

# Operationalization & Measurement of Service Quality in Manufacturing Supply Chains: A Conceptual Framework

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## Abstract

In recent years, several changes in market place, such as increasing diversity and competition, have stimulated theory and practice in supply chain management. The quality of services rendered along the supply chain would help in developing loyal customers, resulting in enhanced business performance. Research demonstrates that service quality (SQ) has strong linkages with business performance, cost reduction, feeling of delight, trust and loyalty among partners and consequently leads to profitability. However, the service dominance perspective that establishes the importance of intangible aspects such as service and relationship is still to be widely embraced in the manufacturing sector. The scholarly attention accorded to service quality in manufacturing is still in its nascence. Against this preamble, this paper aims to bring out a tailor-made framework to evaluate service quality at different dyads of the supply chain. This paper conceptualizes the SQ as a multidimensional construct which operates at interface of supplier-manufacturer, manufacturer-employee, and manufacturer-distributor.

**Keywords:** Service Quality, Supply Chain Management, Small-medium manufacturing enterprises

## Introduction

The fierce competition of today's marketplace is driving small-medium manufacturing enterprises to reshape their strategies in order to curtail overall cost and cut down inefficiencies. To ensure their operational and financial benefits, manufacturing enterprises are working closely and maintaining backward linkages with the suppliers and forward linkages with its distributors besides realizing their employees as the most valuable asset (Gupta and Singh, 2015).

A supply chain is a set of facilities and distribution options that functions to procure materials, transform these materials into intermediate and finished products, and distribute these finished products to customers (Parmata, 2016). Supply chains do exist in all manufacturing units, although the complexity of the chain may vary greatly from industry to industry and firm to firm. Several scholars have taken cognizance of the influence of the actions of one member of the supply chain on the profitability of all the others in the chain. Therefore, there is a growing recognition of building and nurturing relationships with supply chain partners for improvements in profitability, serviceability and reduced costs in the supply chain (Lambert and Cooper, 2000).



Despite these benefits, Indian small-medium manufacturing units are unable to understand the role of each member in the supply chain and in the entire delivery system and find it difficult to change their focus from immediate customer to all downstream and upstream members in the supply chain. By delivering the superior value to ultimate consumers, the chain as a whole achieves the objective of differential advantage. This enhances the performance of the chain as a whole as well as delivers results to the individual members of the chain (Mentzer et al., 2004).

By delivering the superior value to ultimate consumers, the chain as a whole achieves the objective of differential advantage. This enhances the performance of the chain as a whole as well as delivers results to the individual members of the chain (Prakash, 2014). Earlier the Indian small-medium manufacturing units were in dormant stage shielded by the government policies of reservation, quota and license etc., but due to globalization, this once flourishing sector is facing several challenges. Thus, this sector needs to adopt the best practices in all their activities so as to compete in the backdrop of global competitiveness. Although, many studies have been carried out in the developed countries in the aspects of inter-firm linkages, little or no studies have been reported on studying their supply chains in India. Studies on Indian SMEs are largely confined to competitive priorities, manufacturing strategies, capacity building, and innovation trends. However, the service dominance perspective (Lusch et al., 2007) that establishes the importance of intangible aspects such as service quality is unexplored. To remain competitive, the need for such units is to gradually shift their total offering as a manufacturer from mostly tangibles to include services, and finally, develop into a relationship-focused offering.

Service quality (SQ) is, “a way of thinking about how to satisfy customers so that they hold positive attitude toward the service they are receiving. Delivering quality service is considered to be an essential strategy to succeed in a competitive business environment. Firms, which offer

superior services, achieve higher growth in the market and increase profits (Jain et al., 2013)”. Researchers suggest that service quality is positively associated with customer satisfaction (Prakash et al., 2011; Arasli et al., 2005). Studies establish a positive relationship of service quality with customer loyalty (Ganesan, 2007; Ehigie, 2006) too. Service quality is also linked to behavioural outcomes as Word-of-Mouth (WOM), complaint, recommending, and switching (Yavas et al., 2004).

Intrinsic service quality is defined as, “how well the manufacturing organization is working towards the suppliers, employees and distributors” while extrinsic service quality is defined as, “quality of services delivered by supplier, employees and distributors to the manufacturing organization”. For the purpose of this paper, supply chain may be broken into three basic segments of sourcing, manufacturing and delivery and involves its associated flow of material/ service, funds, and information among them.

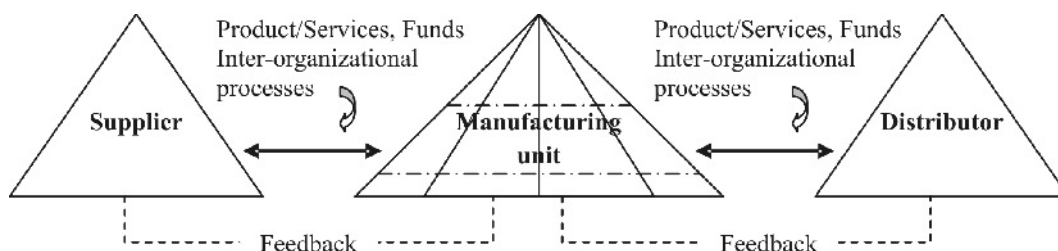
To overcome the above challenges, the small-medium manufacturing units need to develop effective strategies and should frame the policies and constantly review them to meet their long-term objectives. The managers of these units often consider these problems independently and develop solutions. In reality, these issues need to be addressed and evaluated in the supply chain perspective.

The concept of service quality bridges scientific and humanistic management philosophies by focusing on areas such as coordination, collaboration, commitment, communication, trust, flexibility, dependence, joint engineering, integration, and training and development of employees.

### Manufacturing Supply Chains

A simple manufacturing supply chain comprises three components, i.e., the supplier, the manufacturer and the distributor, as shown in figure 1.

**Figure 1: A simple manufacturing supply chain**



A manufacturing supply chain may vary in size and complexity, depending on the number of members and their linkages. Though the management of service quality in a service environment is difficult from that in manufacturing,

both service organizations as well as manufacturing organizations need to pay attention to service and how service quality can be achieved, controlled and improved (Parmata et al., 2016; Prakash, 2011; Seth et al., 2008). The

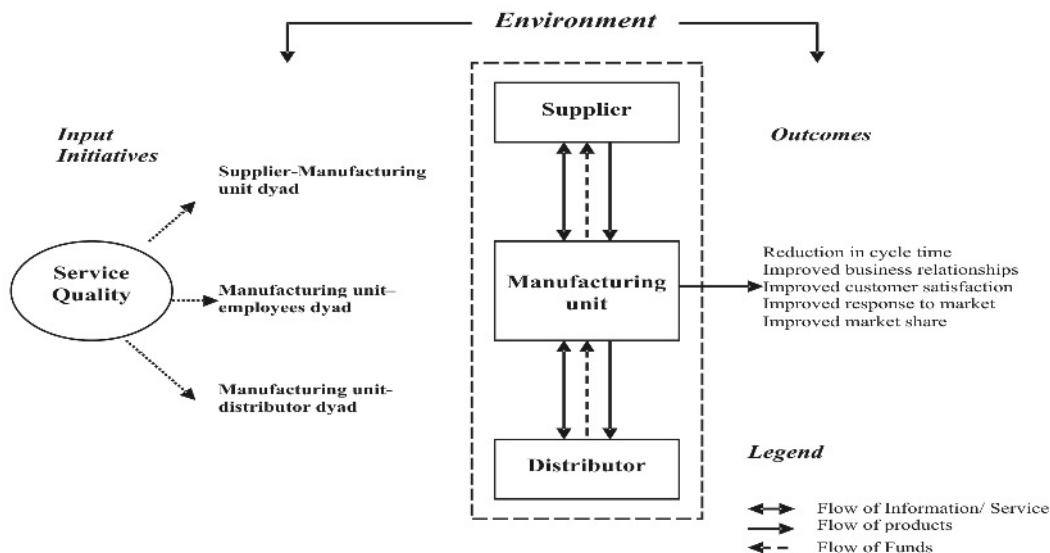


underlined theme of the manufacturing supply chain is to focus on process management, enabling capacity through the use of ICTs and measure performance, while staying customer-centric. Consequently, manufacturing organizations aim to develop value added processes which deliver innovative, high quality, low cost products, with shorter development cycles and greater responsiveness in serving the market (Fine et al., 2002). Though redundancy involves cost however, manufacturing organizations build redundancy as it enables flexibility and helps an organization to enhance its ability to recover from disruption. Building flexibility across procurement-conversion-distribution process enables supply chain to build organic capabilities that can sense environment and respond quickly and helps in moving from forecast driven

supply chains to a demand driven supply chains. The total offering of a manufacture must evolve gradually from mostly tangible to include services, and finally, develop into a relationship-focused offering. Industrial services refer to services offered by a manufacturer to other organization at pre-purchase, at-purchase and after-sales service stages or only after-sale stage (Johansson and Olhager, 2004).

The focus on service quality in the manufacturing supply chain is of recent origin and the body of knowledge is still nascent. Here the focus is on issues related to service which are embedded in various processes in the manufacturing supply chain. Amad et al. (2008) have found that higher level of service quality among intrinsic suppliers and intrinsic customers lead to better extrinsic service quality as illustrated in figure 2.

**Figure 2: Service quality in a manufacturing supply chain**



## Literature Review

The literature reviewed to address the research objectives at hand is discussed in this chapter. Three bodies of literature viz. Service Quality and its consequences; Supply Chain Management; and Small and medium-sized enterprises have been reviewed.

The Grönroos-Gummesson Quality Model (Grönroos, 1990) integrated product and service quality perspectives from the customer's viewpoint. It described four sources of quality, i.e., design, production, delivery, and relations. Design quality refers to how well the combination of goods and services are developed and designed. Production and delivery quality refers to how well services and goods are delivered compared to design. Relationship quality refers to how the customer perceives quality during the service processes.

In the same vein, Philip and Hazlett (1997) developed a hierarchical structure of SQ consisting of overlapping areas

of pivotal, core, and peripheral attributes. By combining the models of Rust and Oliver (1994) and Dabholkar et al. (1996), Brady and Cronin (2001) developed a hierarchical and multidimensional model of perceived SQ that comprises the primary dimensions of interaction, environment and outcome, each of which has three sub-dimensions. This model has greater explanatory power of customer perceptions of SQ as it explains what defines service quality perceptions, how SQ perceptions are formed, and how service experience occurs. On similar lines Fassnacht and Koese (2006) conceptualized hierarchical model of service quality where quality of electronic services falls under three dimension and nine sub dimensions.

Chaston and Mangles (1997) suggested that core capabilities are the main predictors for the growth of the small firms. They observed that areas of competency concerned with new product development, organizational productivity, and management of service quality were extremely crucial for the growth of the small firms.



Subrahmanya (2007) presented the declining trends of SMEs in the globalization period. He has also highlighted the importance of developing inter-firm linkages among supply chain partners and horizontal co-operation across the supply chains of such firms to overcome the traditional barriers.

Thus, physical facilities and processes, people's behaviour, their professional judgment (Haywood-Farmer, 1998), and potential and actual customer's perception affects service quality (Brogowicz et al., 1990). Service quality is perceived as value received (Mattsson, 1992) and operates through sequential elements of antecedents, consequences and mediators (Dabolkar et al., 2000) and plays a significant role in post purchase decision making process (Sweeney et al., 1997). Expectations about SQ leads to disconfirmation felt in service received (Spreng and Mackoy, 1996). Disconfirmation arises because of gaps in seeker's perception and provider's expectation, gaps in service specifications and actual service delivery and gaps in

receiver's expectation and provider's perception (Frost and Kumar, 2000).

Lu et al. (2009) confirmed three levels of the hierarchical structure of service quality which includes primary dimensions of interaction, outcome, and environment qualities. Each primary dimension has its sub-dimensions, and the sub-dimensions in their model include attitude, expertise, problem solving, information, equipment, design, situation, punctuality, tangible and valence.

### Operationalization of Service Quality in Different Sectors

Previous studies on service quality have conceptualized service quality in different service industries, such as retail, banking, hospitality and health care. Studies done in the supply chain context have focused on functional areas, such as, distribution, purchasing, etc. a summary of selected empirical studies on service quality is presented in table 1.

**Table 1: Select list of Studies Related to Service Quality**

Scholar(s)	Description of study	Context
Kettinger and Lee (1994)	Adaption of SERVQUAL items in the information system context.	IT department of an organization
Pitt et al. (1995)	Appropriateness of SERVQUAL instrument for measurement of IS service quality	Financial, consulting and information service
Roth and Jackson (1995)	Strategic determinants of service quality and performance	Banking
Caruana and Pitt (1997)	Internal service quality and business performance	Service industry
Bienstock et al. (1997)	Studied physical distribution service quality	Industrial purchaser
Pitt et al., (1997)	Applicability of gap perspective of SERVQUAL in IS service quality context	Financial, consulting and information service sector
Van Dyke et al. (1997)	Conceptual information of SERVQUAL and associated empirical difficulties. Service quality is context bound and service type dependent	conceptual
Sihna and Babu (1998)	Conceptualized depot service index for measuring service quality of customer service	FMCG companies
Kuei (1999)	Conceptualization and measurement of internal service quality	Intra organizational
Maclaran and McGowan (1999)	Management of service quality for competitive advantage	Small engineering firms
Angur et al. (1999)	Used SERVQUAL to study service quality offered by banks	Banking sector
Perry and Sohal (1999)	Studied quick response capability of Australian organizations	Textile, clothing and footwear industry
Sinha and Ghosal (1999)	Conceptualized customer service based strategy for achieving strategic competitive advantage	Steel industry
Singh and Deshmukh (1999)	Quality initiatives in service sector	Consultancy and technology transfer



Jun and Cai (2001)	Studied key determinants of internal banking service quality	Banking sector
Mentzer et al. (2001)	Logistic service quality as a basis for customized service to various customer segments	Merchandise, textile, clothing, electronics and construction supplies
Stanely and Wisner (1998, 2001, 2002)	Study of service quality in supply chain from purchasing function perspective	Service manufacturing and non-profit organizations
Sureshchander et al. (2002a)	Investigated the relationship between service quality and customer satisfaction	Library service
Sureshchander et al. (2002b)	Conceptualization of customer satisfaction as a multidimensional construct	Banking sector
Jiang et al. (2002)	Appropriateness of SERVQUAL instrument for measurement of IS service quality	IS professional
Bharati and Berg (2003)	Direct and indirect impact of information system on service quality	IS department of electric utility firms
Sureshchander et al. (2003)	Studied the determinants of customer perceived service quality	Banking sector
Malhotra et al. (2005)	Comparing service quality dimensions of SERVQUAL for developed and developing countries	Banking sector
Presbury et al. (2005)	Impediments to improvement in service quality	Hospitality industry
Mukherjee and Nath (2005)	Comparative study of service quality using different approaches like gap model, TOPSIS and loss function	Banking sector
Grant (2005)	Model for investigating transaction and relationship from customer perspective	Conceptual
Seth et al. (2005)	Review of various service quality models	Conceptual
Seth et al. (2006)	Conceptual framework for quality of service for logistic function in the supply chain	Conceptual
Xing and Grant (2006)	Physical distribution service quality of multi-channel and pure player internet retailers	Conceptual
Caro and Garcia (2007)	Study of perceived service quality in urgent transport service	Customer of transport service
Dagger et al. (2007)	Hierarchical model of health service quality	Health sector
Saura et al. (2008)	Logistics service quality in inter-organizational context and its impact on satisfaction and loyalty	Manufacturing sector
Hazra and Srivastava (2009)	Commitment and Trust based Service Quality model	Banking Sector
Kuo and Tsai (2009)	Soft (non-core service) service attributes have a significant influence on hard (core service) service attributes.	Real Estate Brokerage Industry
Kelkar (2010)	SERVDIV model from ancient Indian scripture Atharva Veda guideline, "Guest is divine (Customer is the king)	Hypothetical proposition.
Prakash et al. (2011)	Uses ANN approach and has been adequately validated for all stakeholders in the service network.	Service quality model for Life Insurance Business



Prakash (2011)	Proposes complete structural model with loyalty, competitive advantage and unit's performance used as outcome variables.	Service Quality in Automotive Industry
Das and Pandit (2014)	Based on the availability of resources, service providers need to prioritize certain service areas for immediate improvement.	Transportation Service Quality Model
Parmata (2016)	In this a valid distributor perceived SQ (DSQ) metric is developed using EFA and CFA thereby identifying four determinants namely – reliability, assurance, responsiveness and communication and 13 indicators.	Pharmaceutical Distribution Service Quality Model
Gupta and Singh (2017)	Relates service quality of five drivers with customer satisfaction and customer loyalty using ANN.	Service Quality Index Value Model

From the table it is evident that so far more studies have focused on service industries and few on manufacturing (steel and small engineering firms). Further, the extant literature on the relationship between intrinsic practices and extrinsic service quality practices is minimal.

### Measurement of Service Quality

Modeling and measurement of service quality has drawn attention of numerous researchers. While modeling helps to understand the subject, measurement helps to find out the ways for improvements, many researchers have attempted to conceptualize and measure service quality considering different perspectives.

Grönroos (1984) identified three components of service quality: technical, functional and reputation quality. Haywood-farmer (1988) proposed that service quality consists of physical facilities and processes, people's behavior and professional judgment including advice, autonomy, diagnosis, self-motivation, knowledge and discretion.

Based on the empirical evidences with retail banks, long-distance telephone company, securities broker, appliance repair and maintenance firm, and credit card companies, Parasuraman et al. (1985, 1988) proposed SERVQUAL (a generic tool to measure service quality comprising 22 items and 5 dimensions). These dimensions were Reliability, Responsiveness, Assurance (knowledge and courtesy of employees), Empathy (caring, individualized attention), and Tangibles (Parasuraman et al., 1988). Each of the items in the SERVQUAL was measured on expectations and perceptions on 7 point scale. SERVQUAL was appreciated by several researchers for measurement of service in various service industries: entertainment, health care, education, and services in general. It has been accepted by most scholars as standards or reference points against which service quality performance is judged. It is also recognized as a tried and tested instrument that has been successfully

applied in different contexts, irrespective of the nature of the service (Buttle, 1996). The SERVQUAL instrument represents a multiple-item scale which consists of 22 parallel related expectations (E) and perception (P) statements representing the five service quality dimensions. The gap between customers' expectations and perceptions about the service provided results in the customers' perceptions of service quality.

SERVPERF, a modified version of SERVQUAL, was developed by Cronin and Taylor (1992), which determines service quality by measuring the performance only. SERVPERF exclusively evaluates service quality on the five quality dimensions of SERVQUAL and provides adequate assessment for service quality. The authors provided empirical evidence across four industries (Banks, Pest control, Dry cleaning, and Fast food) to support the superiority of their 'performance only' SERVPERF instrument over disconfirmation-based SERVQUAL scale. The SERVPERF scale efficiently reduces half of the items (Babakus and Boller, 1992; Hartline and Ferrell, 1996). Researchers have found that SERVPERF, the performance-only approach, produced better results than SERVQUAL and is widely used in measuring customer evaluation of service quality (Cunningham et al., 2004). Empirical results point out that SERVPERF has a better predictive validity than SERVQUAL (Asubonteng et al., 1996). It also has higher discriminant validity than SERVQUAL (Angur et al., 1999).

Sureshchandar et al. (2003) proposed that service quality consist of five dimensions: service product (core service); human and non-human elements of service delivery; tangibles or services capes and social responsibility of the service provider. Parasuraman et al. (2005) E-S-QUAL, a tool to measure service quality delivered by web services along four dimensions namely: efficiency, fulfillment, system availability and privacy.



Summarizing the review of service quality measurement tools and debates, it can be revealed that the total offering of industrial units may evolve gradually from mostly tangibles to include services (Dimache and Roche, 2013), and finally, develop into a relationship-focused offering with the focus on issues related to service which are embedded in various

processes in the supply chain.

Based on the discussion ensuing above, we have culled out from the literature, key issues that need to be addressed for enhanced level of service quality in the supply chain. A select list of key issues is summarized in Table 2.

**Table 2: Key Issues Pertaining to Service Quality in the Supply Chains**

Key Issue	Description
<b>A. Service Quality</b>	
Intrinsic service quality	
• <i>Intra-organizational</i>	Employees of various functional departments treat each other as their customers.
• <i>Inter-organizational</i>	Treating supplier and distributor as valuable partners and developing strong linkages with them.
Extrinsic service quality	Levels of service offered by external entities, i.e., suppliers and distributors to the manufacturing unit.
<b>B. Satisfaction</b>	
• Product/service	Satisfaction with the product and the embedded service.
• Financial benefits	Tradeoff of product/service received with expense incurred.
<b>C. Loyalty</b>	
• Future perspective	Patronage of the product and the manufacturing unit.
• Recommendation	Recommendation of the products/manufacturing unit to others.
• Switchover	No switchover to competitors.

### Methodological approaches

Empirical exploration has been the dominating theme and the interview schedule/survey method is the most popular method for conducting SQ research. Multivariate statistical methodologies such as exploratory factor analysis (EFA), multiple regression and correlation, structural equation modeling (SEM), analytic hierarchical process (AHP), decision making trial and evaluation laboratory (DEMATEL), multi-attribute utility theory, fuzzy logic, graph theoretic approach (GTA), interpretive structural modeling (ISM), neural network etc. have been extensively used. Review articles constitute much of the qualitative studies. Confirmatory factor analysis has been the dominating method. Recent years have seen the rise of fuzzy and neural network based approaches. Exploration of neurological aspects of human brain and its linkages with customer satisfaction is on the rise.

### Conclusions

In this paper, the role of service quality has been conceptualized at supplier-manufacturer, manufacturer-employees and manufacturer-distributor interfaces of manufacturing supply chain. At these interfaces service quality has been defined in terms of internal service quality and external service quality. The service quality literature demonstrates the importance of the role of service quality in manufacturing as well as service industries. Though the role of service quality in service industries has been researched extensively, the role of service quality in the manufacturing supply chain has not been researched much. Scholars

generally agree that there are several dimensions of service quality, the exact nature and content of these dimensions vary.

Service quality in the manufacturing supply chains is a multidimensional construct. Conceptually, these dimensions address performance standards, expertise and physical elements of the stakeholder organizations as well as employees' willingness to assist in a timely manner with their knowledge and sensitivity. The services literature recognizes that there are two perspectives of service quality namely, the functional/process (i.e. how) and the technical/outcome (i.e. what) perspectives. Moreover, service quality evaluation is not based only on the outcome of service, but also involves evaluation of the service-delivery process. Though scholars have still not completely identified the attributes of technical quality, they are in agreement that technical quality significantly affects customer's perceptions of service quality. Against this backdrop, this paper puts forward a three-pronged framework for the conceptualization of service quality strategy in an organization's supply chain. The building blocks of the proposed framework include supply chain strategy and service quality strategy. Service quality based processes need to be incorporated in the supplier-manufacturer, manufacturer-employees and manufacturer-distributor interfaces of the supply chain.

A focus on singular link may not represent the holistic perspective. Service quality based processes need to be incorporated at various dyads of the supply chain as per following recommendations:



- i. **Supplier-manufacturer dyad:** Honest sharing of operational information, integrating supply chain strategy, promptness in handling queries or failures attention to each other's requirements, maintaining confidentiality in dealings, flexibility in terms and conditions as per requirements, and preference for long-term collaborative relationship.
- ii. **Manufacturer-employees dyad:** Mutual commitment to best serve one another, developing employees' skillfulness through training, maintaining a pleasant work environment, encouraging workplace hygiene through recognition, open communication, and friendliness.
- iii. **Manufacturing unit-distributor dyad:** Endeavoring ease-of-doing-business (EODB) and customer relationship management (CRM) by honest and timely exchange of information, and developing trust, value and reciprocal benefits with one another, making adjustments as per changes in extrinsic environment to market signals by mutual adjustment with distributors.

Summarizing the analysis and the findings of the research data, an actionable framework is proposed for improving the efficiency and effectiveness of supply chain. The framework is shown in figure 3.

**Figure 3: Framework for improving efficiency and effectiveness of supply chain**



Thus, to achieve supply chain objectives it is vital for supply chain stakeholders to coordinate, synchronize and integrate their activities to produce desired outputs by incorporating service quality initiatives.

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