

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

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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. **Quality Control (QC) of products and services at any level of the supply chain is an essential part of successful Supply Chain Management (SCM).** Romano and Vinelli and Casadesus and de Castro have drawn attentions toward the necessity of understanding the potential role of quality control in supply chain management.[1],[2] Foster and Ogden believe that understanding the relationships between supply chain management and Quality Management (SCQM) is the first step toward building an Supply Chain Quality Management 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.

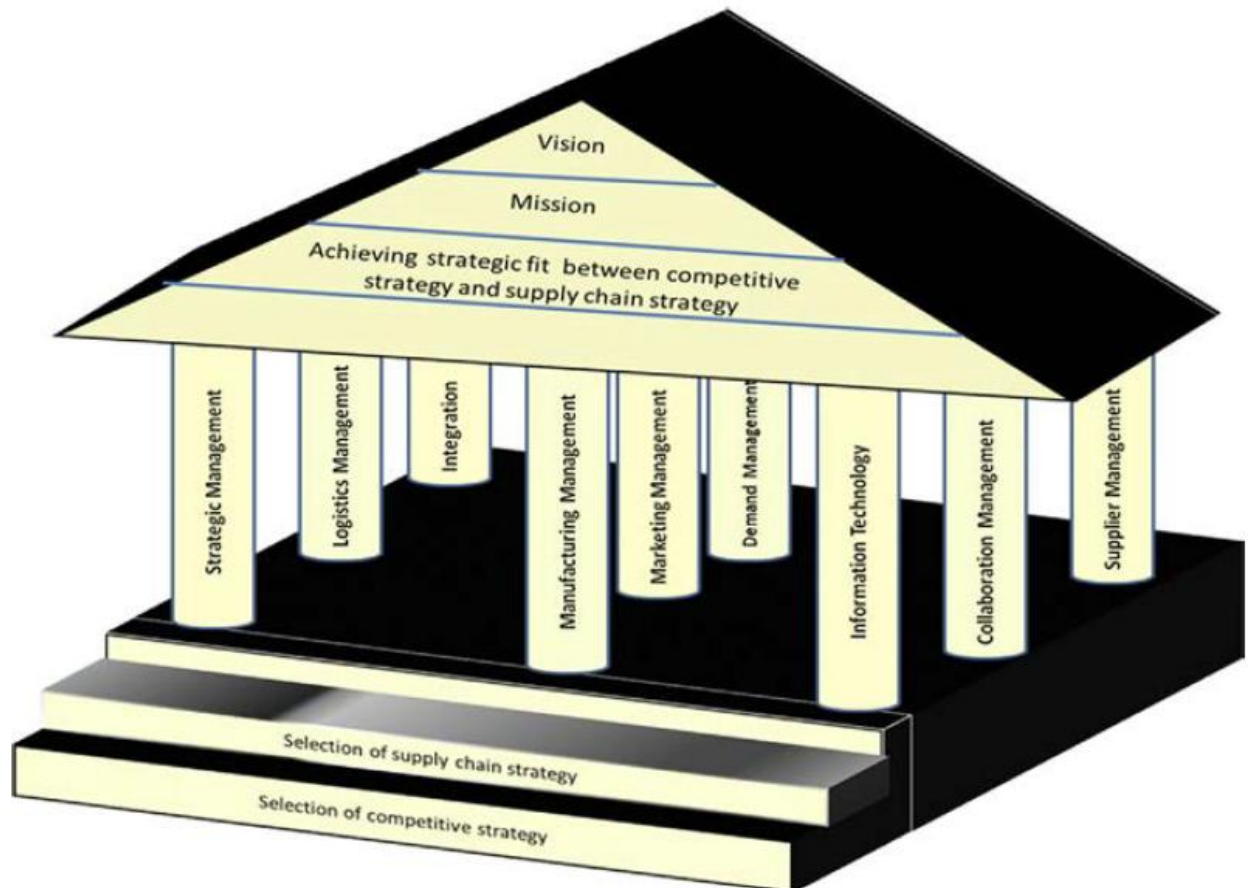
1.2 RESEARCH BACKGROUND

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, 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

72 strategies are framed. Also according to the figure, when the competitive strategy and its
 73 priorities have been determined, after that the company formulates the supply chain
 74 strategy. Supply chain strategy affects the nature of supply chain activities, efficiency and
 75 effectiveness of the supply chain. [6] The use of pillars of SCM is for building the capabilities
 76 of supply chain which may at last cause to achievement of mission and vision of an
 77 organization but only if there is strategic fit between competitive strategy and supply chain
 78 strategy.



79 **Figure1. A comprehensive framework for SCM [5]**
 80
 81

82 The comprehensive SCM framework in has nine pillars. Such pillars are considered as an
 83 integral part of SCM which are: Strategic management, Manufacturing management,
 84 Marketing management, Integration, Information technology, Logistics management,
 85 Supplier management, Demand management and Collaboration management. Supply chain
 86 management (SCM) consists of enterprises which collaborate to improve strategic position
 87 and to heal operating efficiency. [7] SCM is defined also as the function responsible for the
 88 transport and storage of materials on their journey from the earliest suppliers, through
 89 intermediate operations, and on to final customers. [8] SCM as a process that involves all
 90 necessary activities to fulfill customers' needs involves the management of products,
 91 information flow, and business relationships. [9], [10], [11], [2], [12] As supply chains become
 92 more complex, their management plays a considerably significant role in the delivery of
 93 products with high values to international markets. [13]
 94
 95

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 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] Faria-Fernandes et al defines QC as the function which aims to measure and improve the production and marketing processes and the product and information flow to provide products according to specification. [17] QC is significant for manufacturing and services, and has become a primary factor for success in export markets. [18], [19], [20] Therefore, firms should apply good management practices based on effectiveness of QC of supply chains from the following aspects: before planning, production control, harvest, post-harvest and marketing. [21] In 2013, Jraisat and Sawalha had a study on QC in Jordan. [8] They tried to identify the factors of quality control (QC) among key members of a supply chain and investigate the effect on supply chain management (SCM). Their findings determined the high-order factors of QC and identified the role of QC in SCM, acting as the main strategy to improve supply chains. Despite the potential advantages of QC, small businesses are unwilling or consider it difficult to implement QC programs. Some of such difficulties are thought to be weak connections between buyers and sellers, shortage of financial and human resources, insufficient skills or training, and information sharing, and the lack of trust in safety legislations. [8] Again Jraisat and Sawalha claim that in SCM, QC helps to manage different processes inside firms and between them. [8] So QC owns the possibility to maximize the capability of organizing a system of better functions which increases supply chain relationships and performance. [22], [23] QC ought to be developed from a firm level to include the entire supply chain. [8] According to Jraisat and Sawalha understanding the quality of supply chains demands analyzing the internal environment like country facilities and infrastructure, product quality and standards, exporter-producer relationships and marketing research of the fresh fruit market. [8] The Literature reveals there are a few studies that their frameworks include QC through supply chain and they have dealt just with QC in a single firm. As competition extends from single firm to the supply chain, researchers are beginning to explore quality management (QM) in a supply chain context, because integrating QM and SCM will be important for future competitiveness. Supplier quality management and customer focus are two QM practices that are in the domain of SCM. This fact shows that supply chain management (SCM) consists of internal practices, which are contained within a firm, and external practices, which pass organizational boundaries and integrates a firm with its customers and suppliers. In 2008, Kaynak and Hartley studied how the supply chain management-related quality practices, supplier quality management and customer focus, lead to improved performance and examined the practices that mediate those relationships. [24] Kaynak and Hartley developed a structural equation model that showed the relationships between quality management practices and upstream and downstream factors of supply chain. [24] The eight QM practices in their paper were management leadership, training, employee relations, customer focus, quality data and reporting, supplier quality management, product or service design and process management. Their results emphasize the importance of internal and external integration for quality performance. To answer the questions about content and structure of business systems in the context of QM, Kim et al discussed three models towards corporate quality and business prosperity and excellence: the model of European Foundation for Quality Management (EFQM), ISO 9000, and the Malcolm Baldrige National Quality Award (MBNQA). EFQM highlights some phases working for reaching excellence of business: leadership, policy and strategy, management of people, resources and partnerships

management, and managing processes. [25] The different model presented by Zu et al. (2008) with a Six Sigma model that involves five strategic entities and their tactical activities: top management support, classic threshold of QM, Six Sigma structure, traditional QM core, and Six Sigma core. For example Traditional QM infrastructure involves three tactical activities: supplier and customer relationship plus workforce management. [26] And Quality information, design of product or service, and process management are parts of the traditional QM that this point will find a remarkable importance when understanding the 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, 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 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 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, Sila et al, Foster, Kuei et al, Yeung, Vachon et al, Das and Sengupta, Ou et al, and Kuei et al. [27], [30], [29], [31], [32], [33], [34], [35], [36] That among the mentioned studies the study of Robinson and Malhotra presents an appropriate literature on SCM and QM. [27] Lin et al 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

- 200 • Establishing programs for training and quality auditing
- 201 • Relationships with suppliers.
- 202 [38]

203 In 2008, Foster identified key QM content variables to be: customer focus, quality practices,
204 supplier relations, leadership, HR practices, business results, and safety. [3] Many
205 researchers have noted that to realize the full potential of a SCQM system, modern
206 enterprises must pay immediate attention to the processes of both internal and external
207 mobilization.[39], [27], [3], [24], [32], [36] Like what Robinson and Malhotra pointed to, the
208 process of externalizing requires major emphases on communication and partnership,
209 supply chain quality leadership, quality and supply chain practices, and externally focused
210 process integration, management, and strategy.[27] Das and Sengupta introduced a
211 mathematical framework to explore the problem context in the domain of SCQM. [34] And
212 Chae et al considered the necessity of rooting external mobilization efforts in five areas:
213 trust, collaboration, interdependence, information sharing, and long term orientation. [40]
214 According to Lin et al the goal of SCQM, is making supply chain quality capabilities from
215 both externalization and internalization perspectives, and thus it provides a system-level
216 blueprint for designing a comprehensive quality plan for supply chain. [38] A plan that tries to
217 find answers to the standard questions about contents, like what activities to be performed,
218 and structures, like how they should be linked and sequenced, of business systems in a
219 supply chain. By conducting a web-based survey, Foster and Ogden, agreed on some
220 concepts as core values including visionary leadership, customer driven quality,
221 organizational learning, personal development, value of employees, value of partners,
222 organizational agility, future orientation, focus on innovation, social responsibility, results
223 orientation, creative value, and systems orientation. they concluded that in organizations
224 those who considered themselves as supply chain managers , to a wider extent,
225 manipulated quality tools and values than those who thought themselves as operations
226 managers. [3] Yeung probed competition between supply chains to understand the extent to
227 which strategic supply chains interact with quality management systems to drive
228 competitiveness. He followed an approach involving both qualitative and quantitative
229 methods. He searched for features of critical factors that affect supply chain quality and
230 excellence. He also found that implementing QM might facilitate Strategic Supply
231 Management. As a result, he showed that QM is a foundation of Strategic supply
232 management and a key requirement for continuous improvement extending to the supply
233 chain. [32] In 2009, Chang investigated the application of the eight modern TQM principles
234 of ISO9000 in supply chain quality management including customer focus, leadership,
235 involvement of people, process management, system management, continual improvement,
236 factual approach to decision-making, and mutually beneficial supplier relationships, so as to
237 promote the improvement of operation efficiency and competition advantage of the whole
238 supply chain system. [29] Kuei and Madu developed fourteen dimensions for SCQM. [36]
239 Among those fourteen dimensions just four were presented by Kuei and Madu and the other
240 dimensions were derived from the literature. The dimensions comprised of top management
241 leadership, training, product design, supplier quality management, process management,
242 quality data reporting and employee relations. Kuei and Madu introduced customer relations,
243 benchmarking, supplier selection, and supplier participation. Three additional IT-driven
244 change factors were also included; information technology, IT-driven operations process and
245 IT-driven organization integration.[36] Also Kuei and Madu identified three critical factors of
246 SCQM including quality of IT system, supplier relationship and customer focus to build
247 competitive advantage. [36] Supporting components such as QM infrastructure, QM tools
248 and QM practices and QM culture are required for successful SCQM. [28] Leadership
249 support for SCQM is important, to ensure the goals of customer satisfaction, trusted
250 customer-supplier relationship and high level IT based capabilities. [28] Lin et al mentioned
251 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.

1.2.4. The role of logistics in companies supply chain

Transportation processes are one of the necessary sectors of supply chain. These processes, maintain the flow of the materials which a firm has with its suppliers and customers. An integrated view on transportation processes, manufacturing and inventory maintenance is a description of the concept of a modern supply chain management. In a supply chain, transportation processes are taking place in a way that comes below:

Supplying raw materials from foreign suppliers or from a remote domestic factory to the place of manufacturing, from the logistic outlook both are the same.

Products distribution from a factory to the customers Distribution system depends on the kinds of products:

- Capital goods like machineries or industrial customers' equipments are carried through a specific transportation linkage just once or rarely.
- Also materials for production are forwarded to industrial customers; regularly, repeatedly and through the same direction
- Consuming goods to wholesalers and retailers are often sent in customized tiny sizes (in some businesses with an average weight of 100 kilograms) that demands combining transportations when they are launched.

The logistic status and distributions systems in each case are analyzed.

1.3 RESEARCH QUESTIONS

- What are the most effective enablers of Supply chain Quality Management?
- How SCQM Enablers effect on Firms in the Research area?
- Which of the factors examined in firms to more effectively come into force?
- Which factors are priorities for improving or not effectively implemented?

Overall, this study sought to examine four questions are raised.

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. [41]; [42]; [43]; [44] there is overlap between SCM and QM practices. [43]; [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
1. Focus on customer	Customers' involvement in product or service design. Use of customer satisfaction surveys. Focus on achieving greater customer satisfaction. [46], [50]	[59], [50], [49], [48], [51], [52], [53], [24]
2. 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. [45]	[50], [48], [51], [52], [53], [54], [22], [55], [24].
3. 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. [45]	[50], [48], [51], [56], [52], [57], [55], [54]. [22], [58].
4. Information Technology	To enhance cooperation with 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. [38]	[39], [61], [24], [36], [38]
5. Human Resource Management	find talent individuals matching our needs and then offer training and education	[39], [61], [24], [29], [36], [38], [59], [50], [48], [51].

	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. [38]	
6. 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. [45]	[50], [49], [48], [51], [22], [52], [54], [38], [58], [60], [39], [36].
7. 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. [38]	[61], [36], [39], [38].
8. 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. Importance attached to quality in relation to cost and schedule. Comprehensive quality planning. [45]	[59], [50], [49], [48], [51], [52], [54], [22], [58], [24], [36], [29].
9. 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. [45]	[60], [37], [32], [61], [24], [29], [36], [45].

10. Strategic Planning

Problems need to be spotted [60], [39], [32], [36], [45].
with the help of holistic
thinking and planning. Action
plans need to be prepared
accordingly. [45]

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, "the widest accepted range for case studies falls between 2 to 4 as a minimum and 10, 12 or 15 as a maximum". [62] The target population for this study consisted of 4 firms that were using QM practices. These companies were located In Zanzan 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 that design their questionnaire into 2 sections, in this paper we follow their method. [8] 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.

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.

In order to supplying raw materials, this company makes use of cyclic procurement system, in a way that in daily or weekly timelines, transportations flows are left to be gathered in the form of massive parcels then ordering is fulfilled. In addition to the modern inventory systems, ABC system is used for ordering in the company. FIFO method is used for the goods in the warehouse. In the process of distribution to the customer the system of direct distribution, the easiest system of distribution, is used. In which manufactured items are transferred to the sale points in the form of large parcels, then representatives of distribution process initiate selling and delivering the items to the customers.

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.

Two systems of JIT procurement and cyclic procurement are put to use simultaneously, by which some items from the warehouse and some others get into the production line in real time. For inventory control, Twin-Bin system, which is an easier method than that of the first case, is in use in this company that in the case of running out of inventory in the larger pot, ordering stages will launch. Also, FIFO method is used in this case. This company uses extensive distribution or direct distribution for selling its products and the ultimate sector of its supply chain.

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.

Just like the first company, in this company cyclic procurement system is employed while the company enters into flexible contracts with some of its strategic suppliers. Some contracts have been made to provide those strategic items that company had difficulties in supplying them. The method for inventory control is the Twin-Bin system. Furthermore, in planning warehouse tool control FIFO system is operating. Case 3 has outsourced its distribution system section to a distributor company and by making a contract this company offers some of its profits to the supplier company.

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.

In this case company applies the same cyclic procurement system to that of the first case but due to confronting with some problems in supplying some parts, the managers are inclined to implement a system to plan and choose among the suppliers and an upgraded supply system. Alike the first company ABC method is used in this organization. The use of FIFO is the same as the previous cases. This company utilizes an extensive distribution system and distributes its products directly to the customers.

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. The table.2 reports some of the specifications of the four studied firms.

Table2. Descriptive representation of the firms

	Workforce Size	Salaries	Educational Status of Respondents
Case 1	810	185- 1150 \$	Bachelor 25% Master 65% PhD 10%
Case 2	1023	185- 1100 \$	Bachelor 33% Master 67% PhD 0%
Case 3	1142	210- 1320 \$	Bachelor 25% Master 75% PhD 0%
Case4	949	185- 1040 \$	Bachelor 40% Master 55% PhD 5%

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SWOT Analysis

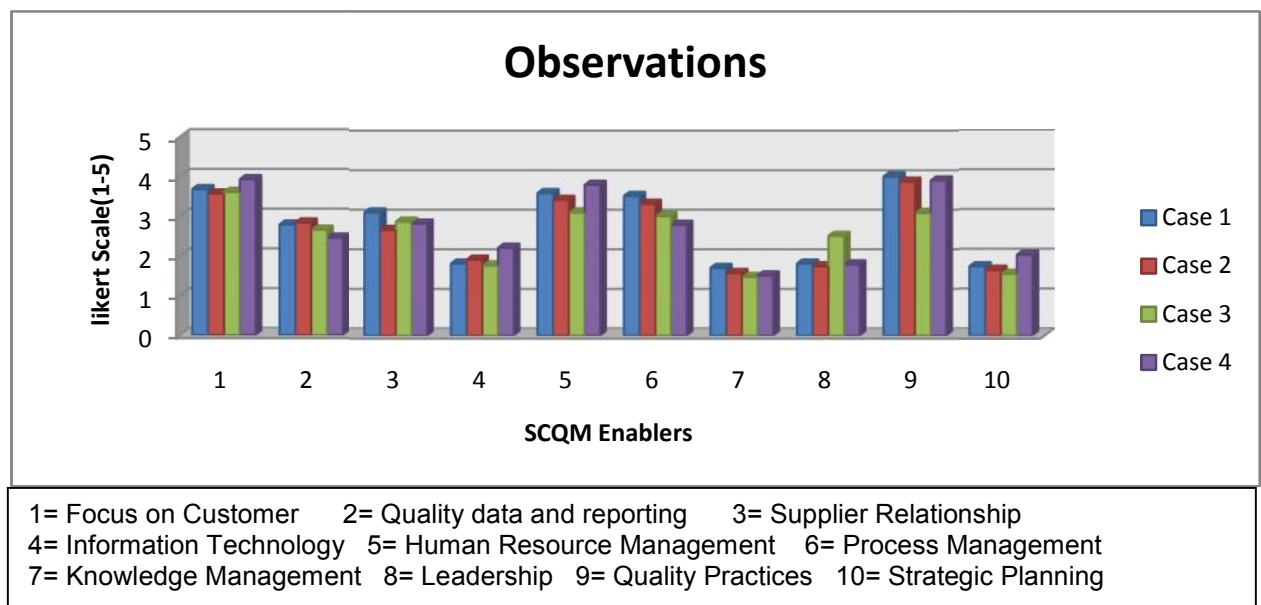
In this section, SWOT analysis is presented and all efforts have been made to discuss the strengths, weaknesses, threats and available opportunities in the electronic industry. 10 proposed quality factors are related to the internal elements of the organizations and will be categorized in areas of strengths and weaknesses. Examinations done by researchers characterized some opportunities and threats in the area of electronic industry. Table 3 not only unveils the results of SWOT analysis, weaknesses, strengths, opportunities and threats, but also offers some ideas for enhancing processes.

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Table3. SWOT Matrix

	Strengths Customer Focus Data and Reporting Quality Suppliers Relationship Human Resource Management Process Management Quality activities	Weaknesses Information Technology Knowledge management Leadership Strategic Planning
Opportunities 1. Niche Market in the region of operation 2. Similar Foreign products with high prices 3. Unfeasibility of the activity and distribution for the foreign products offered by Rivals	The increase in sale by customer focus and penetrating local markets Increasing products supply and quality while offering low prices in local markets	Making use of limited operations of the rivals and making improvements in the four activities mentioned in the weaknesses
Threats 6. The lack of proper technologies comparing to the rivals 7. Low rates of investment by government and investors	More focus on marketing activities and customer focus instead of enhancing technology	Reinforcing current technologies

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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. A closer look at Figure 2 and 3 shows logical trend between them. Since the research factors have been gathered from various studies, therefore their gaps and dissimilarities are expected. But considering the yielded results, there is a meaningful bond between the research factors and the previous body of the research. The observed dissimilarities in some fields like knowledge management, strategic planning or other factors are resulted from the lack of the required infrastructure in the area and city of the study. For instance, the mentioned factors above, in the study by Lin et al. (2013) were considered as effective variables but in this study they were evaluated to be so deficient, thus the need of rethinking and improving the structure of company and making some decisions is predicted. In addition to it, the information technology and sharing information factor, which has been introduced as one of the most crucial parts of supply chain quality management, has been bound to an undesirable level. As lately, the most considerable issue to the different industrial sectors in Iran has been the issue of supply chain management and while there are many obstacles to overcome in the way of implementing such an approach, dealing with quality variables of supply chain management will have a specific impact on improvement and effectiveness of the industries and the electronic industry in particular. Finally this research might have the potential value for policy makers and those responsible for managing supply chain in organizations.

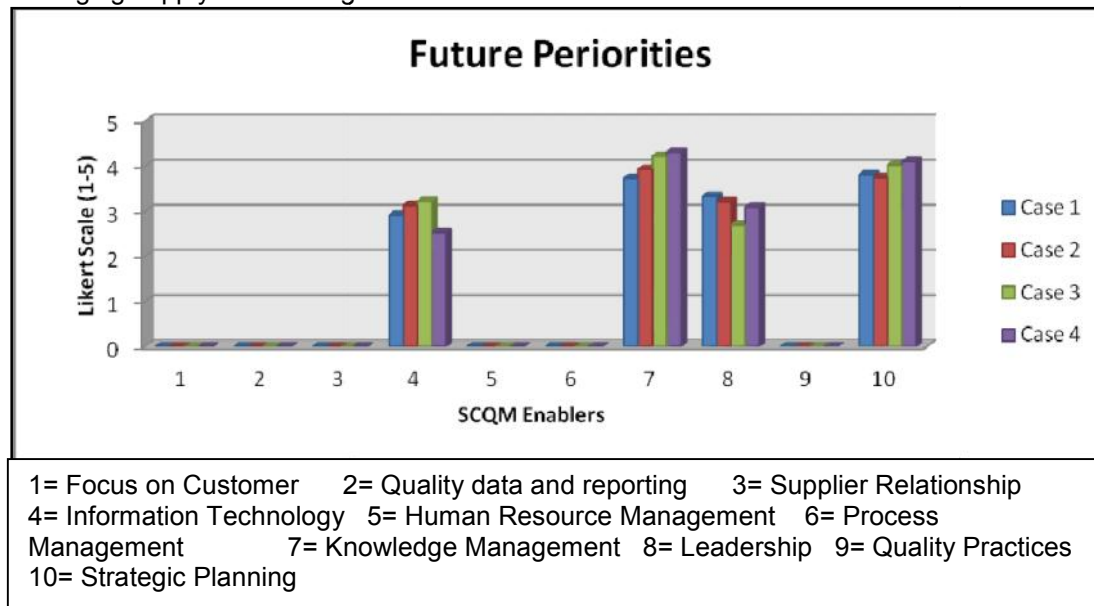


Figure 3: Future priorities for QC enablers

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.

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