

Short Research Article

Introducing a Model for Identifying Operative Enablers of Supply Chain Quality Management

ABSTRACT

Aims: This study aims at investigating the content of supply chain quality management, uncovering its structure and defining the leading paths to explore development opportunities, and to organize resources and organizational operations to push overall performance toward yielding better results.

Study design: As the scope of competition has been driven from the level of the company toward the supply chain and interaction among companies, researchers are in pursuit of identifying measures to improve quality and its management through the supply chain.

Place and Duration of Study: 4 Electronic Companies in Zanjan Province in Iran. The duration of study was between June 2013 and August 2013.

Methodology: After studying the previous researches and finding a comprehensive view for the paper, 10 factors including: focus on customer, the quality of data and reports, supplier relationships, information technology, human resource management, process management, knowledge management, leadership, quality practices and strategic planning are identified and examined. The significance of the factors have been studied and revealed by deploying a questionnaire in four companies. At first, the four companies have been studied separately then their results have been discussed in comparison to the others.

Results: Findings indicate that Knowledge management had the lowest performance rate. So, it needs considerable attention to improve. On the other hand, Quality Practices rates in very good position and it was the best factor of the 10 factors in 4 Companies

Conclusion: . The proposed conceptual framework is expected to help managers in a better understanding the enablers of the supply chain quality management and to implement such enablers to improve its performance.

Keywords: Supply chain management, Quality control, Supply chain quality management (SCQM)

1. INTRODUCTION

These days business competition is found when a supply chain seeks to reach competitive advantage among other rival supply chains. Businesses depend on the effectiveness of supply chain networks to offer products with higher values, quicker responses, and higher service levels. Regarding what has been outlined by scholars, competition has developed from the enterprise level to the supply chain, so the focus is changing from management of internal practices to external practices as well. That means; managers of quality ought to combine the internal practices with practices to customers and suppliers. Any firm must coordinate chains of suppliers, distributors, producers, and customers in a much better way. This is not done without a good management of the supply chain. The growing focus on supply chain management is causing researchers to revise models, constructs, and frameworks for quality management that have been developed for the field of operations management. While some work has been done in this area, more scholarly work is requested. QC of products and services at any level of the supply chain is an essential part of successful SCM. Romano and Vinelli (2001) and Casadesus and de Castro (2005) have

drawn attentions toward the necessity of understanding the potential role of quality control (QC) in supply chain management (SCM).[1],[2] Foster and Ogden (2008) believe that understanding the relationships between supply chain management (SCM) and QM is the first step toward building an SCQM system.[3] Lead firms and their channel partners must thus understand the essentials of SCQM to facilitate transformation of traditional supply chains into competent supply networks, because it will help them in finding mobilization opportunity aspects, managing key issues of the firm, and gaining impetus and sustainable competitive advantage. Studying the literature made clear that empirical field studies are still needed to assess and identify critical paths to high performance of SCQM. This enquiry tries to help the body of the researches in the field of SCQM by fulfilling three objectives; at first the content analysis of supply chain, then identifying its structure and at last showing pathways to opportunity areas of improvement in organizing and operations are discussed. The structure of the paper is as follows. Section 2 narrates the findings of the previous studies on SCM, QC and SCQM. Section 3 presents methodology. Section 4 involves findings and discussions. The last section points to the contributions of this research.

1.2 RESEARCH BACKGROUND

In this section, the definitions and significance of the main concepts of the research including; SCM, QM and SCQM in the examined body of the literature are reflected.

1.2.1 Supply Chain Management

The concept of supply chain management (SCM) originated and flourished in the manufacturing industry.[4] The term which has been mainly used for SCM in the literature is framework though apparently there is a lack of consensus about what actually a framework is. [5] Many researchers and consultants have tried to propose frameworks to perform developments in SCM over a period of time. After all some researchers have noted the lack of clear definitional constructs to consider as the base to SCM research. Figure1 shows a comprehensive framework for SCM. According to Soni and Kodali (2013), The constructs of the framework are frequently used and observed constructs in SCM literature so it is the reason to call it a framework for SCM excellence.[5] In the framework mission and vision of a business are situated on the top of the house that this fact clarifies that the ultimate goal to a company or a member of supply chain is to achieve mission and finally vision. Based on mission and vision, business strategy is formulated that is referred to as competitive strategy which is at the bottom of building that signifies on the basis of business strategy only, further strategies are framed. Also according to the figure, when the competitive strategy and its priorities have been determined, after that the company formulates the supply chain strategy. Supply chain strategy affects the nature of supply chain activities, efficiency and effectiveness of the supply chain. [6] The use of pillars of SCM is for building the capabilities of supply chain which may at last cause to achievement of mission and vision of an organization but only if there is strategic fit between competitive strategy and supply chain strategy.

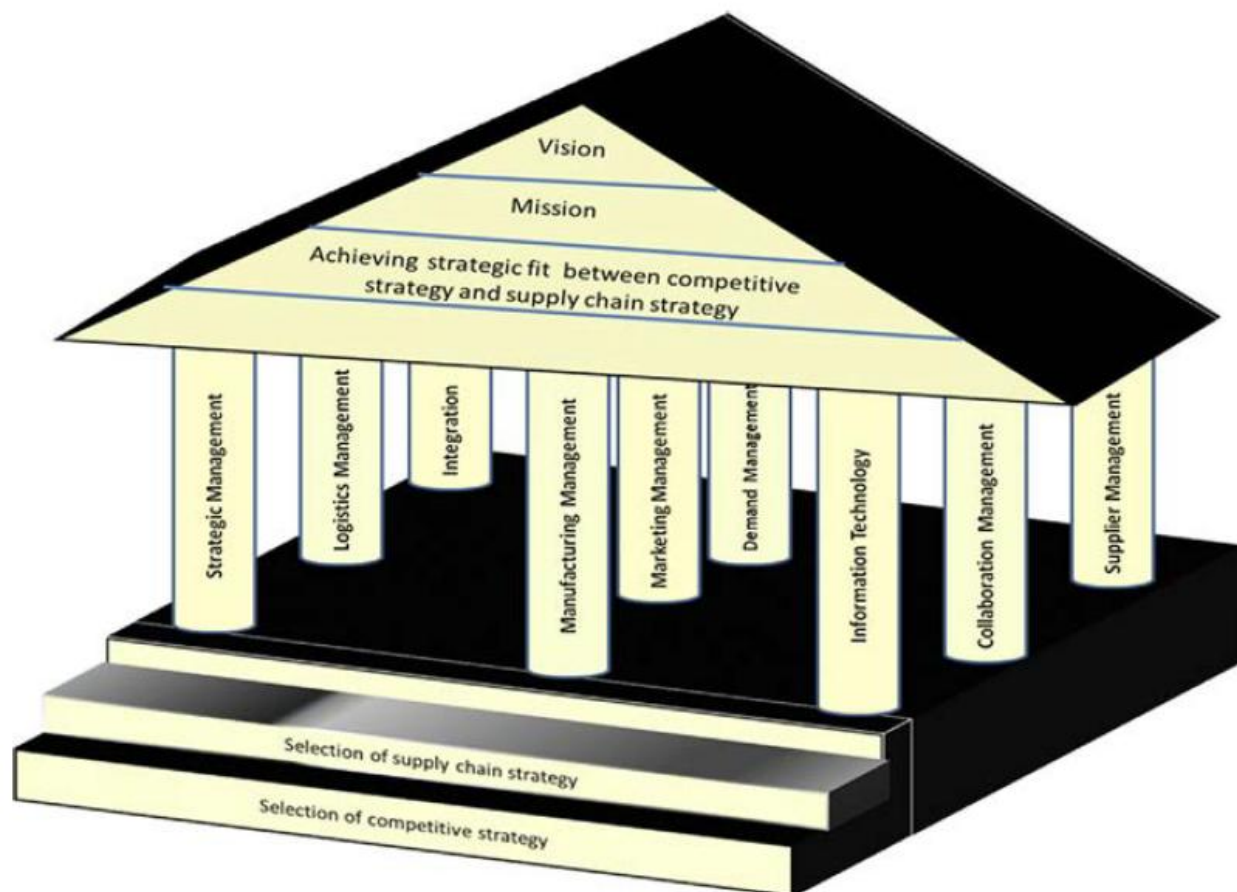


Figure1. A comprehensive framework for SCM [5]

The comprehensive SCM framework in has nine pillars. Such pillars are considered as an integral part of SCM which are: Strategic management, Manufacturing management, Marketing management, Integration, Information technology, Logistics management, Supplier management, Demand management and Collaboration management. Supply chain management (SCM) consists of enterprises which collaborate to improve strategic position and to heal operating efficiency. [7] SCM is defined also as the function responsible for the transport and storage of materials on their journey from the earliest suppliers, through intermediate operations, and on to final customers. [8] SCM as a process that involves all necessary activities to fulfill customers' needs involves the management of products, information flow, and business relationships. [9], [10], [11], [2], [12] As supply chains become more complex, their management plays a considerably significant role in the delivery of products with high values to international markets. [13]

1.2.2 Quality Management and Quality Control

The product quality and manufacturing process of suppliers has great effect on the quality of final product of core enterprise. It means that the emphasis of research and practice of TQM has transferred from enterprise focus to supply chain focus. According to Chang (2009) not only the high quality of product and service but also the high level of quality control of the supply chain system ensures the competition advance.[14] A main part of prosperous SCM is quality control (QC) of products and services at any level of the supply chain. [15], [16]

95 Faria-Fernandes et al. (2009) defines QC as the function which aims to measure and
 96 improve the production and marketing processes and the product and information flow to
 97 provide products according to specification. [17] QC is significant for manufacturing and
 98 services, and has become a primary factor for success in export markets. [18], [19], [20]
 99 Therefore, firms should apply good management practices based on effectiveness of QC of
 100 supply chains from the following aspects: before planning, production control, harvest, post-
 101 harvest and marketing. [21] In 2013, Jraisat and Sawalha had a study on QC in Jordan.[8]
 102 They tried to identify the factors of quality control (QC) among key members of a supply
 103 chain and investigate the effect on supply chain management (SCM). Their findings
 104 determined the high-order factors of QC and identified the role of QC in SCM, acting as the
 105 main strategy to improve supply chains. Despite the potential advantages of QC, small
 106 businesses are unwilling or consider it difficult to implement QC programs. Some of such
 107 difficulties are thought to be weak connections between buyers and sellers, shortage of
 108 financial and human resources, insufficient skills or training, and information sharing, and the
 109 lack of trust in safety legislations. [8] Again Jraisat and Sawalha (2013) claim that in SCM,
 110 QC helps to manage different processes inside firms and between them. [8] So QC owns
 111 the possibility to maximize the capability of organizing a system of better functions which
 112 increases supply chain relationships and performance. [22], [23] QC ought to be developed
 113 from a firm level to include the entire supply chain. [8] According to Jraisat and Sawalha
 114 (2013) understanding the quality of supply chains demands analyzing the internal
 115 environment like country facilities and infrastructure, product quality and standards, exporter-
 116 producer relationships and marketing research of the fresh fruit market. [8] The Literature
 117 reveals there are a few studies that their frameworks include QC through supply chain and
 118 they have dealt just with QC in a single firm. As competition extends from single firm to the
 119 supply chain, researchers are beginning to explore quality management (QM) in a supply
 120 chain context, because integrating QM and SCM will be important for future competitiveness.
 121 Supplier quality management and customer focus are two QM practices that are in the
 122 domain of SCM. This fact shows that supply chain management (SCM) consists of internal
 123 practices, which are contained within a firm, and external practices, which pass
 124 organizational boundaries and integrates a firm with its customers and suppliers. In 2008,
 125 Kaynak and Hartley studied how the supply chain management-related quality practices,
 126 supplier quality management and customer focus, lead to improved performance and
 127 examined the practices that mediate those relationships. [24] Kaynak and Hartley developed
 128 a structural equation model that showed the relationships between quality management
 129 practices and upstream and downstream factors of supply chain. [24] The eight QM
 130 practices in their paper were management leadership, training, employee relations, customer
 131 focus, quality data and reporting, supplier quality management, product or service design
 132 and process management. Their results emphasize the importance of internal and external
 133 integration for quality performance. To answer the questions about content and structure of
 134 business systems in the context of QM, Kim et al. (2010) discussed three models towards
 135 corporate quality and business prosperity and excellence: the model of European
 136 Foundation for Quality Management (EFQM), ISO 9000, and the Malcolm Baldrige National
 137 Quality Award (MBNQA). EFQM highlights some phases working for reaching excellence of
 138 business: leadership, policy and strategy, management of people, resources and
 139 partnerships management, and managing processes. [25] The different model presented by
 140 Zu et al. (2008) with a Six Sigma model that involves five strategic entities and their tactical
 141 activities: top management support, classic threshold of QM, Six Sigma structure, traditional
 142 QM core, and Six Sigma core. For example Traditional QM infrastructure involves three
 143 tactical activities: supplier and customer relationship plus workforce management. [26] And
 144 Quality information, design of product or service, and process management are parts of the
 145 traditional QM that this point will find a remarkable importance when understanding the
 146 relationship between QM and SCM is the first step toward establishing a SCQM system. [3]

1.2.3 Supply Chain Quality Management

According to Robinson and Malhotra (2005), the focus of the current and future is SCQM. SCQM is designed to respond to the market demand requirements effectively by managing the supply chain for quality. [27] Three key features of SCQM are customer focus, quality of IT system and trust relationship. [28] Robinson and Malhotra (2005) classified SCQM as a recognized model by defining two different groups of supply chain and QM themes in association with the internal and external supply chains. [27] They report four elements for dealing with the internal supply chain: strategy, quality leadership, quality practices, and internally focused process integration and management. Robinson and Malhotra (2005) described SCQM as a formal integration of processes that refers to all partner organizations in the supply chain channel. [27] To improve the external supply chain, they emphasized the importance of communication and cooperation, supply chain quality leadership, supply chain practices and quality, and integration and management of processes regarding external factors. Supply chain quality management (SCQM) is also defined as a systems-based approach to performance improvement that increases opportunities led by upstream and downstream relationships with suppliers and customers. [29] Many qualitative and quantitative studies have been in pursuit of offering a better understanding of SCQM. The role and effect of SCQM on enterprises of all sizes has been remarked by Robinson and Malhotra (2005), Sila et al. (2006), Foster (2008), Kuei et al. (2008), Yeung (2008), Vachon et al. (2009), Das and Sengupta (2010), Ou et al. (2010), and Kuei et al. (2011). [27], [30], [29], [31], [32], [33], [34], [35], [36] That among the mentioned studies the study of Robinson and Malhotra (2005) presents an appropriate literature on SCM and QM. [27] Lin et al. (2005) demonstrate that using a structural equation model shows that quality management practices are significantly correlated with the supplier participation strategy, that this correlation may influence tangible business results and customer satisfaction levels. [37] Lin also tested the association between organizational performances and SCQM practices such as manufacturers knowing their supplier's quality records, considering a supplier's capability when designing products, and establishing long-term relationships with individual suppliers. [37] Their results show that perceived improvements in organizational performance are associated with improvements in supply chain quality management practices. Today's enterprises thus need trustworthy ways to help find practices to restart their mobilization efforts and realize the full potential of SCQM. Supply chain quality management (SCQM) as said is concerned with planning, linking, and managing strategic and tactical approaches of a supply chain system to prevent undesired deviations, reassuring accountability of channel partners, create system-level optimization, and build competent supply networks. To fulfill such tasks, the pioneer firms in a supply chain setting such as Toyota, Apple, Zara, Hewlett-Packard and Asus and so more have been formed on a strategically designed mixture of Lin

- Setting strategies for supply chain quality
- Determining external drivers and internal enablers of SCQM
- Efficiency and effectiveness
- Considering cultural requirements
- Creating IT platforms
- Establishing programs for training and quality auditing
- Relationships with suppliers.

[38]

In 2008, Foster identified key QM content variables to be: customer focus, quality practices, supplier relations, leadership, HR practices, business results, and safety. [3] Many researchers have noted that to realize the full potential of a SCQM system, modern

enterprises must pay immediate attention to the processes of both internal and external mobilization.[39], [27], [3], [24], [32], [36] Like what Robinson and Malhotra (2005) pointed to, the process of externalizing requires major emphases on communication and partnership, supply chain quality leadership, quality and supply chain practices, and externally focused process integration, management, and strategy.[27] Das and Sengupta (2010) introduced a mathematical framework to explore the problem context in the domain of SCQM. [34] And Chae et al. (2005) considered the necessity of rooting external mobilization efforts in five areas: trust, collaboration, interdependence, information sharing, and long term orientation. [40] According to Lin et al. (2013) the goal of SCQM, is making supply chain quality capabilities from both externalization and internalization perspectives, and thus it provides a system-level blueprint for designing a comprehensive quality plan for supply chain. [38] A plan that tries to find answers to the standard questions about contents, like what activities to be performed, and structures, like how they should be linked and sequenced, of business systems in a supply chain. By conducting a web-based survey, Foster and Ogden (2008), agreed on some concepts as core values including visionary leadership, customer driven quality, organizational learning, personal development, value of employees, value of partners, organizational agility, future orientation, focus on innovation, social responsibility, results orientation, creative value, and systems orientation. they concluded that in organizations those who considered themselves as supply chain managers , to a wider extent, manipulated quality tools and values than those who thought themselves as operations managers. [3] Yeung (2008) probed competition between supply chains to understand the extent to which strategic supply chains interact with quality management systems to drive competitiveness. He followed an approach involving both qualitative and quantitative methods. He searched for features of critical factors that affect supply chain quality and excellence. He also found that implementing QM might facilitate Strategic Supply Management. As a result, he showed that QM is a foundation of Strategic supply management and a key requirement for continuous improvement extending to the supply chain. [32] In 2009, Chang investigated the application of the eight modern TQM principles of ISO9000 in supply chain quality management including customer focus, leadership, involvement of people, process management, system management, continual improvement, factual approach to decision-making, and mutually beneficial supplier relationships, so as to promote the improvement of operation efficiency and competition advantage of the whole supply chain system. [29] Kuei and Madu (2001) developed fourteen dimensions for SCQM. Among those fourteen dimensions just four were presented by Kuei and Madu and the other dimensions were derived from the literature. The dimensions comprised of top management leadership, training, product design, supplier quality management, process management, quality data reporting and employee relations. Kuei and Madu (2001) introduced customer relations, benchmarking, supplier selection, and supplier participation. Three additional IT-driven change factors were also included; information technology, IT-driven operations process and IT-driven organization integration. Also Kuei and Madu (2001) identified three critical factors of SCQM including quality of IT system, supplier relationship and customer focus to build competitive advantage. Supporting components such as QM infrastructure, QM tools and QM practices and QM culture are required for successful SCQM[28]. Leadership support for SCQM is important, to ensure the goals of customer satisfaction, trusted customer-supplier relationship and high level IT based capabilities.[28] Lin et al. (2005) mentioned that traditional quality management practices and appropriate TQM practices can be involved in SCQM process. Developing a stable and dependable relationship between buyer-supplier that transcends the organizational boundaries is very important to improve performance of the supply chain.[37] The strong and stable relationship can transfer commitment from suppliers to supply quality products. Supplier's commitment to quality is increased by the relationship stability of the buyer and suppliers. As mentioned, both qualitative and quantitative methods are used by researchers to collect data and conduct studies to better understand the concept of SCQM. Empirical field studies are still

needed to assess and identify critical paths to high performance of SCQM. Altogether after reviewing the existing literature, the request for identifying enablers and procedures to SCQM inspired us to put efforts to extend the knowledge of the field. This research is considered a contribution to the field of SCQM by fulfilling three objectives; at first analyzing the content of supply chain, then identifying its structure and at last showing pathways to opportunity areas of improvement in organizing and operations.

2. METHODOLOGY

2.1 RESEARCH MODEL

The ten QM practices investigated in this study focus on customer, the quality of data and reports, supplier relationships, information technology, human resource management, process management, knowledge management, leadership, quality practices and strategic planning have been documented extensively in QM research, as shown in Table 1. SCM consists of internal practices, which are contained within a firm, and external practices, which cross organizational boundaries to integrate a firm with its customers and suppliers (e.g., Droge et al., 2004[41], Frohlich and Westbrook, 2001, [42]; Kannan and Tan, 2005 [43]; Li et al., 2006, [44] and there is overlap between SCM and QM practices (Kannan and Tan, 2005, [43]; Robinson and Malhotra, 2005, [27]). Supplier relationship and customer focus are two QM practices that are clearly in the domain of SCM.

Table1. Quality management Enablers in SCM

QM Enablers	Description	Studies
focus on customer	Customers' involvement in product or service design. Use of customer satisfaction surveys. Focus on achieving greater customer satisfaction. (Ahire et al., 1996; Powell, 1995)	Adam et al. (1997), Ahire et al. (1996), Anderson et al. (1995), Black & Porter (1996), Crosby (1984), Deming (1986), Douglas and Judge (2001), Kaynak & Hartly (2008)
Quality data and reporting	Use of quality cost data. Feedback of quality data to employees and managers for problem solving. Timely quality measurement. Evaluation of managers and employees based on quality performance. Availability of quality data (Saraph et al., 1989, p. 818)	Ahire et al. (1996), Black and Porter (1996), Crosby (1984), Deming (1986, 1993), Douglas and Judge (2001), Feigenbaum (1982), Flynn et al. (1994), Ho et al. (2001), Kaynak & Hartly (2008)
Supplier Relationship	Fewer dependable suppliers. Reliance on supplier process control. Strong interdependence of supplier and customer. Purchasing policy emphasizing quality rather than price. Supplier quality control. Supplier assistance in product development (Saraph et al., 1989, p. 818)	Ahire et al. (1996), Black and Porter (1996), Crosby (1984), Das et al. (2000), Deming (1986, 1993), Dow et al. (1999), Ho et al. (2001), Feigenbaum (1982), Flynn et al. (1994), Kaynak (2003)
Information Technology	To enhance cooperation with	Flynn and Flynn (2005),

		our suppliers, we use two methods to connect to our suppliers: B2B and web site operations. Try to enhance suppliers' competencies through the use of SCM systems. Try to classify suppliers based on their needs/capabilities. (Lin et al. 2013, p. 20)	Stroufe and Curkovic (2008); Kaynak and Hartley (2008); Kuei et al. (2010), Lin et al (2013)
Human Management	Resource	find talent individuals matching our needs and then offer training and education opportunities. Employee involvement and learning capability will influence the performance of internal and external activities. Use seed employees (i.e. champion) to deploy firm's business policies. (Lin et al. 2013, p. 20)	Flynn and Flynn (2005), Stroufe and Curkovic (2008); Kaynak and Hartley (2008); Foster (2008); Kuei et al. (2010), Lin et al (2013), Adam et al. (1997), Ahire et al. (1996), Black and Porter (1996), Crosby (1984), Foster (2008)
Process Management		Clarity of process ownership, boundaries, and steps. Less reliance on inspection. Use of statistical process control. Selective automation. Foolproof process design. Preventive maintenance. Employee self-inspection. Automated testing. (Saraph et al., 1989, p. 818)	Ahire et al. (1996), Anderson et al. (1995), Black and Porter (1996), Crosby (1984), Deming (1986, 1993), Feigenbaum (1982), Flynn et al. (1994), Lin et al, (2013), Kaynak (2003), Kaynak and Hartly (2008), Malhotra et al. (2005), Flynn and Flynn (2005), Kuei et al. (2010).
Knowledge Management		QM staff can draw processes maps by themselves. By referring to such maps, they can understand the standard operating procedures and relevant product information. Update our external information on a regular basis	Stroufe and Curkovic (2008); Kuei et al. (2010), Flynn and Flynn (2005); Lin et al (2013)
Leadership		Acceptance of quality responsibility by top management. Evaluation of top management on quality. Participation by top management in quality improvement efforts. Specificity of quality goals.	Adam et al. (1997), Ahire et al. (1996), Anderson et al. (1995), Black and Porter (1996), Crosby (1984), Deming (1986), Feigenbaum (1982), Flynn et al. (1994), Kaynak (2003), Kaynak (2008), Lin (2013),

	Importance attached to quality in relation to cost and schedule. Comprehensive quality planning. (Saraph et al., 1989, p. 818)	Garvin (1988), Foster (2008)
Quality Practices	stricter with regard to the product quality. Often customers visit our plant to understand/verify our production and development processes. Implement quality standards such as Iso or EFQM. Design quality process activities such as Six Sigma, Zero defect. Lin et al (2013)	Malhotra et al. (2005); Lin et al. (2005); Yeung (2008); Sroufe and Curkovic (2008); Kaynak and Hartley (2008); Foster (2008); Kuei et al. (2010), Lin et al, (2013), Foster (2008).
Strategic Planning	Problems need to be spotted with the help of holistic thinking and planning. Action plans need to be prepared accordingly. Lin et al. (2013)	Malhotra et al. (2005); (2005); Flynn and Flynn (2005); Yeung (2008); Kuei et al. (2010); Lin et al (2013).

273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298

This research followed a confirmatory approach. A case study strategy of five firms was selected in order to investigate potential similarities and differences within the cases. We further explored the QC's factors and the effect on SCM across the cases. According to Perry (1998), "the widest accepted range for case studies falls between 2 to 4 as a minimum and 10, 12 or 15 as a maximum". The target population for this study consisted of 4 firms that were using QM practices. These companies were located In Zanjan province. The numbers of employees in each company were more than 300. This research has focused on different chain members, including inventory, production process and sale and marketing sections. Observations were also made by attending meetings and field tours with various managers. The questionnaire includes both multiple choice questions and open questions in order to cover whole aspects of enablers, find beyond initial responses and overcome to answer questions carelessly. General managers, production managers, marketing managers, logistic managers, and quality managers responded to the interviews. The process was iterative, moving backward and forward in time, exploring what their supply chain was like before the QC system, how and why they started to change and what factors are their priorities in future in order to improve their businesses. Targeted firms are involved in the Electronic industry. A non-probability sampling was adopted using a self-selection technique, based on the researcher's subjective judgment and the researcher's experience. All interviews were tape-recorded in order to facilitate data analysis. The results of each case study will be reported in terms of the key themes and key quotes. Each completed case write-up was made available to the firm's management to share comments related to the findings in order to ensure content validity and research reliability. According to Jraisat and Sawalha's research (2013) that design their questionnaire into 2 sections, in this paper we follow their method. Section (1) identifies QC factors most recognized/applied for improving SCM at present time. Section (2) determines QC factors that should be applied in future.

299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350

3. RESULTS AND DISCUSSION

3.1 CASE STUDIES

3.1.1 Case 1

The firm respondents account for how their understanding of QC in terms of different factors. They stated that they haven't paid attention specifically to the quality factors. In terms of Customer focus the firm is in the acceptable situation, as they spread out monthly questionnaire to measure customer' satisfaction. After analyzing the data they report it to the executive manager. They try to have immediate action for defects. Then the data about the quality of products is collected. Though in collecting and analyzing the data, the firm uses standard procedures but the validity and preciseness of the data is not satisfactory. Due to the significant reliability of the firm products to the products provided by suppliers, the firm pays a high attention to assess the quality of suppliers and their participation in the decisions related to quality and their improvement. In spite of some deficiencies, firm is in a suitable situation. In the field of information technology, the firm suffers from many shortages. Transaction is not feasible through the website and the firm does not use any of the web based procedures for production and inventory. In managing human resources there has been designed some programs to train the staff and the firm is helped by external consultants in some areas. The firm is providing a document to manage human resources in a better way so that by accomplishing such a document, the firm will reach an acceptable position. In the area of controlling and reviewing the processes, most of the activities are done automatically but the techniques like reengineering the processes and the management of product life cycle are not in planned use. In the area of knowledge management, transition of the staff's experiences to each other is not on an appropriate approach. And the level of creativity and innovation among the staff proved to be in a low rate. Totally, the firm is lagging in the field of knowledge management. The leadership of the organization does not follow effective guidelines to increase profit making or establishing two-way communications among the staff. The quality management in the firm is moderately adequate. The firm is implementing the ISO standard and also tries to heal procedures and established executive ways in its activities. A document relating to strategic planning is provided for the organization though there is a long way ahead to reach predicted goals of this document and the document has not lately been the case for rethinking.

3.1.2 Case 2

Considering the likeness of the observed industry and organizational structure, this firm resembles the first firm. Analyzing the data and the information from the second firm made clear that the circumstances for focus on customer, not considering the products made according to the customer needs and demands, is almost like to that of the first firm. The procedures for collecting quality data are the same as those mentioned for the first firm. Also the data for communication with suppliers, human resource management, process management, leadership, and quality management meet acceptable criteria. But the firm deals with serious problems in four areas. Information technology is facing problems from the website to the use of integrated ways of production and no remedy has been predicted to implement knowledge management in the organization. Leadership and strategic planning is similar to the situations of the first firm.

3.1.3 Case 3

In this firm, data about customers are gathered but their analysis and reporting are not done precisely or timely. Data quality and reporting is according to a standard procedure in the firm and the data are studied from the view of corruption, error and cost in an appropriate way. Communication with suppliers is limited to controlling the products which enter the firm. Transactions of some products are done through the internet but no web-based and integrated manufacturing approach is in use. The situations of human resource management, process management and knowledge management are similar to those in the first firm. Leadership and managers are constantly the cases for quality evaluations by the staff and the managers strive to initiate communications with the stuff and solve their problems. From the aspect of quality management, although the firm deploys some procedures like corresponding rival products but no recognized procedure or standard like ISO or EFQM standard is administered in it. In strategic planning, performance measures have been put into action in the firm but from the point of developing the comprehensive strategic plan, it resembles the two previous firms.

3.1.4 Case 4

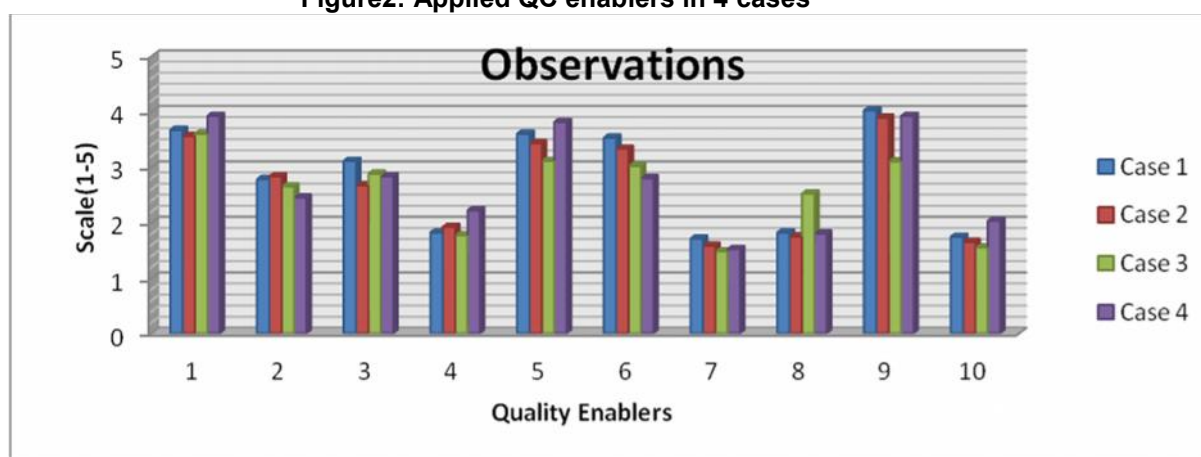
In relation to the factor of customer focus, this firm is evaluated in the same level as the firms 1&2 but here some programs are available for initiating communications with customers through the customers' community system in social networks that is a novel practice in marketing. This firm devotes a major concern to the customer's role and focus on his demands. As there is no standardized procedure, data quality and reporting is not in a satisfactory level. In order to communicate with suppliers, the company has signed some contracts with its suppliers to guarantee the quality of the presented products to meet the expected levels from different angels. Information technology is challenged by the same issues which the previous firms had. The remarkable number of the experts and knowledge workers form the main body of the staff and the human resources. Always educational programs, mainly in the field of immunity and hygiene standards are designed. The situations of knowledge management and process management are evaluated to be the same as the first company and the company needs a specific to improve its knowledge management situation. The situation of the leadership factor is the same as that of the first company. Compare to the previous companies in implementing the EFQM standard, the circumstances for quality management in this company is more paved. The situation of strategic planning considering developing the comprehensive strategic plan and measuring performance indexes is estimated to be reasonable.

3.1.5 The Four Studied Companies in Comparison to Each other

In the previous section, four companies of the study were investigated based on the 10 quality factors in supply chain and the significance of each factor was determined. Also some of the tasks done in relation to any of the 10 grounds were referred to. In this section the analysis of the closed questions, which are designed based on ordinal scale, is presented. As is apparent in Figure 2, in the factor (1), focus on customer, almost the four companies showed fairly sensible situations. In section of data quality and their reporting any of the four firms had specified procedures for it though those procedures were not standard or the received information were not precise or correct. In section of participation with suppliers, in the first firm the closest and highest rate of communication was seen. But in none of the firms, supplier participation was observed as a member in decision making processes of quality. One of the most recognized problems of the firms was the shortcomings of the information technology section. Lack of an integrated intelligent system like ERP and not using the firm's website in selling process and initiating communications with customers and suppliers were the main sources of problems in the firms. Educational programs for the staff were one of the factors that could have the attention of the four firms.

And in the fourth firm due to the structure of the firm, knowledge workers were used and among the firms this factor could draw more attentions to itself in the fourth firm. In the studied firms, controlling the activities through process reengineering and product life cycle management was not done on a concrete basis. Among the 10 factors, the most important area to discuss was the quality of knowledge management that the five sectional process of knowledge management, encouraging the staff to creativity and innovation and the process of sharing knowledge among the staff were not detected in any of the firms so this section demands more consideration and reviewing in the four firms. In leadership factor other than the factor 3 in the field of managers' ability and attention and performance measurement, others were challenged by problems that this shows the priority of this point in the improvement process. Due to the familiarity of the organizations with the standards and their requisite to follow some of them, the status of the quality management systems is approved. Among the 10 factors, the second subject that was confronted by many deficiencies was strategic planning. The most eye catching problem in this field is predicted to be ignoring and not putting the programs into action.

Figure2: Applied QC enablers in 4 cases

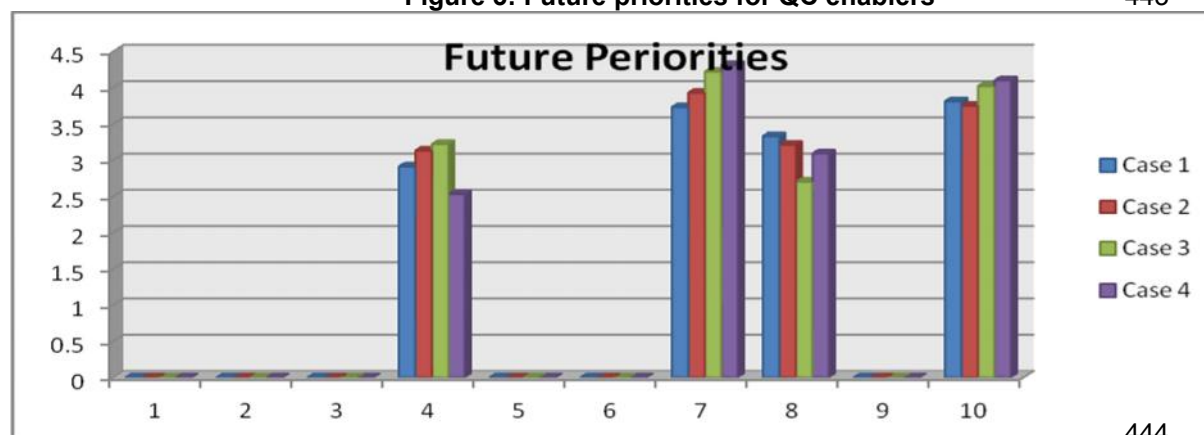


4. CONCLUSION

Nowadays in the turbulent business environment, quality control is looked upon as a priority in the competition arena and a useful tool in marketing. The present study strives for determining the effective factors in supply chain management as the necessity of the marketing in today's organizations. Also companies are dealing with chief necessities of businesses including standards, delivery time and customer satisfaction otherwise they wont be successful to have the desired performance of supply chain in the hyper competitive market. 10 factors were recognized as the device for quality control in the supply chain and their priorities were determined. The study discloses the importance of quality control strategies and their compatibilities in the present and future development of supply chain. In figure 3 considering the observed shortcomings in each of these factors, four areas are discovered to be the priorities for improvement in the future. The order of these areas includes knowledge management, strategic planning, and leadership and information technology. This research might have the potential value for policy makers and those responsible for managing supply chain in organizations.

Figure 3: Future priorities for QC enablers

443



444

4.2 DIRECTIONS FOR FURTHER RESEARCH

There is different issues can be discussed in further research: Supply chain quality strategy, Supply chain quality assurance, Supply chain quality control, Supply chain service. Further research is needed to identify major elements of information and product quality and how to increase information and product flow among the supply chain members. Future research is also required to focus on issues of quality expectations related to delivery A product flow between the supply chain members needs to be analyzed to capture the impact of delivery quality on the QC system and the impact of the information flow on product delivery quality. There is a need to explore how firms aim to reduce distribution uncertainties among chain members in order to increase their chances of obtaining more dependable deliveries with a minimum amount of "just-in-case" resources such as materials inventory, safety production capacity and labor overtime.

ACKNOWLEDGEMENTS

The article greatly thank to 4 companies managers and all employees who attend the research.

REFERENCES

- 1- Romano, P. and Vinelli, A., Quality management in a supply chain perspective strategic and operative choices in a textile-apparel network, *International Journal of Operations & Production Management*. 2001, Vol. 21, No. 4, pp. 446-460.
- 2- Casadesus, M. and de Castro, R., How improving quality improves supply chain management: empirical study, *The TQM Magazine*, 2005, Vol. 17, No. 4, pp. 345-357.
- 3- Foster, S.T. Jr and Ogden, J, "On differences in how operations and supply chain managers approach quality management", *International Journal of Production Research*, 2008, Vol. 46, No. 24, pp. 6945-6961.
- 4- Vrijhoef, R. and Koskela, L, The four roles of supply chain management in construction, *European Journal of Purchasing and Supply Management*, 2000, Vol. 3/4, No. 6, pp. 169-178.
- 5- Soni, G. and Kodali, R, A critical review of supply chain management frameworks: proposed framework, *Benchmarking: An International Journal*, 2013, Vol. 20, No. 2, pp. 263-298.

- 483 6- Chi, T., Peter, P.D., Vidyaranya, K. and Gargeya, B, "Alignment between business
484 environment characteristics, competitive priorities, supply chain structures, and firm
485 business performance", International Journal of Productivity and Performance
486 Management, 2009, Vol. 58, No. 7, pp. 645-669.
487
- 488 7- Bowersox, D., Closs, D., Cooper, M.B, Supply Chain Logistics Management, McGraw
489 Hill, New York, NY, 2007.
490
- 491 8- Jraisat, L.E. and Sawalha, I.H, Quality control and supply chain management: a
492 contextual perspective and a case study, Supply Chain Management: An International
493 Journal, 2013, Vol. 18, No. 2, pp. 194–207.
494
- 495 9- Christopher, M, Logistics and Supply Chain Management: Strategies for Reducing Cost
496 and Improving Service, 2nd edition, Financial Times Publishing, London, 1998.
497
- 498 10- Chopra, S. and Meindl, P, Supply Chain Management: Strategy, Planning and
499 Operations, Prentice Hall, Englewood Cliffs, NJ, 2001.
500
- 501 11- Wu, W-Y., Chiag, C-Y., Wu, Y-J. and Tu, H-J, The influencing factors of commitment
502 and business integration on supply chain management, Industrial Management & Data
503 Systems, 2004, Vol. 104, No. 4, pp. 322-33.
504
- 505 12- Wang, X. and Li, D, A dynamic product quality evaluation based pricing model for
506 perishable food supply chains, Omega, 2012, Vol. 40, No. 6, pp. 906-917.
507
- 508
- 509 13- Davis, J.R, The Trade Implications of Agri-food Sector Restructuring, NRI publication,
510 Chathamj, available at: www.nri.org, 2005.
511
- 512 14- Chang, G, Total Quality Management in Supply Chain", International Business
513 Research, 2009, Vol. 2, No. 2.
514
- 515 15- Choi, T.Y. and Rungtusanatham, M, Comparisons of quality management practices:
516 across the supply chain and industries, The Journal of Supply Chain Management, 1999,
517 Vol. 35, No. 1, pp. 20-27.
518
- 519 16- Cagnazzo, L., Taticchi, P. and Brun, A, The role of performance measurement systems
520 to support quality improvement initiatives at supply chain level, International Journal of
521 Productivity and Performance Management, 2010, Vol. 59, No. 2, pp. 163-185.
522
- 523 17- Faria-Fernandes, F.C., Filho, M.G. and Bonney, M, A proposal for integrating
524 production control and quality control, Industrial Management & Data Systems, 2009, Vol.
525 109, No. 5, pp. 683-707.
526
- 527 18- Martinez, M.G. and Poole, N, The development of private fresh produce safety
528 standards: implications for developing Mediterranean exporting countries, Food Policy,
529 2004, Vol. 29, No. 3, pp. 229-255.
530
- 531 19- Carmignani, G, Supply chain and quality management: the definition of a standard to
532 implement a process management system in a supply chain, Business Process
533 Management Journal, 2009, Vol. 15, No. 3, pp. 395-407.
534

- 535 20- Talib, F., Rahman, Z. and Qureshi, M.N, A study of total quality management and supply
536 chain management practices, *International Journal of Productivity and Performance*
537 *Management*, 2011, Vol. 60, No. 3, pp. 268-288.
538
- 539 21- Zhang, Y. and Ran, X.L, Ren Study on product quality tracing technology in supply
540 chain", *Computers & Industrial Engineering*, 2011, Vol. 60, No. 4, pp. 863-871.
541
- 542 22- Flynn, B.B., Schroeder, R.G. and Sakakibara, S, A framework for quality management
543 research and an associated measurement instrument, *Journal of Operations Management*,
544 1994, Vol. 11, No. 4, pp. 339-366.
545
- 546 23- Van-Der-Vorst, J.G.A.J., Carlos, A., da Silva, C.A. and Trienekens, J.H, Agro-industrial
547 Supply Chain Management: Concepts and Applications, *Food and Agriculture Organization*
548 *of the United Nations (FAO)*, Rome, Italy, pp. 1-5, 2007.
549
- 550 24- Kaynak, H. and Hartley, J.L, A replication and extension of quality management into the
551 supply chain, *Journal of Operations Management*, 2008, Vol. 26, No. 4, pp. 468-489.
552
- 553 25- Kim, D.Y., Kumar, V. and Murphy, S.A, European foundation for quality management
554 business excellence model, *International Journal of Quality and Reliability*, 2010, Vol. 27,
555 No. 6, pp. 684-701.
- 556 26- Zu, X., Fredendall, L.D. and Douglas, T.J, The evolving theory of quality management:
557 the role of Six Sigma, *Journal of Operations Management*, 2008, Vol. 26, No. 5, pp. 630-650.
558
- 559 27- Robinson, C.J. and Malhotra, M.K, Defining the concept of supply chain quality
560 management and its relevance to academic and industrial practice, *International Journal of*
561 *Production Economics*, 2005, Vol. 96, No. 3, pp. 315-337.
562
- 563 28- Kuei, C., and Madu, C.N, Identifying critical success factors for supply chain quality
564 management (SCQM), *Asia Pacific Management Review*, 2001, 6(4), 409-423.
565
- 566 29- Foster, S.T. Jr, Towards an understanding of supply chain quality management, *Journal*
567 *of Operations Management*, 2008, Vol.26, pp. 461-467
568
- 569 30- Sila, I., Ebrahimpour, M. and Birkholz, C, Quality in supply chains: an empirical analysis,
570 *Supply Chain Management: An International Journal*, 2006, Vol. 11, No. 6, pp. 491-502.
571
- 572 31- Kuei, C., Madu, C.N. and Lin, C, Implementing supply chain quality management, *Total*
573 *Quality Management and Business Excellence*, 2008, Vol. 19, No. 11, pp. 1127-1141.
574
- 575 32- Yeung, A.C.L, Strategic supply management, quality initiatives, and organizational
576 performance, *Journal of Operations Management*, 2008, Vol. 26, No. 4, pp. 490-502.
577
- 578 33- Vachon, S., Halley, A. and Beaulieu, M, Aligning competitive priorities in the supply
579 chain: the role of interactions with suppliers, *International Journal of Operations & Production*
580 *Management*, 2009, Vol. 29, No. 4, pp. 322-340.
581
- 582 34- Das, K. and Sengupta, S, Modeling supply chain network: a quality-oriented approach,
583 *International Journal of Quality & Reliability Management*, 2010, Vol. 27, No. 5, pp. 506-526.
584
- 585 35- Ou, C.S., Liu, F.C., Hung, Y.C. and Yen, D.C, A structural model of supply chain
586 management on firm performance, *International Journal of Operations & Production*
587 *Management*, 2010, Vol. 30, No. 5, pp. 526-545.

- 588
- 589 36- Kuei, C., Madu, C.N. and Lin, C, Developing global supply chain quality management
- 590 systems, *International Journal of Production Research*, 2011, Vol. 49, No. 15, pp. 4457-
- 591 4481.
- 592
- 593 37- Lin, C., Chow, W. S., Madu, C. N., Kuei, C. and Yu, P, A Structural Equation Model of
- 594 Supply Chain Quality Management and Organizational Performance, *International Journal of*
- 595 *Production Economics*, 2005, Vol. 96, pp. 355-365.
- 596
- 597 38- Lin, C., Kuei, C. and Chai, K. W, Identifying critical enablers and pathways to high
- 598 performance supply chain quality management, *International Journal of Operations &*
- 599 *Production Management*, 2013, Vol. 33, No. 3, pp. 347-370.
- 600
- 601 39- Flynn, B.B. and Flynn, E.J, Synergies between supply chain management and quality
- 602 management: emerging implications, *International Journal of Production Research*, 2005,
- 603 Vol. 43, No. 16, pp. 3421-3436.
- 604
- 605 40- Chae, B., Yen, H.B. and Sheu, C, Information technology and supply chain collaboration:
- 606 moderating effects of existing relationships between partners, *IEEE Transactions on*
- 607 *Engineering Management*, 2005, Vol. 52, No. 4, pp. 440-448.
- 608
- 609 41- Droëge, C., Jayaram, J., Vickery, S, The effects of internal versus external integration
- 610 practices on time-based performance and overall firm performance. *Journal of Operations*
- 611 *Management* 22, 2004, Vol 6, 557–573.
- 612
- 613 42- Frohlich, M., Westbrook, R, Arcs of integration: an international study of supply chain
- 614 strategies. *Journal of Operations Management*, 2001, Vol 19, 185–200.
- 615
- 616 43- Kannan, V.R., Tan, K.C, Just in time, total quality management, and supply chain
- 617 management: understanding their linkages and impact on business performance. *Omega*,
- 618 2005, Vol 33, 153–162.
- 619
- 620 44- Li, S., Ragu-Nathan, B., Ragu-Nathan, T.S., Subba, S.R, The impact of supply chain
- 621 management practices on competitive advantage and organizational performance. *Omega*,
- 622 2006, 34 (2), 107–124.
- 623
- 624 45- Saraph, J.V., Benson, G.P., Schroeder, R.G, An instrument for measuring the
- 625 critical factors of quality management. *Decision Sciences*, 1989, Vol. 20, 810–829.
- 626
- 627 46- Powell, T.C, Total quality management as competitive advantage: a review and empirical
- 628 study. *Strategic Management Journal*, 1995, Vol. 16, 15–37.
- 629
- 630 47- Morrow, P.C, The measurement of TQM principles and work-related outcomes. *Journal*
- 631 *of Organizational Behavior*, 1997, Vol. 18, 363–376.
- 632 48- Black, S.A., Porter, L.J, Identification of the critical factors of TQM. *Decision Sciences*,
- 633 1996, Vol. 27, 1–21.
- 634
- 635 49- Anderson, J.C., Rungtusanatham, M., Schroeder, R.G., Devaraj, S, A path analytic
- 636 model of a theory of quality management underlying the Deming management method:
- 637 preliminary empirical findings. *Decision Sciences*, 1995, Vol. 26, 637–658.
- 638
- 639 50- Ahire, S.L., Golhar, D.Y., Waller, M.A, Development and validation of TQM
- 640 implementation constructs. *Decision Sciences*, 1996, 1996, Vol. 27, 23–56.

- 641
642 51- Crosby, P.B, Quality Without Tears. McGraw-Hill Book Company, New York, 1984.
643
- 644 52- Deming, W.E, Out of the Crisis. Massachusetts Institute of Technology, Center for
645 Advanced Engineering Study, Cambridge, MA, 1986.
646
- 647 53- Douglas, T.J., Judge Jr., Q.W, Total quality management implementation and
648 competitive advantage: the role of structural control and exploration. Academy of
649 Management Journal, 2001, Vol. 44, 158–169.
650
- 651 54- Feigenbaum, A.V, Quality and business growth today. Quality Progress, 1982, 15 (11),
652 22–25.
653
- 654 55- Ho, D.C.K., Duffy, V.G., Shih, H.M, Total quality management: an empirical test for
655 mediation effect. International Journal of Production Research, 2001, 39, 529–548.
656
- 657 56- Das, A., Handfield, R.B., Calantone, R.J., Ghosh, S, A contingent view of quality
658 management—the impact of international competition on quality. Decision Sciences, 2000,
659 Vol. 31, 649–690.
660
- 661 57- Dow, D., Samson, D., Ford, S, Exploding the myth: do all quality management practices
662 contribute to superior quality performance? Production and Operations Management, 1999,
663 Vol. 8, 1–27.
664
- 665 58- Kaynak, H, The relationship between total quality management practices and their
666 effects on firm performance. Journal of Operations Management, 2003, Vol. 21, 405–435.
667
- 668 59- Adam Jr., E.E., Corbett, L.M., Flores, B.E., Harrison, N.J., Lee, T.S., Rho, B.H., Ribera,
669 J., Samson, D., Westbrook, R, An international study of quality improvement approach and
670 firm performance. International Journal of Operations and Production Management, 1997,
671 Vol 17, 842–873.
- 672 60- Malhotra, A., Gosain, S. and Elsayy, O.A, Absorptive capacity configurations in supply
673 chains: gearing for partner-enabled market knowledge creation, MIS Quarterly, 2005, Vol. 29
674 No. 1, pp. 145-87.
- 675 61- Sroufe, R. and Curkovic, S, An examination of ISO 9000:2000 and supply chain quality
676 assurance, Journal of Operations Management, 2008, No. 4, pp. 503-20.
677
- 678 62- Perry, c, Processes of a case study methodology for postgraduate research in
679 marketing, European Journal of Marketing, 1998, Vol. 32 Nos 9/10, pp. 785-802.
680