Conceptual model for assessment of service quality across supply chain
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Abstract

The link between service quality and business performance makes all business focus on improving service quality to flourish their business. In this supply chain driven economy, service quality to the ultimate consumer is a result of service quality delivered by all the entities along the chain. In order to measure and improve service quality to the ultimate customer, one has to measure and improve the service quality across all entities of supply chain. Planning, delivering and measuring service quality so that one may improve it, is a challenging task given to the facts that the services are intangible, inseparable and heterogeneous. This research work suggests a conceptual model based on gap analysis for measuring service quality across various entities in the supply chain. This model will help in reducing the service quality gap in the supply chain and assist in improving the service quality to the ultimate customer.

Keywords: Service quality, supply chain, gap model, internal gap, external gap, service quality of dyads, service quality of supply chains.

1. Introduction

The advent of globalization fuelled by IT revolution has shrunk this world into a small village. This has restructured the economies of nations and changed the face of competition. Businesses, in order to survive and sustain globally have metamorphosed into supply chains (Lambert and Cooper, 2000). Quality is no longer the prerogative of any single firm but rather it is the outcome of contribution made by each and every member in the supply chain. While this gives an opportunity to every firm to add its best competency, it makes delivering the right quality to the customer a complex task. As the competition is really getting fierce, differentiation at brand levels and product levels literally seem to be ineffective, it is the service quality then, that gives that competitive edge to the businesses and in turns enhances the profitability, performance and customer satisfaction (Shemwell et al., 1998, Leonard and Sasser, 1982; Cronin and Taylor, 1992; Sureshchander et al., 2002; Chang and Chen, 1998; Newman, 2001). It may thus be established that in order to differentiate themselves from others, the supply chains need to deliver superior service quality. This may mean defining, building and maintaining the required attributes of quality by all the members of supply chain so that the final customer gets what he wants. The expectation of customer may transform into different set of quality attributes expected from different entities in the supply chain. Failure in delivering quality attribute on the part of any one entity may get amplified and reflected in performance of subsequent entity in the supply chain and ultimately manifest itself as poor quality to the ultimate customer. Thus managing and maintaining service quality in the supply chain is complex and challenging. It is needed that the expectation from every member in the supply chain may be well defined, measured and
incorporated into deliverables so that the right quality progressively gets built up as it reaches the final customer.

Quality has caught the attention of scholars long back and the literature in this discipline is opulent in terms of modeling, measuring and metering quality is concerned (Seth et al., 2005). With the shift towards the service economy, the emphasis on quality of services has triggered further development of this stream. There are models in literature to measure quality of tangible and models to measure quality of services. However it may be seen that services due to their typical characteristics of being heterogeneous, inseparable and intangible are much more difficult to model, measure and maintain.

Research in the area of supply chain is about two decades old. A lot of work has accrued in the domains of vendor management, inventory management, supplier evaluation, logistics performance, IT integration (Chen and Paulraj, 2004) and so on but research in the field of quality in supply chain is still in its infancy. Quality and supply chain both are segregated large islands with a very rich potential for integration. The service quality models, so incessantly spoken of in literature may be adapted for supply chains with or without modifications. This will result in a diagnostic tool to measure and improve the quality of service across the entire supply chain. The supply chains will be able to use this tool to identify the key parameters to improve the performance of the supply chain at all ends leading to increased productivity and profitability of every member in the supply chain.

This research paper proposes a model to measure the service quality of supply chain based on the Parsuraman’s (1985) gap model. The model may be very helpful in diagnosing the cause of poor service quality in the supply chain and also prove useful for improving the service quality in the supply chain so that the ultimate customer gets what he wants and the stakeholders in the supply chain get what they want.

2. Literature review

2.1 Supply chain management

The advent of globalization has resulted in paradigm shift in business. It has raised the level of competition and customer expectations to unprecedented heights. The firms in order to sustain themselves in business amalgamated there individualism and aligned themselves into networks called supply chains (Tan, 2001; Giannakis and Croom, 2004). This gave rise to managerial and relational issues in the supply chain. To manage, maintain and coordinate these network posed a challenge, inviting the attention of researchers to the discipline of supply chain (Chen and Paulraj, 2004). The initial research on supply chain focused on logistics, distribution and material flow (Mentzer et al., 2001; Oliver and Weber, 1982; Houlihan, 1985) which later ramified into streams like vendor management, supplier evaluation, Buyer evaluation, IT integration, dyadic relations, supply chain strategic issues, organizational behavior and so on (Croom et al., 2000; Carter and Elram, 2003). Today the supply chain stream is comprehended to be eclectic mix of various disciplines like Industrial engineering, Operations management, Marketing, Consumer behavior, Organisational dynamics, Information technology etc. This diversity makes the development of cognate theories and models in supply chain difficult (Saunders, 1995; Babbar and Prasad, 1998). Most of the research in supply chain is empirical and descriptive and does not contributes much to the development of sound conceptual base and cogent theories in supply chain (Croom et al., 2000; Giannakis and Croom, 2004). Further the research work in supply chain is fragmented and mostly at firm level. There is dearth of literature that may be said to have
evolved systematically and that may have considered supply chain as a whole rather than firms as research subjects.

2.2 Quality models and metrics

Quality has always caught the attention of researchers owing to its nexus to customer satisfaction and business performance (Leonard and Sasser, 1982; Cronin and Taylor, 1992; Sureshchander et al., 2002; Chang and Chen, 1998; Newman, 2001). If one explores the literature of quality, one may realize that the stream has developed systematically and progressively over last four decades and it has reached its maturity. There are ample of models, metrics to measure service quality specific to the service setting. Some of the models most referred to in literature are the Gap based model (Parsuraman, 1985) in conjunction with Servqual scale, performance only models (Cronin and Taylor, 1992), IT based models (Berkley and Gupta, 1994); synthesized models (Brogowicz et al., 1990), attribute based models (Haywood and Farmer, 1988), ideal value model (Mattsson, 1992) antecedent and mediator model.

The gap model of Parsuraman et al. (1985) measures service quality as the gap between customer perception of service received and expectation of the service on five dimensions of service quality (RATER) using the Servqual construct. The Servqual construct measure the gap from the customer’s perspective though the gaps are caused by reasons internal to the firm which are called as internal gaps. This most universally accepted and applied model has its own share of critics. The Servqual construct measures only the functional quality or the process of delivery but totally ignores the technical quality of service (Cronin and Taylor, 1992). Yet on account of its parsimony the Servqual scale has been used by researchers across a wide array of services like banking, restaurant, hospital, quality consultants, public services etc. (Rahman, 2005; Viadiu et al., 2002; Foster and Newman, 1998). The Servqual construct has been modified in each of the surveys to suit the service type (Dabholkar et al., 2000) etc.

2.3 Quality in supply chain

Quality in supply chain is a relatively new area though the stream of quality itself has affluent research back up. Stanley and Wisner (2002) have worked on service quality in supply chain on the purchase side, Mentzer (1999) has contributed by developing a scale to measure quality of logistics, Lings (2000) have developed a conceptual model for measuring service quality for internal as well as external customers in the supply chain. Seth et al. (2006a) have delineated a scale to evaluate the service quality of suppliers. Perry and Sohal (1999) have worked on enhancing the service quality of supply chain. They have identified response time as critical to service quality of supply chains. Beinstock et al. (1997) has contributed in the area of physical distribution service quality (PDSQ) with a conceptual model comprising of three factors namely, timeliness, availability and condition. A diagnostic study is conducted by Sinha and Babu (1998) on Quality of service in supply chain system and they have identified various measures like volume, time, fill rate, backorders etc. as measures of performance of supply chain. Forslund (2006) have conceptualized a model to evaluate service quality across dyads in supply chain. Yet there is no composite measure that evaluates the quality of service across the supply chain and links it to business performance of the supply chain. A conceptual model for assessing service quality across supply chain is however, suggested by Seth et al. (2006b) based on Parsuramans (1985) gap model.
This research paper suggests a conceptual model to measure the service quality across supply chain as a whole. The model will be useful for diagnosing the areas of poor quality and improving them.

3. Proposed Model

A basic supply chain may be visualized as an arrangement of several dyads of service provider and service user. Exchange of goods and services between the dyads results in service quality which is measured as service quality gap. This gap is the difference between the expectation of service and the perception of service received by the service partner in the respective dyad. The service quality of supply chain is thus the sum of service quality delivered by the dyads in the supply chain.

![Basic Supply Chain Model](image)

The supply chain shown in Figure1, comprises of three dyads –supplier-manufacturer, manufacturer-distributor, distributor-consumer. The exchange between the dyads will result in three interface gap which are service quality gaps. These gaps are external to the organization and may be measured as difference between the service users’ expectation and perception of the service delivered. Thus there are three external gaps in the supply chain, namely

- Gap SM - expectation – perception gap of manufacturer
- Gap MD – expectation - perception gap of distributor
- Gap DC- expectation – perception gap of consumer

These external gaps may be the resultant of internal gaps which may exist on either side of the dyads. The internal gaps may classified as forward or reverse gap. A forward gap is the gap on the service provider side and a reverse gap is the gap on the service user side which effects the external service quality gap at the interface of service provider and service user. Thus there are three internal forward gaps and three internal reverse gaps in the supply chain model, namely,

- Gap SF- Internal forward gap on supplier side
- Gap MF- Int. forward gap on manuf. side
- Gap DF-Int. forward gap on distributor side
- Gap CR-Int. reverse gap on customer side
- Gap MR-Int. reverse gap on manuf. Side
- Gap DR-Int reverse gap on distributor side

Further it may be said that

- Gap SM = f ( Gap SF, Gap MR)
- Gap MD= f( Gap MF, Gap DR)
- Gap DC= f( Gap DF, Gap CR)
(i) Gap SM (external service quality gap between supplier and manufacturer): This gap comes into existence when manufacturer places order with the supplier and supplier delivers the order. The difference between the manufacturer expectation and perception about the service delivered by the supplier manifests itself as Gap SM.

The Gap SM is the outcome of gaps on the supplier side and also on the manufacturers side which are internal gaps. The gaps on the supplier side are the forward gaps that impacts Gap SM and the gaps on manufacturer side are the reverse gaps that impact on Gap SM.

The internal gaps may be further analysed to understand the reasons behind loss of service quality ie Gap SM

(ii) Gap MD (external service quality gap between manufacturer and distributor): This gap comes into existence when distributor places order with the manufacturer and manufacturer delivers the order. The difference between the distributors’ expectation and perception about the service delivered by the manufacturer manifests itself as Gap MD.

The Gap MD is the outcome of gaps on the manufacturer’s side and also on the distributor’s side which are internal gaps. The gaps on the manufacturers’ side are the forward gaps the impacts Gap SM and the gaps on distributor side are the reverse gaps.

The internal gaps may be further analysed to understand the reasons behind loss of service quality ie Gap MD

(iii) Gap DC (external service quality gap between distributor and customer): This gap comes into existence when customer places order with the distributor and distributor delivers that order. The difference between the customers expectation and perception about the service delivered by the distributor manifests itself as Gap MD.

The Gap MD is the outcome of gaps on the distributor’s side and also on the customer’s side which are internal gaps. The gaps on the distributors’ side are the forward gaps the impacts Gap SM and the gaps on customers side are the reverse gaps.

The internal gaps may be further analysed to understand the reasons behind loss of service quality ie Gap DC

For understanding the internal gaps in supply chain dyads, the parasuraman et al., (1985) model for measuring service quality gap may be used. But this model takes into account only the forward gaps, however we may include the reverse gaps also as both reverse and forward gaps impact the external service quality(Seth et al...2006c) (Figure 2).
Figure 2: Forward-Reverse Gap Analysis of a Dyad

Applying the above gap analysis to every dyad in the supply chain will reveal various internal gaps. The table 1 below summarises the various external and internal gap along with the causes -

Table 1: Service quality gaps

<table>
<thead>
<tr>
<th>External Gap</th>
<th>Internal gap</th>
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<tbody>
<tr>
<td>Source</td>
<td>Source</td>
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<td>Forward</td>
<td>Reverse</td>
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<tr>
<td>SM</td>
<td>Gap 1(R)</td>
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<tr>
<td>SF1</td>
<td>Gap 2(R)</td>
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<td>Gap 3(R)</td>
<td>Gap 4(R)</td>
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<td>Gap 3(F)</td>
<td>Gap 4(F)</td>
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</tbody>
</table>

i. Lack of Marketing Research orientation in the supplier firm

i. Cognition process of manufacturer

ii. Behavioural process
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<tr>
<th>Gap SF2</th>
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<th>Gap MR 2</th>
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<tbody>
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<td></td>
<td>ii. Improper upward</td>
<td>i.</td>
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<td></td>
<td>communication in the</td>
<td>Techno</td>
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<td></td>
<td>supplier firm</td>
<td>saviness</td>
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<td></td>
<td>iii. Too many levels of</td>
<td>ii.</td>
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<td></td>
<td>management in the</td>
<td>Verbal</td>
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<td></td>
<td>supplier organization</td>
<td>articulation</td>
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<td></td>
<td>i. Degree of supplier’s</td>
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<td></td>
<td>top management</td>
<td>manufacturer</td>
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<td>commitment to service</td>
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<td>quality</td>
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<td>Gap</td>
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<tr>
<td>SF3</td>
<td>i.</td>
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<td>ii. Degree of goal setting</td>
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<td></td>
<td>supplier end</td>
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<td>iii. Suppliers belief in the</td>
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<td>feasibility of customer</td>
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<td></td>
<td>expectation being met</td>
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<td></td>
<td>i. Team work at the</td>
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<td></td>
<td>supplier firm</td>
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<td></td>
<td>ii. Employee job fit and</td>
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<td></td>
<td>technology job fit at</td>
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<td></td>
<td>supplier firm</td>
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<td>iii. Perceived control by</td>
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<td></td>
<td>the employees</td>
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<td></td>
<td>iv. Degree of Supervisory</td>
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<td></td>
<td>control on employees</td>
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<td></td>
<td>at supplier firm</td>
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<td>v. Role conflict and role</td>
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<td></td>
<td>ambiguity amongst</td>
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<td></td>
<td>i. Degree of horizontal</td>
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<td></td>
<td>communication between</td>
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<td></td>
<td>sales, advertising and</td>
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<td>manufacturer</td>
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</table>
| Gap MD | Gap MF 1 | i. Lack of Marketing Research orientation in the manufacturer firm  
   ii. Improper upward communication in the manufacturer firm  
   iii. Too many levels of management in the manufacturer organisation |
|--------|----------|------------------------------------------------------------------|
| Gap MF 2 | i. Degree of manufacturer top management commitment to service quality  
   ii. Degree of goal setting and standardization at manufacturer end  
   iii. Manufacturers belief in the feasibility of customer expectation being met. |
| Gap MF 3 | i. Team work at the manufacturer firm  
   ii. Employee job fit and technology job fit at manufacturer firm  
   iii. Perceived control by | i. Cognition process of distributor  
   ii. Behavioural process of distributor  
   i. Techno saviness of distributor  
   ii. Verbal articulation at distributor end |
the employees

iv. Degree of Supervisory control on employees at manufacturer firm

v. Role conflict and role ambiguity amongst the employees

i. Degree of horizontal communication between sales, advertising and operations department.

ii. Tendency of sales department to over promise

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<thead>
<tr>
<th>Gap DC</th>
<th>Gap DF 1</th>
<th>Gap DF 2</th>
<th>Gap DF 3</th>
<th>Gap CR1</th>
<th>Gap CR2</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Lack of Marketing Research orientation in the distributor firm</td>
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<td>ii. Improper upward communication in the distributor firm</td>
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<td>iii. Too many levels of management in the distributor organisation</td>
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</table>

i. Degree of distributors top management commitment to service quality

ii. Degree of goal setting and standardization at distributor end

iii. Distributors belief in the feasibility of

i. Cognition process of customer organization

ii. Behavioral process of consumer organization

i. Techno savviness of customer

ii. Verbal articulation at customer end
Further it may be surmised that the external gaps may be interrelated along the supply chain. It may be possible that the magnitude and direction of an external gap in the supply chain may have an effect on the subsequent external gaps. The above point may be hypothecated as below (figure 3)-

H01: There is no significant relationship between Gap SM and Gap MD
H02: There is no significant relationship between Gap MD and Gap DC
H03: There is no significant relationship between Gap SM and Gap DC
If the above hypothesis gets rejected than one may be able to identify the critical and the non critical gap in the supply chain. The service quality to the ultimate customer may also be controlled by identifying the critical gaps and controlling them downstream in the supply chain.

4. Measurement of Gaps

1. The external gaps may be measured by SERVQUAL with some modifications so that the same tool may be used to measure the external SQ gaps across all dyads in the supply chain.

2. The internal gaps may be analysed and suitable constructs may be developed for measuring these gaps. A five or seven point rating scale may be used.

4.1 Managerial Implications

1. The proposed model will prove useful in maintaining the service quality across the supply chain.

2. The measurement of gap SM, gap MD, gap DC will lead to the identification of internal gaps on the side of supplier, manufacturer, distributor and customer. Thus one may be able to identify the factor causing these gaps.

3. Further the factors may be categorised as critical and non critical factors. The critical factors may be controlled to minimize the external gaps.

4. Similarly one may be able to identify the external gaps which are critical to maintaining service quality to the ultimate customer.

5. The model will prove useful for the supply chains to evaluate their partners and strategically maintain the relations.

6. It will help in benchmarking the supply chain performance.

5. Conclusion

In the contemporary business scenario where firm level competition has been replaced by competition between supply chains, service quality is the outcome of all members of the supply chain. As service quality is linked to business performance, it is necessary to deliver good service quality to the customer. This requires identification, measuring of factors that effect the service quality of the supply chain. This research paper proposes a conceptual model based on Parsuraman’s (1985) gap analyses to measure the service quality delivered by
supply chain. The model considers gap as bidirectional (Seth et al., 2006). The reverse and forward gaps in supply chain are considered in this model and it is proposed that the service quality is the cumulative outcome of all these reverse and forward gap. If these gaps may be measured then the firms may fruitfully apply techniques to reduce the gaps and enhance the service quality. The firms may be able to take strategic decision about which firm to include in the supply chain. It may further be able to leverage one gap at the cost of other gaps to maintain service quality. There is a need to further relate the service quality of supply chain with the business performance of the supply chain. The business performance may be financial as well as non-financial. Research is required in this area to identify the performance parameter of a firm. These performance parameter may be then be linked to single performance or overall performance parameter of the supply chain (Puniyamoorthy, 2008). One may then be able to compare and benchmark the supply chains on the basis of their overall performance.

6. References


