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A Study of Efficient Quality Parameters in Supply Chain Management

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Abstract:

The aim of this paper is to highlight some prominent quality parameters which have influence on most of the supply chains related to different sectors or most of the organizations. The impact of quality parameters involved in various supply chain of different sectors has received less attention in literature. Although research on the quality parameters in supply chain management have been done in the last two decades still there is paucity of such research that put limelight on prominent quality parameters.

Key words: Supply chain management, quality parameters, Literature review

1. Introduction

As global market evolve and increase in world-wide competition along with the technological advancements, quality managers and supply chain managers are faced with many new challenges, as traditional approaches to managing quality and supply chains prove increasingly inefficient. This paper begins with a brief description of the main objective to be analyzed, followed by a review of the quality parameters in SCM. This is followed by an illustration of some of the prominent quality parameters. Finally, the paper concludes with a discussion and a brief statement on future research. Since the 20th century, quality has become a major influence in the business world. Although,

In general, for the major companies it all began with applying the theories of the quality gurus, especially doctors Deming and Juran. It is evident in the context of supply chain that quality has impact not only on supplier/distributor, employees, and customer but also it affects the overall business and growth of the organization. [1] Published a study describing the case of accompany from the textile sector, to help to

Understand how quality could be managed using an SCM perspective, and what the operative and strategic consequences were for the company understudy and the chain to which it belonged. They showed how SCM improves the capacity of the companies to recognize the expectations of the end customers [2].

In the current intense global competition, SCM principles and technologies are taking centre stage as a mean to achieve business excellence. This SCM movement embraces quality management initiatives, further supporting the notion that product quality is only one aspect of quality oriented continual improvement programs leading to competitive leadership. Highly publicized companies such as Wal-Mart and Dell Computer have integrated their supply chains to make efficient use of information and technologies while orchestrating all activities of the chain [3]. Today, customers want higher quality services at lower costs. In today's competitive environment, it is supply chains (SC) rather than companies that compete [4]. At the same time, the world is becoming a single industrial market. From the supply chain point of view, provision of high quality products at a cheap price helps to secure more customers and raise supply chain profits. Supply chain connections are critical to quality, on-time delivery, and cost reduction. The increasing emphasis on supply chain management is causing researchers to rethink models, concepts, and frameworks for quality management that have been developed for the field of operations management. Quality management practices reduce process variance, which has a direct impact on supply chain performance measures, including inventory and time measures, such as cycle time and delivery dependability. As process variances reduced; there is less need for safety stock and cycle stock inventory. Cycle times are shortened through the improved flows resulting from quality management practices, correspondingly less pipeline inventory is needed [5].

In order to elaborate the relationship of quality with SCM, let's take an example of retailer of shoes. Retailer keeps the store updated as per trend, have good quality shoes and have dedicated staff. He ships out a large stock of shoes for some faraway consumers. However the shoes are packed in a well organized manner. But on the way, the carrier lets the shoes to get damaged because of rough handling. The customer who buys our shoes sees a damaged box, and packing is also in very poor condition. Does the customer think our product is good? No. In the customer's mind there is a notion of terrible supply chain which cannot transport the shoes in good condition. The customer neither knows nor cares that it "is not retailers fault" – and if the product leaves the store as retailer would like it, but gets messed up along the way by another member of the supply chain – we are not delivering quality. Thus in order to explore such issues of quality in SCM, the objectives of the paper is framed as follows:

- To enumerate the quality parameters considered in the realm of SCM.
- To find out prominent parameters.
- To propose a framework of quality in supply chain.

2. Methodology

2.1 Selection of Articles

The articles were collected from four major management science publishers viz. Science Direct, Taylor & Francis, Emerald Online and Wiley Inter science (earlier Blackwell Synergy) as majority of well-referred journals of industrial management are found in these databases. Keywords like "supply chain management" and "quality parameters" were searched in all four databases. In total 110 articles were consulted.

2.2. Frequency Analysis of Quality Issues

In this paper various quality attributes is going to be discussed. Various quality parameters were noted and the number of papers in which they were present was considered as frequency. On the basis of the context in which parameters were present in the selected articles the parameters were identified as qualitative and quantitative.

2.3. Frequency Analysis Table

Quality Parameters	Quality Parameters	Qualitative/ Quantitative Or Both
Reliability (REL)	25	Both
Prompt delivery (PRD)	18	Qualitative
Communication (COM)	17	Qualitative
Trust (TR)	16	Qualitative
Responsiveness (RES)	14	Qualitative
Assurance (ASR)	9	Qualitative
Flexibility (FLX)	9	Qualitative
Commitment (COMT)	8	Qualitative
Consistency (CONS)	7	Both
Empathy (EMP)	6	Qualitative
Credibility (CRE)	6	Qualitative
Customer Satisfaction (CUS)	6	Qualitative
Access (ACC)	6	Qualitative
Courtesy (COU)	5	Qualitative

	Quality Parameters	Qualitative/ Quantitative Or Both
Order Accuracy (ORA)	5	Qualitative
Competence (CMP)	5	Both
Cooperation (COP)	5	Qualitative
Adaptation (ADP)	4	Qualitative
Confidentiality (CONF)	4	Both
Friendliness (FRND)	3	Qualitative
Completeness (COMP)	3	Qualitative
Customization (CUS)	3	Qualitative
Quick feedback /response (QF)	3	Qualitative
Collaboration (COL)	3	Qualitative
Price information with discount (PIWD)	3	Quantitative
Order tracking/ logistic status (OT)	2	Both
Punctuality (PUN)	2	Qualitative
After sales service/ assistance (ASS)	2	Qualitative
Coordination (CRD)	1	Qualitative
Politeness (POL)	1	Qualitative
Return policy (RP)	1	Both
Specificity (SPE)	1	Qualitative
Convenience (CONV)	1	Qualitative
Proactive (PRA)	1	Qualitative
Data accuracy (DA)	1	Qualitative
Delivery lead time (DLT)	1	Quantitative

Table 1

2.4. Distribution Of Quality Parameters

These quality parameters are related to manufacturing sector, service sector and many other sectors. The success of organizations greatly depends upon the quality parameters (Reliability, Assurance, Tangibles, Empathy, Responsiveness, Access, Creditability, Commitment, Flexibility etc.) that are included in their supply chain. Some of qualities parameters (up to frequency 6) have more influenced on the supply chain than other quality parameters, as different sectors need different quality priorities to be employed in their supply chains. Various quality parameters has enlisted in this paper, their frequency in different sectors is noticed. Here in this

paper our aim is to find some of the prominent quality parameters which influence most of the supply chains related to different sectors or most of the organizations. From this study it can be seen that the most predominant quality parameters are

- Reliability(REL)
- Prompt delivery(PRD)
- Communication(COM)
- Trust(TR)
- Responsiveness(RES)
- Assurance(ASR)
- Flexibility(FLX)
- Commitment(COMT)
- Consistency(CONT)
- Empathy(EMP)
- Creditability(CRE)
- Customer satisfaction(CUS)
- Access(ACC)
- Courtesy(COU)
- Tangibles(TAN)
- Order Accuracy(ORA)
- Competence(CMP)
- Cooperation(COP)
- Adaptation(ADP)
- Confidentiality(CONF)
- Friendliness(FRND)
- Completeness(COMP)
- Customization(CUS)
- Quick feedback /response(QF)
- Collaboration(COL)
- Price information with discount(PIWD)

Quality parameters that are involved in supply chains of different sectors

Different Sector's	Quality Parameter's
MANUFACTURING SECTOR	REL, PRD, COM, TR, RES, ASR, COMT, CONS, EMP, CRE, CUS, ACC, COU, TAN, ORA, CMP, COP, COMP, CUS, QF, COL, PIWD, OT, PUN, ASS, CRD, RP, CONV, PRA, DA, DLT.
SERVICE SECTOR	REL, COM, TR, RES, ASR, COMT, CONS, EMP, CRE, CUS, ACC, COU, TAN, ORA, CMP, COMP, CUS, QF, PIWD, OT, ASS, POL, CONV, PRA, DA, DLT.
LOGISTICS	REL, PRD, COM, TR, RES, ASR, COMT, CONS, EMP, CRE, CUS, ACC, COU, TAN, ORA, CMP, COP, COMP, CUS, QF, COL, PIWD, OT, PUN, ASS, CRD, CONV, PRA, DA, DLT.

Table 2

3. Dominant Quality Parameters

Here every quality parameter has its own importance in different kind of supply chains. In this paper some of the prominent quality parameters that affect virtually all kind of supply chains that are applicable to different sectors are talked about.

3.1. Reliability

Reliability has now become most significant performance measure for evaluation of quality of any supply chain. Reliability is nothing but a quality measuring tool. Reliability can be related to quality of service, delivery of product, delivery time, warranty issues and technology issue [6]. Reliability can be defined

as “number of full orders delivered to the due date and ability to perform the promised service dependably and accurately” [7] . The United States Advisory Group on reliability of electronic components gives the definition of reliability as referring to ‘products within the required timeframe and the conditions, to complete the trouble-free function of probability’ [8]. Reliability is defined as “the probability that an item (component, equipment or system) will operate without failure for a stated period of time under specific conditions “which predict success or failure of supply chain.

3.2. Prompt Delivery

Delivery should be on time and faster delivery always leads to lower costs[9]. According to Kannan, prompt delivery acts as “supplier selection criteria”[10]. Delivery speed plays an important role in selection of supply chain partners [11]. Raw materials and parts arrive within the delivery date [12]. Service should be on date and time. Prompt delivery of ordered goods to consumer destinations [13]. For prompt delivery emphasizes is on high quality delivery service [14].

3.3. Communication

Communication is ‘the formal as well as informal sharing of meaningful and timely information between firms’ [15]. Information sharing improves coordination between supply chain processes to enable the material flow and reduces inventory costs [16]. Communication is a very important aspect for reducing the gap between logistic service provider and focal firm [17]. Effective communication between trading partners is treated as one of the key assets for smooth functioning of any supply chain [17]. Lee suggests that when partners have successful information and knowledge sharing systems in place; they can exchange decision rights, work, and resources [18]. Finest suggest that timely communication and information sharing will decide the extent to which both Parties jointly engage in planning and goal setting Frequent and timely communication is also important because it assists in resolving disputes and aligning perceptions and expectations[19].

3.4. Trust

Trust is defined as a willingness to rely on a partner in whom one has confidence and regard [20]. Trust is related to Firm’s belief that another company will perform actions that will result in positive actions for the firm [21]. The trust between supply chain members will lead to long term relationships. The trust(Contractual trust, competence trust & goodwill trust) can be defined as “the firm’s belief that another company will perform actions that will result in positive actions for the firm, as well as not take unexpected actions that would result in negative outcomes for the firm” [21]. Higher trust in the supplier- firm relationship leads to reduction in inspection activities and in inventory costs [1]. The sixth factor ‘financial trust’(the aspect of maintaining financial trust between trading partners) comprises four items (timeliness, trustworthy, financial strength and minimum price charged).

3.5. Responsiveness

Responsiveness is willingness to help customer and provide prompt service [7], encompasses the ability and willingness of representatives to render services and tailor them as necessary [7]. Fast response to organizational work [22]. Responsive to customer's/ purchasers needs[23]. Reflects willingness to help suppliers and provide prompt service. Reliability in terms of "just-in-time delivery". Willingness of the purchasing department to help internal customers and provide prompt service. Responsiveness to customer needs.

3.6. Assurance

In today’s era quality assurance have become the fundamental requests of supply chain management. It helps in building quality based relationships between trading partners, Assurance of product quality, delivery by supplier [22]. Assurance is knowledge and courtesy of employee and their ability to convey trust and confidence to the customer [7]. Assurance leads to knowledge and courtesy of the purchasing department’s employees and their ability to convey trust and confidence [12]. Assurance reflects the ability to win trust and faith of their suppliers [24].

3.7. Flexibility

Flexibility is an ability to respond to unexpected demand change as per customer need in terms of volume and variety. According to Nilsson and Nordahl, in the face of shorter product life cycles, fast changes in market demands, and diversified consumer preferences, a flexible and quick response to environmental changes has become more and more important. The factor ‘service flexibility’ (the aspect of providing and accommodating right service as per the changes in requirements) directly relates to the aspect of meeting changes required in this dynamic environment. This factor depends on flexibility in respect of accommodating the changes as per requirements, terms and conditions of the supplier and IT use in its operations [22] also mentioned that, from a strategic perspective, a supplier’s flexible capability means to create an organizational structure with flexible managerial capabilities to facilitate emergency strategies. Flexibility involves that supplier accommodates changing needs of the focal organization. Fynes suggest that flexibility is related to volume flexibility and variety flexibility, Flexibility in raising production volumes.

A good supply partner should also be flexible in its dealings with its customers, e.g. flexibility in delivery schedule in order to meet better some urgent needs of customers [25].

3.8. Commitment

Commitment refers to the willingness of trading partners to exert effort on behalf of the relationship and suggests a future orientation in which firms attempt to build a relationship that can be sustained in the face of unanticipated problems. Commitment has been identified as the variable that discriminates between relationships that continue and that break down. Commitment refers to an enduring desire to maintain a valued relationship [20]. Commitment of trading partners leads to high level of information sharing and long term partnership success.

3.9. Consistency

In relevance to supply chain context Consistency is related to performance and delivery [22]. Consistency means producing a product or service as it is every time with same quality. Consistency in quality of product/services delivered [22]. When an organization consistently delivers superior value and wins customer loyalty, market share and revenues go up, and the cost of acquiring and serving customers goes down. Consistency means reliable reproducibility which will lead to control the processes.

3.10. Empathy

Empathy is all about caring, individualized attention the firm provides its customers [7]. It is evident that the empathy factor is not related to any one indicator. A possible indicator of the empathy level might be the "timeliness" on the communication of information about the disorganization (expressed in time units). In this way, the customer should be able to get 'measures' in short time.

3.11. Creditability

This factor is related to supplier reputation [22].The dimension is treated as the combination of reputation, honesty in operations, positive attitude and innovativeness in operation [22].Credibility is a determinant of quality that involves customers' appraisals of the trustworthiness and honesty of service providers. Credibility has a positive impact on supplier alliance success aspects such as satisfaction, price and quality.

3.12. Customer satisfaction

Customer satisfaction in terms that the product only contains what it claims to contain [26] .According to Michelson Clear and direct communication with the purchaser, swift order management and safe routes of transportation are here the fundament of customer satisfaction. Customer requires better product quality, faster delivery and cheaper costs, or quality-delivery-cost [9].Customer satisfaction could be achieved more effectively where quality was built into the whole supply chain [28].

3.13. Access

Access to suppliers, manufacturing organization and customers'etc [27]. Accessibility in terms of easy storage and retrieval of data. Service quality can be enhanced if customers are allowed to access their database hours and hence customer will be highly satisfied (e.g. In case of railway enquiry or order tracking information). Access refers to the extent to which customers perceive that the service provider is available when needed.

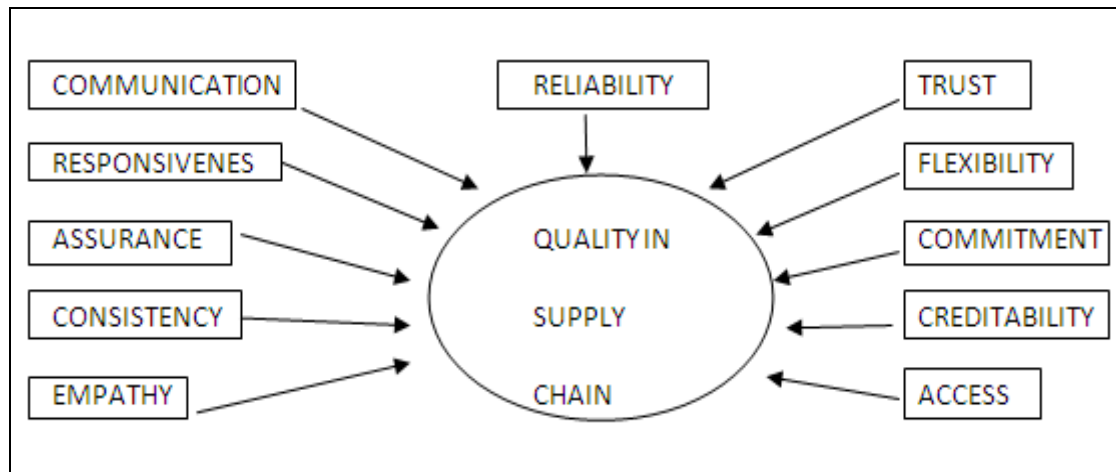


Figure 1: Showing Dominant Quality Parameters in Supply Chain

4. Discussion

The main purpose of this paper was to investigate about various quality parameters that can influence a supply chain. Here important aspects and different interpretations of dominant quality parameters are further discussed and reviewed. From the list of prominent parameters, it can be seen that we do not find presence of quantitative parameter (either it will be qualitative or it will be both qualitative and quantitative).This becomes an important reason for taking care of quality parameters at different stages of supply chain. It was also observed that presence of most of the dominant quality parameters(11 out of 13) like reliability, communication, trust, responsiveness, assurance, commitment, consistency, empathy, creditability, customer satisfaction, access can be felt in all the three sectors (manufacturing, service, and logistics). By looking at the frequency analysis table it can be said that quality parameters which occur more frequently should be given greater importance. In case, a compromise is to be made between reliability (frequency 25) and consistency (frequency 7) than we may go for a compromise in consistency rather than compromising for reliability. Supply chain management has become more and more important because supply chain management has a significant role in strengthening organizational competitiveness [18].And to strengthen Supply chain we necessitate employing quality parameters to achieve better

supply chain performance. This literature review provides guidelines for the organizations to understand the quality parameters which influence decisions in a supply chain management.

5. Conclusion

In summary, we can conclude that dimensions such as reliability, prompt delivery, communication, trust, responsiveness, adaptation, flexibility, commitment, consistency, empathy, creditability, customer satisfaction and access accompaniment and strengthen each other in terms of potentiated relationships that can last for many years.

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