

ASSESSING INTERNAL SERVICE BY MEASURING QUALITY DIMENSIONS IN A MANUFACTURING COMPANY

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Abstract: This paper deals with an empirical study of internal-service quality assessment in which the main objective is to measure service quality assessment of internal services in a manufacturing company. For data collection, questionnaires were filed in by users of maintenance and their results were statistically analysed. The findings show that the assessment was feasible and effective to capture the characteristics of internal customer service by using a set of well known quality dimensions that varied across the studied manufacturing cells. The paper concludes that the work was able to identify which dimensions had low perception by users of maintenance services. Future efforts should contribute for a better understanding of related concepts and the improved means to assess and enhance internal service quality.

Keywords: service quality; internal service; quality dimensions

1 Introduction

Since the 90's many service companies have pursued to enhance their performance and effectiveness in search of achieving differentiation in the market. An example of that is the attempt to convince customers that their quality is superior to the competitors. In addition, the importance of service sector has sharply increased at both

developed and developing countries. Over 75% of all US jobs now reside in services industries. Further, the services sector generates over 85% of all new jobs and 66% of the GNP of the US. In developing countries like Brazil, where this work was developed; services correspond to more than a half of the GNP (Cauchick Miguel and Salomi, 2004).

Research on services has grown correspondingly. In particular, academics and practitioners alike have exhibited considerable interest in the issues that surround the measurement of service quality. Research has been undertaken to investigate their service characteristics, their quality and their organizational effectiveness from the perspective of those who are the organization's external customers (Grönroos, 1984; Parasuraman et al., 1985; Parasuraman et al., 1988; Cronin and Taylor, 1992; 1994; Lee et al., 2000). Much less has been reported about organization effectiveness from the perspective of internal customer satisfaction, but a number of publications are still available (e.g. Stauss, 1995; Kuei, 1999; Gilbert, 2000; Kang et al., 2002).

Measuring the quality of internal services is relevant since an external-customer support requires internal systems aligned with external customer expectations, including each internal subsystems adding value to others systems within the organization (Gilbert, 2000). Given the importance of internal services this paper deals with an empirical work of internal-service quality assessment. It consists of assessing internal-service quality supplied by a maintenance department to manufacturing cells of an industrial unit. In this sense, the purpose of this article is to describe an application for measuring internal service quality in the studied company based on typical quality dimensions. It is worth mentioning that the quality dimensions used in this study are those proposed by Parasuraman et al. (1988), and not maintenance technical dimensions.

2 Related Literature

The emergence of service quality and its assessment has attracted the attention of numerous researchers in the past two decades or so. In this sense, there are two main lines of thoughts on measuring service quality (Kang and James, 2004): an American and an European perspective. Brady and Cronin (2001) suggest that the researchers generally adopt one of the two conceptualisations in their work. The focus on functional

quality attributes is referred to as the American perspective of service quality while the European perspective suggests that service quality considers two more components.

The European perspective considers additional aspects other than the process of service delivery. Grönroos (1984), for instance, noted that the quality of a service as perceived by customers consists of three dimensions: functional (the process of service delivery to customers), technical (the outcomes generated by the service to the customers), and image (how the customers view the company). Considering those dimensions, the quality of the service is dependent upon two variables: the expected service and the perceived service. More details of the previous argument are provided by Grönroos (1984).

The American perspective was established by Parasuraman et al. (1985), who originally identified 10 determinants of service quality based on a series of focus group sessions. They subsequently developed SERVQUAL (Parasuraman et al., 1988), a two-part instrument for measuring service quality that was refined later (Parasuraman et al., 1991). Much of the research to date has focused on measuring service quality using this approach and its use has become quite widespread (Brown et al., 1993; Kang and James, 2004).

SERVQUAL instrument consists of a 22-item instrument for assessing service quality based on customer's perceptions, which is, by his turn, the difference between the customer's perceived quality and his/her expectation. The perceived quality is assessed based on service quality dimensions that correspond to the criteria used by consumers when assessing service quality. There are 10 potentially overlapping dimensions: tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding/knowing the customer, and access. A more detailed description of those dimensions can be found in Zeithan et al. (1990). Afterwards, these dimensions were reduced to five, namely: tangibles, reliability, responsiveness, assurance, and empathy. Using those 10 or 5 dimensions as the evaluation criteria the specification of service quality becomes the gap between customers' expectations and their perceptions (Parasuraman et al, 1985). This performance-expectation model was also adopted by other authors (e.g. Brown and Swartz, 1989).

However, there has been an extensive debate whether the perception-minus-expectations specification would be appropriate or assessing perception alone would be sufficient. Some concerns about the SERVQUAL instrument were raised by Cronin and Taylor (1992; 1994) and Teas (1993; 1994). The authors argue that there are serious conceptual and operational drawbacks associated with the SERVQUAL model, inducing Cronin and Taylor (1992) to propose a perceived quality model called SERVPERF. The perceived quality model postulates that an individual's perception of the quality is only a function of its performance. Considering that the 22 performance items adequately define the domain of service quality, Cronin and Taylor (1992) proposed the SERVPERF instrument, which is a more concise performance-based scale; an alternative to the SERVQUAL model. In addition, they compared the SERVPERF model with SERVQUAL and two other alternatives: the weighted SERVQUAL and the weighted SERVFERF models. Those weighted versions consider the importance of a quality attribute as a determinant of perceived quality. In response to the criticisms, Parasuraman et al. (1994) claimed that many of those concerns are questionable and offered a set of research directions for addressing unresolved issues. Models for measuring external service quality is either viewed as a measure of the degree of discrepancy between consumers' perceptions and expectations (e.g. Parasuraman et al., 1985) or a tool for assessing the perceived quality (Teas, 1993). Yet, further alternative models have been offered by other authors (Cronin and Taylor, 1992; Bolton and Drew, 1991).

A literature review those models can be found in Cauchick Miguel and Salomi (2004). When examining the literature, it becomes clear that there is no consensus on which model is more appropriate in a general sense. SERVQUAL heightened the interest of many researchers but there are some arguments against its validity. Criticisms include the use of different scores, applicability, dimensionality, lack of validity, etc. Critical reviews of SERVQUAL are offered by Asubonteng et al. (1996) and Buttle (1996).

Cronin et al. (1994) continue the debate between the effectiveness of SERVQUAL and SERVPERF for assessing service quality. The authors remained unconvinced of both, that including customer expectations in measures of service quality is a position to be supported, and that SERVPERF scale provides a useful tool for measuring overall service quality. Moreover, Lee et al. (2000) empirically compare SERVQUAL (performance minus expectations) with performance-only model (SERVPERF). The

authors also conclude that the results from the latter appeared to be superior to the former.

Despite those criticisms, a large number of applications of SERVQUAL have become available. In addition to the applications listed in Table 1, different types of services have been investigated using SERVQUAL. Examples of service are fast-food, airlines and long distance telephone calls (Gupta and Chen, 1995), banking (Newman, 2001; Cui et al., 2003), physiotherapy (Curry and Sinclair, 2002), web sites (Iwaarden et al., 2003), health care (Wong, 2002; Kilbourne et al., 2004) to name but a few. The investigations on SERVPERF applications have also been intense but not as much as SERVQUAL. Nevertheless, instances of service types include public services (Bigné et al., 2003) and hotels (Nadiri and Hussain, 2005). Kang and James (2004) presented the application of Grönroos' model (Grönroos, 1984) to explore the European perspective of measuring quality of cell phone services considering other dimensions (technical and image) besides the functional ones.

A comprehensive and more recent review of other models, besides SERVQUAL and SERVPERF, is provided by Seth and Deshmukh (2005). The authors critically examine 19 different service quality models reported in the literature. A relevant deliverable from that work is a set of research streams in the field of service quality assessment. One of them is to investigate new situations with existing models (Seth and Deshmukh, 2005), including therefore the possibility of assessing internal-service quality.

It is worth emphasising that research initiatives as those described earlier have been mainly devoted to measure external-services quality, i.e. assessing service experience in terms of the outcome of the service under the end-consumer perspective. The majority of those publications deals with measuring service quality under the external customer standpoint. Effective internal supplier-to-customer relations are essential prerequisites to the level of quality service that yields sustainable external customer satisfaction (Gilbert, 2000). Next session is devoted to investigate it from the perspective of the literature.

2.1 Measuring Internal Service Quality

Internal services can be defined as services provided by distinctive organizational units or people working in these departments to other units or to the employees within an organization (Stauss, 1995). The previous definition involves a wide range of miscellaneous services within an organization, which include human resources management, R&D and marketing departments, internal logistics services, maintenance support, and so on.

One of the issues, which have attracted a great deal of attention, has been the assessment of internal service, which motivated researchers to conduct studies on internal service quality. Since years ago, researchers (Reynoso and Moores, 1995; Caruana and Pitt, 1997) have pointed out that there is a positive correlation between internal service quality, business performance and services delivered to customers, motivating some efforts to measure internal service quality by applying the SERVQUAL instrument. Some of these investigations are described next.

Kuei (1999) proposed a model to describe the interactions between internal organizations and process they serve. An empirical study is conducted based on such a model. The author identified determining variables for internal service quality such as quality-oriented climate, problem resolution capability, keeping customers' best interests in mind, and instilling customers' confidence. Based on these findings, the author concluded that SERVQUAL instrument (without the tangible dimension) is useful for evaluating internal service quality.

Gilbert (2000) identified two empirically derived measures of internal customer support used to access team effectiveness from the perspective of the team's internal customers. The measures, personal service and technical competence, were based on analysis of the responses of 465 individuals representing 150 internal customer teams. The findings revealed that members of work teams are inclined to overestimate the effectiveness of their performance when compared with the ratings of the same teams given by their internal customers.

Frost and Kumar (2001) developed a conceptual model they called INTSERVQUAL, based on the SERVQUAL scale proposed by Parasuraman et al. (1985; 1988). The

study was conducted in a major international airline for measuring expectations and perceptions of internal customers. According to the authors, the two scales exhibited adequate validity as separate measures of front-line staff (customer-contact personnel) expectations of support services and their perceptions of the support staff's performance. The results indicated that the scales can be successfully used to assess the magnitude of the gap between front-line staff perceptions and expectations.

Kang et al. (2002) described another undertaking to use the SERVQUAL instrument as a tool for measuring internal service quality. The study modified the instrument for a service setting. It has been empirically tested and confirmed that it is appropriate for measuring internal-service quality. Based on this investigation, one of the directions for further research is to replicate the study with other services to further examine the transferability of the SERVQUAL to internal-service quality assessment. Moreover, it would be important to compare whether a perception-only measurement is superior to perception minus expectations, since both these methods have been suggested in the literature but have not been empirically tested (Kang et al., 2002) very extensively.

As can be seen from the previous reports, SERVQUAL instrument has been a predominant method used to measure internal customers' perceptions of service quality. The present investigation can also be considered an attempt to use it for measuring internal-service quality, which is the service provided by a maintenance department in a manufacturing company. Next section outlines the research design to conduct such study, from which findings are presented further ahead in the paper.

3 Research Design

The first step was to develop the instrument based on a 22-items scale proposed by Parasuramann et al. (1988), including a pilot run to enhance the questionnaire in both form and contents. After checking the overall quality of the instrument regarding reliability and validity (see Cauchick Miguel et al. 2005a), four models were compared: SERVQUAL, SERVPERF, weighted SERVQUAL, and weighted SERVPERF (Cauchick Miguel et al., 2005b). The four models were investigated to identify which of them can be taken as a more appropriate tool for measuring internal-service quality. Moreover, it is an assessment of whether the addition of the importance weights (added in the questionnaire) suggested by Zeithaml et al. (1990) improves the ability of the

SERVQUAL and SERVPERF scales to measure service quality. Then, after choosing one of the instruments, based on the statistical analysis of the results, an examination was undertaken with regard to the quality dimensions of the service provided by the maintenance department to manufacturing cells. This is the objective of the present work.

The study was conducted in manufacturing company which produces and sells 5,000 items such as precision tools and gages, saw blades and accessories, metrology systems (optical comparators, CMM systems, video measuring systems), construction tools, gauge blocks, granite products as well services (calibration and repair). It is a private American-owned company with a work force of 2,800 employees from which half of it is based in Brazil, located in the State of São Paulo. Annual sales are approximately US\$ 225 million and the Brazilian unit respond to half of this revenue. In the beginning of the 90's, the company implemented organizational changes, introducing Material Requirement Planning (MRPII) and reorganised its lay out and the production flow in manufacturing cells. In 1995, the company was certified by ISO 9002, 1994 version, and, in 2002, by the ISO 9001, 2000 version. The director and staff were initially contacted regarding the project and consensus was reached to conduct the study. Data were collected from shop floor employees from 9 manufacturing cells that use the maintenance service in a day-to-day basis. The maintenance department employed 13 people in addition to a subcontractor company with 50 professionals.

4 Findings and Discussion

Before assessing the internal service quality it was necessary to establish the validity and reliability of the instrument for data collection. As stated earlier, this result can be found in Cauchick Miguel et al. (2005a). Next, four instruments were compared from which results can be found in Cauchick Miguel et al. (2005b). From the results it was not possible to infer which model was more appropriate to assess internal-service quality under the given constraints. Although the results are not conclusive, this work corroborates the instruments considered by other researchers (Cronin and Taylor, 1992; Parasuraman et al., 1994) and their value to evaluate internal-service quality. Despite the statistical "equality" among the investigated instruments at 95% confidence level and larger correlation coefficient found for the SERVPERF model, this instrument

was applied to assess the internal service quality provided by the maintenance department.

4.1 Measuring Internal Service by Quality Dimensions

The results from the 18 questions of the questionnaire were used to assess four quality dimensions: reliability, responsiveness, assurance, and empathy, respectively questions 1 to 5, questions 6 to 9, questions 10 to 13, and questions 14-18. The value of service quality (SQ) according to the SERVPERF instrument can be represented by equation 1, where P_{ij} is the result of service performance measurement for each characteristic i from the dimension j .

$$SQ = \frac{1}{18} \sum_{i=1}^{18} P_{ij} \quad (1)$$

The findings of the aggregated results of each dimension (the mean of all characteristics/questions relative to the dimensions) are presented in Table 1.

Table 1 - SERVPERF Questionnaire Results (n = 106).

Total	Responsiveness	Reliability	Empathy	Assurance
SQ _{Tot} = 5.24	SQ _{Res} = 4.89	SQ _{Rel} = 5.14	SQ _{Emp} = 5.21	SQ _{Ass} = 5.75

ANOVA was applied in order to check the statistical identity of the means shown in Table 4, for which following hypothesis test were considered.

$$H_0: \quad SQ_{Res} = SQ_{Rel} = SQ_{Emp} = SQ_{Ass}$$

$$H_1: \quad \text{the means are different}$$

The total number to be considered in the ANOVA is $N = 424$ (106 respondents and four dimensions) with $(N - 1)$ degrees of freedom. After calculating the root square mean for the dimensions and their errors, the result of Fisher test indicated 14.558 ($\alpha = 0.05$), bigger therefore than the critical value of 3.15. Based on this result the null hypothesis cannot be accepted and the values for each dimension are to be considered statistically different.

Since the H_0 was not accepted, the Tukey test is applied (Zar, 1999) to check for multiple comparisons. In this case, a q value larger than or equal to the critical value indicates that the hypothesis null $H_0: SQ_A = SQ_B$ (A, B, C, and D dimension) cannot be accepted. The available results indicate that only the assurance dimension shows statistical difference among the other dimensions and that there is no statistical difference among the responsiveness, reliability, and empathy. The dimensions with poorest results are those that should be tackled. Nevertheless, based on Tukey's results no priority could be pointed out to the implementation of managerial corrective actions in order to enhance their performance of internal services.

Assurance was the dimension with the best score based on customer analysis within the scale from 1 to 7, corresponding to 82.14% of the total possible score. Assurance encompasses courtesy, competency, credibility, and security. Apart from courtesy, the remaining 'sub-dimensions' are comparable to technical dimensions that are particular to maintenance. It is essential to have competency (or at least to instil it) to technically maintain a machine, as well as with credibility (although the manufacturing cells are not able to chose other service provider). Reliability is a dimension clearly inherent to maintenance services because of it best maintains the characteristic of a maintenance service, i.e. it comprises a corrective or a preventive action in a machine or equipment and no one wants to redone the service. In addition, it is also related to a definitive problem resolution (error free service). The dimension empathy gives way to personalization, which can be another important element in maintenance. This can be justified based on the need to personalise or adapt the services according to the users' needs (keeping customers' best interests in mind). Finally, in the present discussion, tangible dimension was not considered in this research due to three main reasons: (i) virtually there is no contact of the investigated internal customer with maintenance facilities; (ii) the person who request the service does not know where the service will be made (in the manufacturing cell, in company maintenance facility, outsourced or even mixed), and (iii) the literature corroborate this approach since characteristics of tangible dimension are not subject of internal customers (Bolton and Drew, 1991; Kuei, 1999).

Although the previous discussion is essential managerial, once the weak dimensions are identified, i.e. those with low perceived quality, corrective and preventive actions can be put in place to enhance the overall service quality. This study suggests that

industrial professionals should broaden their perceptions of the scope of internal services beyond the technical dimensions (in this case maintenance performance measures). Thus, managers and researcher should consider the individual dimensions of service quality when designing quality programs.

5 Conclusions

There is a great need for empirical research to evaluate service quality in internal-service units. This study has aimed at contributing further towards measuring internal-service quality by applying a service quality measuring instrument usually used for assessing external service quality. The findings show that it is indeed feasible and effective to capture the characteristics of internal customer service by using a set of well-known quality dimensions. This work was able to identify which dimensions had low perception by user of maintenance services. It is of paramount importance to enhance all dimensions since previous studies (e.g. Gremler et al., 1994; Gilbert, 2000) have suggested that internal quality service is related to external service quality.

Finally, this study of internal-service quality is both important and challenging. Future efforts should contribute for a better understanding of related concepts and the improved means to assess and enhance internal-service quality. Nevertheless, when designing this study an attempt was made to reduce its limitations. However, the external validity (generalisation) beyond the specific investigated scope is limited, since this study was particular to a maintenance service in the chosen context. Given that the sort of service settings that could be examined is probably unlimited, future studies should consider other internal service than the one examined here. For instance, perceived quality might play a bigger role in situations with higher personnel involvement, as those where the needed interactions with customers are greater. Giving the importance of the concept of internal-service in operations management theory and practice, the issue of quality assessment deserve attention in further theoretical and empirical research.

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