knowledge the literature has proven an impact of SCM on the link between QM and Operational Performance (OP). However, there is an empirical gap to identify the role of SCM enhancing the relationship between QM and OP. Therefore, it is vital to investigate the issue whether Sri Lanka's rubber manufacturing firms can increase their OP through QM and SCM practices in order to increase the competitiveness of the industry in the global context. Hence, the objectives of the study were: Firstly, to explain the influence of QM practices on organisations' OP; secondly, to identify the relationship between QM practices and SCM practices; thirdly, to explicate the effect of SCM practices on organisations' OP; and finally, to identify how SCM practices effect QM practices in order to enhance the OP.

The remainder of the paper is organised as follows. Section 2 discusses the literature and hypothesis development. The research methodology is outlined in section 3 and section 4 presents the findings and discussion. Finally, section 5 presents conclusions, limitations and areas for future research.

Literature Review

This literature review discusses the relevant theories, relationships between QM, SCM and OP drawing from previous studies.

Quality Management

In a competitive market, the demand for quality is emerging as the single most critical factor for companies to survive in the ever-expanding global market place. Quality is vital in determining the economic success of manufacturing companies (Garvin, 1988, Curkovic, Vickery, & Droge, 2000). Similarly, Sidin and Wafa (2014) supports a strong positive relationship between the implementation of quality management and quality of production in Malaysian manufacturing firms including rubber manufacturing firms. World-class manufacturing companies gain competitive edge and greater market share through extraordinary levels of performance by providing a quality product with a competitive price as required by demanding customers. The concept of QM has been developed as the result of intense global competition. Companies with international trade and global competition have paid considerable attention to QM philosophies, procedures, tools and techniques. A growing number of companies use QM practices as strategic foundation for generating a competitive advantage (Reed, Lemak & Mero, 2000) and improving organisational performance (Samson & Terziovski, 1999). As per many scholars, QM constructs are top management commitment (Saraph, Benson, & Schroeder, 1989; Flynn, Schroeder, & Sakakibara, 1994; Ahire, Golhar & Waller, 1996; Sila, 2007), customer focus (Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Rao, Solis & Raghu-Nathan, 1999), human resource management (Flynn et al., 1994; Ahire et al., 1996; Reed et al., 2000; Sila, 2007; Parast, Adams, Jones, Rao, & Raghu-Nathan, 2006) and communication information and analysis (Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Sila, 2007).

Supply Chain Management

The essence of SCM is the co-ordination and integration of different processes throughout the supply chain both upstream and downstream. Organisations operating beyond their national boundaries can no longer depend on previously proven domestic quality practices (Mehra & Agrawal, 2003). For an example as per Bag, Anand, and Pandey (2014), Indian rubber manufacturing firms introduced SCM in order to increase their firm performance. Similarly, Sri Lanka Rubber Secretariat, Ministry of Plantation Industries, Sri Lanka (2016) highlights the importance of introducing whole-of-the-supply-chain approach to the rubber industry of Sri Lanka in order to gain a competitive advantage. Explaining the results, they highlighted that Sri Lanka's rubber industry is governed and influenced by many stakeholders with different personal agendas.

The private sector which is mainly profit motivated and engaged in different supply chain links may see other players as competitors or threats and as a result collaboration should need a support from respective authorities.

Li, B. Ragu-Nathan, Ragu-Nathan, and Rao, (2006) described the practices of SCM as a multi-dimensional concept, which can be conceptualised as a five-dimensional construct, named as supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement. Further, in reviewing and consolidating the literature, four distinctive dimensions, including strategic supplier partnership, customer relationship, information management and lean systems are selected for measuring SCM practice. The four constructs cover upstream (strategic supplier partnership) and downstream (customer relationship) sides of a supply chain, information flow across a supply chain (Information Management), and internal supply chain process (Lean system) (Li et al., 2006).

Operational Performance

In the changing world, competitive advantage emerges from the creation of supplier competencies to create customer value and achieve cost and/or differentiation advantages, resulting in market share and firm profitability (Richard, Devinney, Yip, & Johnson, 2009; Prahalad & Hamel, 1990). The competitive edge can only be met by improving operational performance. The competitive advantage of a firm indicates that the firm possesses better capability in respect of price, quality, responsiveness, flexibility etc. (Tracey, Vonderembse, & Lim, 1999) compared to its competitors, which, in turn, enhances its overall performance.

OP is a multidimensional concept that encompasses aspects including financial performance and market performance (Richard et al., 2009). To enhance OP, firms need to set up barriers that make imitation difficult through continual investment to improve the firm advantage, making this a long-run cyclical process (Day & Wensley, 1988). Souza and William (2000) suggested that cost and quality is a part of operational performance dimension. Improving further, Vokurka, Zank, and Lund, (2002), Fawcett and Smith (1995) and White (1996) described the operational performance dimensions included price/cost, quality, responsiveness, and time to market. As per Vesey (1991) dimensions of

operational performance are price, quality, responsiveness, flexibility, time to market, and product innovation.

Literature suggests that there are strong links between these constructs of quality management, supply chain management and operational performance, especially in the rubber manufacturing industry. These are taken into consideration in the conceptualisation of the study.

Conceptualisation

Feng, Prajogo, and Sohal (2006) highlighted that in today's concurrent market place, firms must focus on improving quality and innovativeness. As explained by Jayalath (2006) Sri Lanka's rubber manufacturing firms should focus on the same in order to enhance the competitiveness. Further, Deming (1986) found that a major determinant of success in the competitive environment is quality. Therefore, QM implementation generally has strong and positive relationships with OP (Brah, Tee, & Rao, 2002). Sidin and Wafa (2014) who researched on Malaysian manufacturing industries including rubber also confirmed the positive relationship between QM and organisational performance. Further, most of the previous studies report that QM practices have positively been related to OP with respect to different manufacturing organisations (Chenhall, 1997; Mann & Kehoe, 1994). Moreover, as explained by the Resource Based View of the firm (Escrig-Tena, 2003) unique resources and competencies can be generated by implementing quality management practices. These competencies therefore contribute to improved firm performance. Thus, the first hypothesis is,

H₁: The higher the level of QM practices (QMP) of the rubber manufacturing firms, the higher the level of the OP of the firm.

SCM involves an integrated and process-oriented approach to the management, design and control of the supply chain, with the aim of producing value for the end consumer, through both customer service and reduced cost (Bowersox & Closs, 1996; Li et al., 2006). Bowersox and Closs (1996) showed that to be fully effective in a globally competitive business, companies must develop their integrated behaviour to incorporate customers and suppliers. For an example, the rubber industry consists of diverse players which includes producers, manufacturers, traders and marketers, various suppliers to the industry, technology developers and disseminators, knowledge service providers,

human resource developers, etc. Therefore, integration of these stakeholders is necessary to achieve both individual and national objectives (Sri Lanka Rubber Secretariat, Ministry of Plantation Industries, Sri Lanka, 2016). Vickery et al. (1993) concluded that positive direct and indirect relationships exist between supply chain integration and financial performance. Furthermore, Tan (2002) proved that certain SCM practices positively impact firm performance. Hence, the second hypothesis of the study is,

H₂: Higher the level of SCM practices (SCMP) of the rubber manufacturing firms, the higher the level of OP of the firms.

Kanji and Wong (1999) investigated relationships between total quality management and supply chain management and concluded that failure to consider the impact of total quality management programs helps to explain the inadequacies of existing models of SCM. The external focus of SCM may be due to the fact that the organisation itself must work with its customers and the suppliers within the same SCM system. Most SCM frameworks emphasise the relationship with external business partners and almost ignore the human resource component (Vanichchinchai & Igel 2009). Although SCM emphasises integration of external business partners, the actual implementation must begin by integrating internal functions and then moving on to external integration. Further, in the QM environment, all employees are treated as internal customers. If the internal customers are not satisfied, value creation for the external customer is difficult. Therefore, QM emphasises employee involvement (Khan, 2003). Yeung and Armstrong (2003) reported that a main barrier of QM implementation was lack of external focus, as the quality improvement effort was made only in internal issues. Kannan and Tan (2005) also highlighted the inherent relationships between QM and SCM practices. Therefore, a firm with advanced QM capability is likely to select suppliers that are similarly competent. Therefore, the third hypothesis is as follows:

H₃: There is a positive relationship between QMP and SCMP

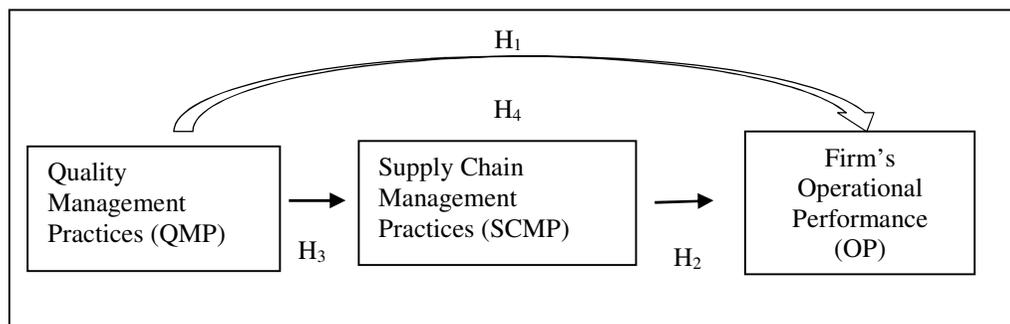
Kuei, Madu, and Lin, (2001) reported for Taiwan that companies with higher SCM and QM tended to perform better than companies with lower supply chain quality management in the performance of cost saving. Moreover, Li, B. Ragu-Nathan, Ragu-Nathan, and Rao, (2005) who surveyed the impact of supply chain quality management in Taiwan and in Hong Kong found that QM significantly correlated with the supplier participation and selection strategy in SCM and this

influenced business performance. Tan, Kannan, and Handfield, (1998) who studied the linkages between QM, supplier evaluation and supply base management in the US suggested that QM and supply base management should be implemented together to improve corporate performance. Kannan and Tan (2005) and Kaynak and Hartley (2008) concluded that there were linkages between TQM, SCM, and Just-In-Time (JIT) which reinforced each other and then improved business performance.

Vanichchinchai and Igel (2009) concluded that SCM targets external business partnerships and QM mainly emphasises internal functions to participate. Therefore, an ultimate integration and the difference in primary focus can be a source for both synergy and barriers in improving OP when implementing a combined set of SCM and QM systems. Further, Hsu, Tan, Kannan and Leong (2009) highlighted that SCM practices mediate the impact of operations capability on performance where operational capability operationalised through total quality management. This is consistent with Resource Based and Competence Based views of the firm, and for Resource Advantage Theory as it relates to manufacturing success. According to Barney (1986) SCM and QM practices are interrelated and together generate synergies by means of enhanced valuable, rare, inimitable and non-substitutable strategic assets vis-a-vis global competitive environment. Thus, SCM practices allow firms to take advantage of their manufacturing capabilities by leveraging the expertise and cooperation of key members of their supply chains. This allows them to achieve performance levels in excess of those they might achieve by relying solely on their internal capabilities (Li et al., 2005). Therefore, the fourth hypothesis is,

H₄: SCMP mediates the relationship between QMP and OP

Figure 1: Conceptual Framework of the Study



This study developed a conceptual model based on the literature review, and drawing on the key assumptions from RBV of the firm, which highlights competitive advantage, emerging from developing key resources and capabilities (see Figure 1).

Methodology

The methodology of the study was guided by the positivistic research tradition as per the nature of the research objectives and priori-based conceptual model. Due to these facts, the following methods were adopted to empirically test the conceptual model.

Operationalisation

The study operationalises the constructs and variables using the measures in the extant literature. QM practices block comprises of four variables: top management commitment (Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Sila, 2007), customer focus (Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Rao et al., 1999), human resource management (Flynn et al., 1994; Ahire et al., 1996; Reed et al., 2000; Sila, 2007; Parast et al., 2006) and communication information and analysis (Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Sila, 2007). Top management commitment was measured using on eight multi-item scale, customer focus uses a four multi-item scale, human resource management uses an eight item multi-scale and communication and information uses a five multi item scale. The SCM practices comprises of the variables: strategic supplier partnership, customer relationship, information management, and lean systems (Li et al., 2006). Each of these variables was measured using a five multi item scale. Operational performance block is constructed by selecting cost, flexibility, responsiveness, quality, product innovation, and time-to-market variables based on the competitive dimensions (Vokurka et al., 2002; Fawcett & Smith, 1995; White, 1996). Each variable was measured through a four multi item scale.

Research Strategy, Population and Sample

This study used quantitative research approach and was designed as a survey which was based on rubber product manufacturing organisations in Sri Lanka. The population therefore was limited to the rubber products manufacturing firms that are registered in Sri Lanka Export Development Board under exports, which totalled to 89 (Export Development Board , 2015). All companies of the target

population were approached for the study but only 44 companies responded to participate in the survey. Thus, the response rate was 49 per cent. Head of Quality Management Department responded to measures of the QM construct whilst Head of Operations Department of the firm responded to measures related to the constructs SCM and OP. Quantitative research method was used to collect primary data by administering a structured questionnaire. Respondents were contacted using e-mails. The independent and dependent variables were measured using a Five Point Likert scale with end points of “strongly disagree” and “strongly agree”.

Data Analysis

The reliability of the measures was assessed through Cronbach’s Alpha. Further, factor analysis was carried out to assess the convergence validity of the constructs. The data was analysed through descriptive statistics and inferential statistics. The hypothesis tests were carried out using multiple linear regression analysis.

Results and Discussion

This section presents analysis and discussion of the empirical findings of the study.

Reliability and Validity

Cronbach’s Alpha tests and factor analysis were conducted to test the reliability and validity of collected data. As per the findings, all the constructs received a Cronbach’s Alpha value greater than 0.6 and hence reliability of the variable was satisfied (Nunnally, 1978). Factor analysis results have shown factor loadings greater than 0.5 for all elements. Hence, the constructs were considered as valid measures (Churchill, 1979). Further, it was reasonable to assume that all variables have face validity and construct validity as they were adapted from well-established measures in literature (Sekaran, 2006).

Descriptive Analysis

The summaries of the variables were derived through descriptive statistics outputs comprising of means and standard deviations of all variables of the three constructs as shown in Table 1.

Table 1: Descriptive Analysis

Indicators	Variables	Mean	Std. Deviation
Quality Management	Top Management Commitment.	4.10	0.50
	Customer Focus	4.00	0.47
	HRM	4.01	0.45
	Communication/ Information Analysis	4.04	0.46
Supply Chain Management	Strategic Supplier Partnership	3.83	0.51
	Customer Relationship	4.16	0.53
	Information Management	3.70	0.57
	Lean Systems	3.83	0.64
Operational Performance	Cost / Profit	3.35	0.62
	Flexibility	3.37	0.64
	Responsiveness	4.00	0.61
	Quality	4.20	0.58
	Product Innovation	4.07	0.53
	Time to Market	3.51	0.77

All dimensions of QM practices show a mean value above point 4 and highest mean value is recorded for top management commitment - 4.10 with a standard deviation of 0.50. This indicates that responses are within 4.10 ± 0.50 . Under the SCM construct the highest mean value was scored by customer relation - 4.16 with a standard deviation of 0.53. This indicates that responses are within 4.16 ± 0.53 . The lowest mean was recorded by information management which is 3.70 with a standard deviation of 0.57. The highest mean value among the OP variables was recorded by quality - 4.20 with a standard deviation of 0.58 and the lowest mean value was recorded by cost/ profit - 3.35 with standard deviation of 0.62.

According to the descriptive statistics, most of the mean values of the independent variables are closer to the agreed point (4) on the five point Strongly Disagree to Strongly Agree Likert Scale. This implies that QM and SCM are significant attributes of organisational practices. All the dimensions of firm's performance have mean values around 4 and standard deviations less than 1. It is also closer to agreed point (4) on a five point Strongly Disagree to Strongly Agree Likert Scale.

These descriptive statistics provide a general and primary description about the independent and dependent variables. It is essential to have inferential statistical analysis to test the hypothesis highlighted in the conceptual model.

Hence, a further analysis was carried out on relationships among independent and dependent variables as depicted in the sections below.

Correlation Analysis

Table 2 shows the correlation coefficients between dimensions of independent and dependent variables at 0.01 level significance. All four dimensions of QM practices showed significant positive association with OP. The highest correlation of 0.654 is reported for the association between top management commitment and operations performance. Other correlation coefficients explain moderate associations between HRM and operations performance (0.531), customer focus and operations performance (0.508) and a poor association communication/ information analysis and operations performance (0.373).

Table 2: Correlation between QMP and OP

	Operational Performance
Top Management Commitment	0.654
Customer Focus	0.508
HRM	0.531
Communication/ Information Analysis	0.373
Strategic Supplier Partnership	0.483
Customer Relationship	0.573
Information Management	0.547
Lean Systems	0.555

All four dimensions of SCMP showed a significant positive association with OP. The highest correlation value of 0.573 indicates a moderate association between customer relationship and operations performance. Other correlation values explain moderate association between lean system and operations performance (0.555), information management and operations performance (0.547) and strategic supplier partnership and operations performance (0.485).

Test of Hypotheses

Hypothesis 1: Relationship between QMP and organisations' OP. According to Table 3 showing the coefficient of determination, the model predicting the impact of QMP and OP has a R^2 of 0.396. This indicates that 39.6 per cent of total variance of OP is explained by QMP in the rubber sector.

Table 3: Model Summary – QMP & OP

Predictor	R	R Square	Adjusted R Square	Std. Error of the Estimate
QMP	0.630	0.396	0.389	0.36607

The beta of the QMP is 0.630 and significance at 0.05 level as per the Table 4. Hence, the impact of QM practices on OP is significant at 0.05. Therefore, hypotheses H_1 is accepted. The result confirmed that higher the level of QMP in the rubber manufacturing firms, the higher the level of OP of the firms.

Table 4: Coefficients – QMP & OP

	Unstandardized Coefficients		Standardized Coefficients	t-stat	Sig.
	B	Std. Error	Beta		
(Constant)	0.767	0.210		3.656	0.000
QMP	0.760	0.105	0.630	7.247	0.000

Hypothesis 2: Relationship between SCMP and organisations' OP. Table 5 shows that the model predicting the impact of SCMP on OP has a coefficient of determination (R^2) of 0.458. This indicates SCMP explains 45.8 per cent of the total variance of OP of the firm.

Table 5: Model Summary – SCMP & OP

Predictor	R	R Square	Adjusted R Square	Std. Error of the Estimate
SCMP	0.676	0.458	0.451	0.34703

Table 6 shows that beta coefficient of SCMP is 0.676 and P value is less than 0.05. Therefore, hypothesis H_2 is accepted. The results confirm that higher the SCMP of the rubber manufacturing firm, the higher the OP of the firm.

Table 6: Coefficients – SCMP & OP

	Unstandardized Coefficients		Standardized Coefficients	<i>t</i> -stat	Sig.
	B	Std. Error	Beta		
(Constant)	0.760	0.186		4.078	0.000
SCMP	0.704	0.086	0.676	8.214	0.000

Hypothesis 3: Relationship between QMP and SCMP. Table 7 depicts the coefficient of determination (R^2) of the model predicting the impact of QMP on SCMP. The R^2 indicates that the model explains that QMP accounts for 53.2 per cent of the total variance of SCMP.

Table 7: Model Summary – QMP & SCMP

Predictor	R	R Square	Adjusted R Square	Std. Error of the Estimate
QMP	0.729	0.532	0.526	0.30467

According to the results shown in Table 8 the beta value of QMP is 0.729 and is significant at 0.05. Therefore, hypothesis H_3 is accepted. The results confirm that the higher the QMP of the rubber manufacturing firm, the higher the SCMP of the firm.

Table 8: Coefficients – QMP & SCMP

	Unstandardized Coefficients		Standardized Coefficients	<i>t</i> -stat	Sig.
	B	Std. Error	Beta		
(Constant)	0.520	0.354		1.471	0.145
QMP	0.832	0.087	0.729	9.537	0.000

Hypothesis 4: Testing mediating effect of SCMP on the relationship between QMP and OP. Mediation effect of SCMP was analysed through hierarchical linear regression outputs as per the guidelines recommended by the Baron and Kenny (1986). The path analysis is reported in Table 9.

As per Baron and Kenny (1986), several steps were tested for conformity of mediation effect.

- Step 1 (Path c): QMP and OP has a significant positive relationship (B=0.760)
- Step 2 (Path a): SCMP and QMP value has a significant positive relationship.
- Step 3 (Path b): SCMP has a significant positive relationship on OP while QMP is controlled.
- Step 4 (Path c'): QMP has a significant positive relationship on OP while SCMP is controlled. (B=0.377).

Table 9: Testing Mediator Effects Using Multiple Regression

Testing Steps in Mediation Model	B	Std. Error	Beta	t-stat	Sig
Testing Step 1 (Path c)					
Outcome: OP					
Predictor: QMP	0.760	0.105	0.630	7.247	0.000
Testing Step 2 (Path a)					
Outcome: SCMP					
Predictor: QMP	0.832	0.087	0.729	9.537	0.000
Testing Step 3 (Paths b & c')					
Outcome: OP					
Mediator: SCMP (Path b)	0.448	0.124	0.428	3.618	0.001
Predictor: QMP (Path c')	0.377	0.141	0.317	2.674	0.009

The above steps are significant and B value of QMP for Step 4 (0.377) is less than B value of QMP in Step 1 (0.76). Therefore, this is partial mediation according to Baron and Kenny (1986). Thus, H₄ is accepted. This supports to conclude that SCMP partially mediate to build the relationship between QMP and OP.

Discussion

As confirmed by the hypothesis results there is a significant positive relationship between QMP and OP in rubber manufacturing firms in Sri Lanka. This implies that QMP are imperative for achieving OP in the sector. By explaining similar findings Chenhall (1997), and Mann and Kehoe (1994) highlight that QMP have positive relationships with OP measures such as cost, quality, innovation, etc. This is an indication that OP is enhanced by QMP. This

finding reflects the positive role of QMP on OP of the firm as evidenced in the study of Sidin and Wafa (2014).

Hypothesis 2 (H₂) was developed to identify the impact of SCMP on OP. According to the results of data analysis, SCM is significantly and positively related to OP in Sri Lankan rubber manufacturing firms. This implies that the SCMP have a significance impact on OP as highlighted by Vickery et al. (1993). Therefore, data support the second hypothesis as well. This result is also consistent with the study of Tan (2002) that emphasise the positive effect of SCMP on firm performance.

Further, most important finding of the study revealed that the effect of QMP on OP is partially mediated by the SCM practices. Vanichchinchai and Igel (2009) concluded that SCM targets external business partnerships and QM mainly emphasises internal functions to participate. Therefore, an ultimate integration and the difference in primary focus can be a source for both, synergy and barriers in improving OP when implementing a combined set of SCM and QM systems. This finding is similar to the study undertaken by Hsu et al. (2009). Thus it is reasonable to argue that SCM has some mediation on the relationship between QM and OP as both internal and external resources competencies together lead to improve OP. This is also consistent with RBV of the firm as evidence in the study of Li et al. (2004).

Conclusions, Implications and Future Research

The findings of this study present insights into the debate concerning the impact of QMP on SCMP and their combined effect on OP with respect to rubber manufacturing firms in Sri Lanka.

First, the study found that the QMP is a significant determinant for the enhancement of the OP in rubber manufacturing firms in Sri Lanka. The QMP such as top management commitment, customer focus, HRM and communication, information analysis considered for this study can be considered as determinants of the OP. Secondly it was found that SCMP such as Business to Business customer relationship, strategic supplier partnership, information management and lean systems are significant determinants of OP in the rubber manufacturing sector of Sri Lanka. The third objective of the study was achieved through the finding of significant positive relationship between QMP and SCMP.

Finally, the findings revealed that the QMP can indirectly improve OP by enhancing SCMP. The positive relationship between QMP and SCMP implies that the firms that undertake QM efforts are also likely to involve in SCM practices as well. Hence, the fourth objective of the study also accomplished.

Implications

The findings of this study indicate that QMP and SCMP result in valuable, rare, inimitable and non-substitutable strategic competencies that lead to enhance operational performance in line with the resource based view of the firm (Barney, 1986). This stresses the validity of the resource based view of competitive advantage in dynamic global markets. The study also supports the argument that SCM and QMP should co-exist in enhancing operational excellence.

In addition to the above theoretical contribution, this paper has some practical implications; firms engaged in rubber manufacturing can use the findings of the study in several ways to improve their OP. In order to improve the OP of rubber manufacturing firms in Sri Lanka, it is necessary to enhance both QMP as well as SCMP. Even though QMP encompass a wide range of activities within an organisation, the key concepts of QM that need to be addressed are the top management commitment, customer focus, human resource management and the communication, information and analysis. These results of QM reflect that strategic significance of adopting cross functional approach and organisational wide applications of QM in the rubber sector. Therefore, it is recommended to invest in all these aspects and build up strategies for the establishment and continuous improvement of QM practices in rubber manufacturing organisations in Sri Lanka to enhance competitiveness in export market.

It is necessary to employ effective SCMP in order to achieve successful OP. SCMP including customer relationship, strategic supplier partnership, information management and lean systems have a significant role in SCMP in the rubber manufacturing industry of Sri Lanka. Therefore, it is necessary to develop mechanisms and allocate resources on these areas for realising SCMP to achieve the intended results in rubber manufacturing organisations in Sri Lanka.

It was evident that the QMP can directly facilitate the implementation of SCMP as well. This is because QM has been broadened to cover some SCMP and firm performance dimensions such as cost and responsiveness. Thus, in

accordance with competency based view of firm, QM can be used as a foundation for implementing SCM and improving OP. Although QM and SCM are large-scale management systems, managers should not consider them as separate domains. Both could be implemented together to achieve performance excellence. However, the differences in scope and maturity of QM and SCM implemented in firms can affect the results. If the QM foundation is not comprehensive enough, the firm may not be able to use QMP to support the SCMP in rubber manufacturing organisations in Sri Lanka.

Further, it is the responsibility of government and the respective authorities to help the rubber manufacturing firms in order to establish proper QMP and SCMP through incentives such as proper training, motivational programmes, policy and monetary supports. Moreover, this study also helps many scholars who are interested in the QM and SCMP relationship to better conceptualise and advance the constructs.

Limitations and Further Research

This study has several limitations even though it contributes to the literature. Locations of the firms were limited to Colombo and suburb areas such as Gampaha, Galle and Kalutara districts where respondents are more sophisticated and more accustomed to QM and SCM practices. Hence, the ability to generalise findings to the entire rubber industry is weak.

In further research, the variety of industries involved in rubber products value chain can be used as the population. In addition, the downstream business partners could be studied together with the upstream suppliers in order to investigate the relationship along the whole supply chain.

When considering the conceptual model developed for this study, it considers only a few dimensions in order to explain the constructs, whereas there can be many other operationalisation. Therefore, it suggests to incorporate more dimensions in order to explain the variables more. For example, the dimensions such as strategic supplier partnership, customer focus and human resource management are broad concepts which can be further broken down into narrower components. An in-depth analysis was not considered for the current study as it was out of the scope. Therefore, it is possible to drill down into other important constructs that might affect operational performance. Further, some control

variables affecting the performance such as firm size, industry experience, and ownership can be increased in the further studies in the same area.

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