Prioritizing internal service quality dimensions using TOPSIS Technique (With a case study in Isfahan Steel Mill Co.)

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Abstract

Nowadays, the customer satisfaction is the major duties and responsibilities of organizations management. On the other hand, employees as the internal customers play a vital role in the organizations' achievement. So, organizations should try to determine their staff's needs to maintain, improve and enhance service quality and attract their satisfaction. In this regard, the present study has assessed the internal service quality (ISQ) of service units in Isfahan Steel Mill Company. To do so, by using the standard questionnaire of SERVQUAL model and based on the model of service quality gap, the internal service quality in several units are measured and service quality gap is determined in the five dimensions of service quality. In following, the TOPSIS Technique is used to prioritize the service quality dimensions based on the given gap. According to the given results, there is a meaningful gap between the perceived and desired quality in the service units. In addition, based on the prioritizing of service quality dimensions by TOPSIS Technique, the tangible and reliability dimensions respectively had the highest and lowest priority in the service units of aforementioned company.

Keywords: Internal service quality, Internal customer, SERVQUAL, TOPSIS technique

1. Introduction

In the today' industrial world, the human resources are as the most important and vital funds of the manufacturing or service organizations and play a significant rule in their failure or success. Hall Rosenbloth states in his book "customer in the second place", that the organizations should at first focus on their employees. So, any investment in human resources is equal to the direct investment in improving the factory products (Nosratian et al., 2008). On the other hand, providing the employees' satisfaction is a priority for the top management, in such a way that the organizations are trying to make added value for their products to improve and increase their employees' satisfaction and efficiency levels.

To fulfill this aim, the organizations need to evaluate their internal service quality. ISQ refers to those deeds which management should do to make sure that the service are provided with a suitable quality for the employees (Caruana and Pitt,1997). Service quality is a function of leadership, internal relationship and group performance and by increasing effectiveness in service providing, the organization's profitability will increase (Change and Chen,1998). Service quality depends on some variables such as the service providers, time, place and how to deliver services, therefore, it can be mentioned that the most important element in determining the appropriate service quality is the service providers (Nosratian et al., 2008).

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Compared with external service research, there is relatively limited research focused on ISQ measurement. The most common approach is gap-based measure of ISQ, usually through the application of the SERVQUAL scale (Parasuraman et al., 1988) which evaluates the employees' expectations and perceptions in five dimensions of service quality.

Through measuring ISQ, the service units will quantitatively understand the status of delivering services and by getting their weakness and strengths, optimally allocate the limited resources. At the same time, through prioritizing service quality dimensions, the service units will understand the quality of dimensions which are in the staff's priorities and by considering the provided gap in each of dimensions, they will be able to improve the quality of delivered services. Considering to the vital rule of service units in providing the employees' satisfaction , three service units are selected in a manufacturing company. Those service units consist of transportation, restaurant and social and cultural affairs (S&C affairs) which have the most important in aforementioned company. Therefore, in order to measure ISQ in service units, the SERVQUAL tool is used and for prioritizing service quality, TOPSIS technique which introduced by Hwang and Yoon (1981) is applied.

In the following, a brief reviewing surrounding the studies about the ISQ measurement is provided. Then, some explanations of main research concepts such as ISQ, internal costumer and the approaches to measure ISQ are presented. In addition TOPSIS technique is demonstrated step by step. The methodology for our study is then described in detail, followed by determining the sample society, sampling method, the applied instrument for gathering information (SERVQUAL questionnaire) and its reliability are presented. The research findings are analyzed by some statistical methods. Finally conclusions are discussed and some suggestions are offered for service units and also for future studies (based on the research limitations).

2. Literature review

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 ISQ. Since years ago, researchers (Reynoso and Moores, 1995; Caruana and Pitt, 1997) have pointed out that there is a positive correlation between ISQ, business performance and services delivered to customers, motivating some efforts to measure ISQ 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.

Caruana and Pitt (1997) Developed SERVQUAL tool and designed INTQUAL to measure ISQ, also investigate the relationship between service quality and business performance which describe the interactions between internal organizations and process that served. The results suggest that Service quality delivered by a business does have an effect on performance.

Frost and Kumar (2001) designed a conceptual model, INTSERVQUAL, based on the original "Gap Model", to explore the extent to which the construct service quality plays in an internal marketing setting. The expectations and perceptions scales have emerged as measures with excellent internal consistency reliabilities and the scales can be successfully used to assess the magnitude of the gap between internal customers perceptions and expectations.

Kang et al. (2002) modified the SERVQUAL instrument for a service setting. It has been empirically tested and confirmed that SERVQUAL is appropriate for measuring ISQ and confirmed the validity and reliability of all five SERVQUAL dimension in a service setting. Miguel(2006) Measured service quality assessment of internal services in a manufacturing company. 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. Abolhasani (2008) Measured ISQ gaps based on the SERVQUAL tool and reformed model of service quality gaps (shahin, 2006, parasuraman,1985) and analyzed the relation between the employees' job satisfaction and ISQ gaps.

The results show that there is a negative and indirect relation between the employees' job satisfaction and ISQ gaps. By deceasing ISQ gaps, employees' job satisfaction increased. Large and Konig(2009) developed An instrument for the measurement of the internal service   quality of purchasing units, Based on the SERVQUAL and the general gap model of service quality. The model contains a self-evaluation by contrasting the views (expectations and perceptions) of the internal customer with those of the purchaser. The application of this instrument in a large company demonstrates the general usefulness of this instrument.

Nejati et al. reviewed service quality factors of the airline industry, and ranked these factors in Iranian society. In order to prioritize the airline service quality in an Iranian context, the service quality factors were driven from the SERVQUAL model and by using Fuzzy TOPSIS approach were prioritized. The findings of this research shows that "Flight safety", "Good appearance of flight crew" and "Offering highest possible quality services to customers 24 hours a day" are considered as the most important quality factors for airlines in the perspective of Iranian customers .

Brandon and Silvestro (2010) tested Gap-based and perceptions-only approaches to measuring ISQ and evaluated their respective benefits and limitations. Findings indicates that both the gap-measure and perceptions-only measure are reliable and valid, so the empirical study, generates some understanding of the internal service context in which the two approaches might be appropriate.

3. Measuring ISQ

Internal service quality (ISQ) can be traced back to Ishikawa's concept of the voice of the customer (1985) and has been an emerging theme in the service operations and marketing literature over the past three decades (Stauss, 1995). ISQ is defined as the perceived quality of service provided by distinctive organizational units or the people working in these, to other units or employees within the 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 units, internal logistics services, maintenance support, and so on. Internal services create a network of functional units which are linked together with the aim of delivering service to external customers (Marshall et al., 1998). Each unit receives inputs, transforms them, and delivers the output to the next operation in the chain – their internal customer. Each link in the chain represents an interaction between internal service providers and internal customers (Finn et al., 1996).

Internal customer is any member of the organization that receives the products and service from the other members for their duties. Hesket et al. (1997) presented a model of service profit chain, which shows the relations between ISQ, employees' job satisfaction and their profit, and the organization's functions. Although some limited evidences are provided for this claim, but briefly it's possible to state that in the internal market, employees are the inside customers with a qualitative service relationship whit their organization and in the service profit chain, the organization provides service to customers who is the provider of service quality for the inside and outside customers of that organization. This statement does not mean the employees' priority over the outside customers (Abolhasani, 2008).

Compared with external service research, there is relatively limited research focused on ISQ measurement. Attempts to measure ISQ follow two common approaches: The first is to adopt a gap-based measure of ISQ, usually through the application of the SERVQUAL scale (Parasuraman et al., 1988). The SERVQUAL scale is a widespread instrument to measure both the expectations and the service perceptions of customers. This twin scale consists of 22 items. The size of the gaps between internal customers' expectations and their perceptions indicate the level of dissatisfaction. Expectations and perceptions are measured across 5 dimensions of service quality (Parasuraman et al., 1988)

• Tangibles: Physical facilities, equipment and appearance of employees.
• Reliability: Ability to perform the promised service dependably and accurately.
• Responsiveness: Willingness to help customers and provide prompt service.
•Assurance:Knowledge and courtesy of employees and their ability to inspire trust and confidence.
• Empathy: Caring, individualized attention the firm provides for its customers.

The application of the SERVQUAL scale range from almost exact replication (Young and Varble, 1997; Kang et al., 2002), to minor changes (Frost and Kumar, 2000), to addition and deletion of dimensions (Kuei, 1999; Large and Konig, 2009).

The second approach has been for researchers to develop perceptions-only measures of ISQ. Cronin and Taylor (1992) proposed the SERVPERF instrument, which is a more concise performance-based scale; In addition The perceived quality model postulates that an individual's perception of the quality is only a function of its performance.

4. *TOPSIS model*

TOPSIS (technique for order preference by similarity to an ideal solution) model introduced by Hwang and Yoon (1981) which is an operational design approach that helps select the optimal levels of service quality attributes that would facilitate the delivery of customer satisfaction. TOPSIS views a multi-attribute decision making problem with m alternatives as a geometric system with m points in the n-dimensional space. The method is based on the concept that the chosen alternative should have the shortest distance from the positive-ideal solution and the longest distance from the negative-ideal solution (Yoon and Hwang, 1995). This technique can be extremely useful for service design. Similarly, loss function is better suited to highlight the future long-term damage caused by not delivering on customer-defined service standards (Nejati et al., 2009). The TOPSIS procedure consists of the following steps (Yoon and Hwang, 1995):

(1) Create decision matrix (N) and calculate the normalized decision matrix(ND).
    Relation 1:

$$n_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{n} a_{ij}^2}} \qquad j = 1,\ldots,n$$

Where i is the number of alternatives, j is the number of indicators and n_{ij} is the normalized of alternative i for indicator j.

(2) Calculate the weighted normalized decision matrix (V).
    Relation 2:

$$V = ND \times W_{n \times n}$$

    Where $W_{n \times n}$ is the importance (weight) of each indicators.

(3) Determine the ideal (v_j^+) and negative-ideal solution (v_j^-).

(4) Calculate the sum of distances from positive and negative ideal for each indicator.
    Relation 3:

$$d_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2} \qquad i = 1,2,\ldots,m$$

    Relation 4:

$$d_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2} \qquad i = 1,2,\ldots,m$$

(5) Calculate the relative closeness to the ideal solution(CL^*).
    Relation 5:

$$CL_i^* = \frac{d_i^-}{d_i^+ + d_i^-}$$

(6) Rank the preference order.

5. *Methodology*

In this paper, the study sample society was containing all employees in the Isfahan Steel Mill Company at 2011 summer (approximately 20,000 employees for unit 1 and 2 and 10,000 employees for unit 3). For sampling, questionnaires (separately for each units) were distributed among a sample size of 161,167 and 111 employees and consequently the average return rate for units was 75 per cent.

In order to gather data, the SERVQUAL questionnaire is used. This contains 22 questions which asked employees expectations and perceptions about delivered service with (1-7) likert spectrum. Prioritizing the ISQ dimensions was done using the TOPSIS method. Because the questionnaire used in this research had already been used in previous studies (parasuraman et al.,1988), its validity is confirmed. In order to test the reliability of the questionnaire, Cronbach's alpha was found to be more than 0.9 for each unit, which indicated that the questionnaire has high internal reliability.

6. Finding

In order to analyze the results, the statistical analysis like mean and paired samples T- test for measuring ISQ are applied, also for prioritizing service quality dimensions, TOPSIS method is used.

6.1. Measuring ISQ in service units of Isfahan Steel Mill Company

Here, in order to measure ISQ through the SERVQUAL questionnaire, differences between employees' expectations and perceptions from the delivered service in each service quality dimensions are determined. But at first, it should be evaluated that is there a meaningful difference among the total employees' expectations and perceptions regarding the provided service. To do so, the paired samples T- test is used. The results of T test is illustrated in table 2.As the sig is equal to zero and less than 0.05 in all the units, therefore there is a significant difference between the total employees' expectations and perceptions. So, it can be claimed that there is a gap in all the units. In order to measure the service quality gap in service units, the mean of employees' expectations and perceptions in each dimension of service quality is calculated and then the ISQ gap is given by their subtraction. The amounts of expectations(E), perceptions(p) and ISQ gap(G) in each department is presented (table 3).

6.2. Prioritizing ISQ dimensions in Isfahan Steel Mill Company

As it was stated before, the TOPSIS Technique is used to prioritize the dimension of service quality. In this study, the indicators include the service units and the alternatives are the five dimension of service quality. The Entropy method is also used to determine the importance (weight) of each indicators. To make decision making matrix, the resulted gap of service quality dimensions in each service units is used. In following, the decision making matrix is presented in table 4.

7. Conclusion and suggestions

In this study we applied the SERVQUAL scale (Parasuraman et al., 1988) to measure ISQ in service units and prioritized service quality dimensions by using the TOPSIS technique. According to the results, the gap between employees' expectations and perceptions in service quality dimensions for transportation, restaurant and S&C affairs units are negative which it implies that the employees' expectations is more than their perceptions. Therefore, the total resulted gap in transportation, restaurant and S&C affairs units respectively are 1.196, 0.956, 0.856. The figures reveal that transportation unit has the greatest level of gap and S&C affairs unit is with the least one. Also, the results of prioritizing service quality dimensions by using TOPSIS technique reveal that respectively, tangibility, empathy, responsiveness, assurance and reliability dimensions have the highest priority in the employees' views.

In the present study, It has been tested and confirmed that SERVQUAL is appropriate for measuring ISQ and confirmed the validity and reliability of all five SERVQUAL dimension in a service setting. Compared with the findings of other studies, the gained results are the same as the Kang et al. (2002) study. Therefore, it could be concluded that SERVQUAL scale is a suitable instrument for measuring ISQ in service setting. Based on the results of service quality dimensions gaps and the results of prioritizing service quality dimensions, the following suggestions are offered for three units. In transportation unit, the greatest gap is related on responsiveness, empathy and tangibility dimensions. It also appears from the results of prioritizing service quality dimensions that transportation unit should improve its service quality regarding the dimensions of tangibility, empathy and responsiveness to increase the employees' satisfaction. Hence, some proposed strategies for this unit include: delivering prompt service to employees, be willing to help employees, conformity of performance with the employees' need, applying modern looking, safe and comfortable equipments. In restaurant unit, the greatest gap is related on tangibility, empathy and responsiveness dimensions. It also appears from the results of prioritizing service quality dimensions that restaurant unit should improve its service quality regarding the dimensions of tangibility, empathy and responsiveness to increase the employees' satisfaction.

Hence, some proposed strategies for this unit include: increasing physical facilities, conformity of performance with the employees' need, delivering prompt service to employees.

In S&C affairs unit, the greatest gap is dependent on tangibility, empathy and responsiveness dimensions. It also appears from the results of prioritizing service quality dimensions that S&C affairs unit should improve its service quality regarding the dimensions of tangibility and empathy to increase the employees' satisfaction. Hence, some proposed strategies for this unit include: applying modern looking, safe and comfortable equipments, increasing physical facilities, conformity of performance with the employees' need.

In following, some suggestions (based on the research limitations) are proposed for the future studies. As this company has five service units and due to time limitations, it was impossible to measure ISQ among all units, therefore, it's suggested to measure ISQ in all the units to determine total ISQ. As the results of this study are based on the sampling style in a given time, ISQ can be measured in different time domains and then compare results with to gather. since employees' perceptions of service quality are generally expressed subjectively in vague linguistic terms, Fuzzy TOPSIS technique can be used for prioritizing service quality dimensions and the results derived of this method can be compared to TOPSIS ones.

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Table 2. The results of paired samples T- test for service units

| | | Paired differences | | | | t | df | sig.(2-tailed) |
| | | Mean Difference | std. Deviation | 95% confidence interval of the difference | | | | |
				Lower	Upper			
transportation	expectation-perception	1.207	1.114	1.007	1.407	11.965	121	0.00
restaurant	expectation-perception	0.956	1.029	0.091	0.776	10.503	127	0.00
S&C affairs	expectation-perception	0.807	0.912	0.597	1.017	7.66	74	0.00

Table3. The amounts of expectations(E), perceptions(p) and ISQ gap(G) in each service unit

| service quality dimensions | transportation | | | restaurant | | | S&C affairs | | |
	E	P	G	E	P	G	E	P	G
tangibility	4.213	3.025	1.188	4.119	3.021	1.098	4.183	3.147	1.036
reliability	4.178	3.055	1.123	4.022	3.200	0.822	4.111	3.395	0.716
responsiveness	4.242	2.932	1.31	3.993	3.116	0.877	4.014	3.270	0.744
assurance	4.337	3.227	1.11	4.131	3.256	0.875	4.176	3.427	0.749
empathy	4.146	2.858	1.288	4.038	2.941	1.097	4.121	3.102	1.019
total	4.218	3.022	1.196	4.058	3.102	0.956	4.122	3.226	0.856

Table4. Decision making matrix based on the service quality gaps

	transportation	restaurant	S&C affairs
tangibility	1.188	1.098	1.036
reliability	1.123	0.822	0.716
responsiveness	1.31	0.877	0.744
assurance	1.11	0.875	0.749
empathy	1.288	1.097	1.019

Table 5. Prioritization of internal service quality dimensions

alternatives	d_i^+	d_i^-	CL_i	rank
tangibility	0.004	0.105	0.965	1
reliability	0.105	0.001	0.004	5
responsiveness	0.094	0.014	0.129	3
assurance	0.093	0.013	0.121	4
empathy	0.005	0.100	0.951	2