

Factors Influencing TQM Practices In Indian Hospital Industry – An Empirical Study through Principal Component Analysis

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Abstract

TQM has its root in manufacturing industries, due to its universal applicability, it was believed that TQM principles and policies can be adapted to service industries as well. The rising population and increasing standards of living of have driven significant growth within the health care sector globally. Thus dynamic nature of the hospital industry and growing demand of the customers made the hospital to focus on its quality issues seriously. Hence it become imperative to the hospitals for professional management system to meet its customer needs. The present study has made an attempt to measure the factors influencing TQM practices to meet quality performance of hospitals. From the findings of the study it was observed that, larger share of the respondents profile is from clinical and non-clinical departments and mostly heads of the departments represented for the survey. The study extracted ten factors explaining the TQM practices of selected hospitals. Among the ten factors, the factor 'top management commitment' is viewed with top priority, followed by 'knowledge and training' and 'quality system and culture'. This may infer that these factors would influence the existence of quality management in hospital industry. The present study can be helpful in identifying the functional targets to focus and extract the expected outcomes so as to meet the quality management in any hospitals. This would help in elevating the service rate and the goodwill of the hospital industry.

Keywords: Factor Analysis, Principal Component Analysis, Healthcare Management, Quality Management, Hospital Industry.

Paper Classification: 97K80

INTRODUCTION

One of the important services in the Global economy has been health. This is growing as most challenging sectors and holds a key to the country's overall progress. Quality has been shown to be an important element in the consumers' choice of hospitals. In light of these changes, there is an emerging need to improve the quality of healthcare services. Further, the changing market and accreditation pressures have motivated hospitals to implement TQM concepts. The TQM application in hospitals is seeking ways to lower costs and improve care. Several researchers have asserted that successful implementation of TQM can result in significantly superior

outcomes in healthcare organisation (Karasa et al., 2008, Miller et al., 2009, Short and Rahim 2010) such as the up gradation of Service Quality, improvement in healthcare quality and productivity and satisfaction of both internal and external customer.

Quality of healthcare management depends upon many aspects of the healthcare organisation like its resources, its utilisation processes and practices of the establishment to achieve maximum possible clientele satisfaction. This is important for both the internal as well as and external stakeholders especially for the patients in whom the final outcome is reflected by promotion of health, prevention of disease, management of the sick with prompt diagnosis and treatment as well as by rehabilitative measures simultaneously ensuring protection of community from the disease process in a cost effective manner. Thus it is an onerous work of healthcare establishment (HCE) which must ensure all above actions to claim its very existence and survival as physically tangible extension of medical sciences ever fighting to arrest and cure disease process within humans specifically those of poor and socially vulnerable community at all costs. The concept of quality is gaining increasing importance in the production and consumption of products and services. Patients are less willing to accept services without question or complaint, and hospital managers need proper managerial practices to understand and record patients input and feedback in order to improve those services. Determining the 'quality' of hospital services has long been an elusive term with varying definitions based on outcome, technical services provided, and interpersonal characteristics (Self et al., 2009). Customers want assurance that they are well cared for, that there will be no errors in their treatment, and that they be valued as 'patients' in the hospital. Customers do not emphasize that the physical facilities be appealing and that modern equipment be available (Suki and Lian, 2009). Commitment to quality can fetch more benefit towards the profit making and strategy development in the same time (Jalili and Rezaie, 2010). However, it is emphasised in above mentioned studies that the core quality of healthcare services are of critical nature and cannot be ignored. Other associated supportive quality parameters in healthcare should be synergised with the core quality parameters in a way to achieve results to satisfy the patients and other related stakeholders, i.e., family payers, insurers and the government.

For the past few years, India have witnessed an increasing concern over the quality of healthcare services. The government policies have significantly changed the healthcare scenario in India. India is striving to compete with other nations to emerge as a preferred healthcare destination because of its relatively low cost and reasonable quality of treatment available, giving rise to the term “medical tourism”(Pachapakesan et al., 2015). India is rated one among top three medical tourism destinations in Asia along with Thailand and Singapore as reported by the Economic Times (2014). According to (Sahay ,2008), it was found that Indian hospitals are best with challenges related to poor customer service and could lose their competitive advantage to other players in the global market who offer a high quality service.

LITERATURE SURVEY

An extensive literature review of the previous studies on TQM have examined what constitutes TQM and what are the key practices for the success of TQM (Fotopoulos and Psomas, 2009, Sadigkolu and Zahir, 2010). All these studies gave different set of practices which are considered to be essential for the success of TQM implementation but as such no study has identified a common set of practices for successful implementation of TQM. The study by (Fotopoulos and Psomas, 2009) identified customer focus, process management, continuous improvement, employee management and involvement, supplier management, leadership, strategic quality planning, information and analysis and also knowledge and education as a set of TQM practices to form a structural relationship with the organizational performance in ISO 9001:2000 certified Greek companies. Kumar et al (2011) Identified management commitment, customer satisfaction, continuous improvement, teamwork, employee’s empowerment, training, feedback, and effective communication as few success factors for both manufacturing and service industries. While the study by (Bayraktar et al., 2008) presented the following critical success factors (CSFs) of TQM: leadership, vision, measurement and evaluation, process control and improvement, programme design, quality system improvement, employee involvement, recognition and award, education and training, student focus, and other stakeholder’s focus. (Sadikoglu and Zahir, 2010) After thoroughly reviewing the literature developed a set of eight TQM practices. They are: leadership, training, employee management, information and analysis, supplier management, process management, customer focus, and continuous improvement. They investigated the effects of innovation and employee performance on the relationship between these TQM practices in Turkish firms. (Talib and Rehman, 2010a) Identified a set of nine TQM practices for their proposed TQM model for service industries. They are: top-management commitment, customer focus, training and education, continuous improvement and innovation, supplier

management, employee involvement, employee encouragement, benchmarking, quality information and performance. (Dahkgard et al., 1998) went on to identify ten TQM practices: top-management commitment, customer focus and satisfaction, quality information and performance measurement, human resource management, employee involvement, teamwork, process management, quality assurance, zero defects, and communication. Brah et al., (2002) in their study, gave 11 constructs of TQM viz., top management support, customer focus, employee involvement, employee training, employee empowerment, supplier quality management(QM), process improvement, service design, quality improvement rewards, benchmarking, and cleanliness and organization.

Through the comprehensive review of the TQM literature, the present study utilizes 17 TQM practices identified by(Talib and Rehman, 2011a, Talib Rehman, 2011b) for service industries which are frequently occurring in the TQM literature. They are: top-management commitment, customer focus, training and education, continuous process improvement, quality systems, employee involvement, supplier management, information and analysis, process management, benchmarking, quality culture, human resource management, strategic planning, employee encouragement, teamwork, communication, and product and service design. Hence these practices are used because of its repeated occurrence in different service oriented researches and the wholesome approach involving both hard and soft components of TQM. A study done by (Cartner et al., 2010) have deconstructed the quality management model based on two aspects viz., quality context and quality practices. Researchers have found that the link between quality practices and firm performance can be better evaluated by more meaningfully placing the quality based concepts in the actual firm environment. Quality context and quality practices found to exhibit a strong effect in terms of overall quality management (Cartner et al., 2010).

The TQM practices of a firm are defined as the procedures and actions taken by the firm to deliver a high quality service. The measuring variable was generated from the prior research and literature support. It was supported from the previous researches that deconstructing quality management into separate constructs and analyzing the casual effect of relationship between these constructs will provide meaningful results (Cartner et al., 2010).

Research Objectives

With respect to the proposed research model, the objectives of the study are as follows;

1. To present the demographic profile of the executives of network hospitals
2. To extract the factors influencing Quality awareness and TQM practices in hospitals through factor analysis

MATERIALS AND METHOD

Research Method

The study was conducted among network hospitals accredited for Tamilnadu Government Employees New Health Insurance Scheme. Among 514 hospitals, 490 hospitals located in Tamilnadu were taken as population size and a sample of 245 hospitals were chosen for the study using systematic sampling method. From each hospital five respondents were chosen as sample size. Data were collected through a self-administered questionnaire through email, personal interview and for certain cases, schedules were sent through trained enumerators. Thus the study used multiple methods for data collection. The questionnaire consisted of 79 items to represent the three main variables of the study. Out of 1225 questionnaire 1012 questionnaires were received in complete and usable condition. The data were collected from top and middle level executives of network hospitals. The study adopted descriptive statistics, factor analysis for its analysis. The current research used a descriptive cross-sectional study design. It deals with analysis of facts, condition, problem, views, and demographic information. In addition to this, the study also employed the survey method, which makes use of a research instrument. This study used electronic mail (e-mail) survey method, mailed questionnaire method and interview method as the means of data collection which is commonly used in similar kind of research (Fotopoulos and Psomas, 2009, Cartner et al., 2010, Zu, 2010, Salahedin, 2009). The sampling hospitals were drawn from each cluster by adopting the method of systematic random sampling. The framework of analysis involved descriptive statistics, Exploratory Factor Analysis (Principal Component Analysis) using SPSS 17.0.

Construct Development

In order to assess the respondent perception on TQM practices, a total of 60 items were adopted based on the prior researches (Bayraktar et al., 2008; Brah et al.,2002; Salaheldin, 2009; Saravanan and Rao, 2006; Sila and Ebrimphour, 2005; Antony et al., 2002; Talib et. al., 2013). The purpose of selecting these literatures were that the scales of these selected studies were proven to be good in reliability and validity in all these studies and the studies are taken on service industries similar to the current study.

RESULTS AND DISCUSSION

Classification of Respondents Profile:

The profile of respondents is very important as it helps to determine the perception of each sampling unit about the research problem. The present study collected demographic variables like designation/role, gender, years of experience, and department/section of respondents.

Table 1. Summary of respondents 'profile

| S.No | Demographic variable | Frequency | Percentage |
|------|--|-------------|------------|
| 1. | Designation/role of the respondent | | |
| | Managing Director/Executive Director/General Manager | 41 | 4 |
| | Chief Medical Officer | 63 | 6 |
| | Medical Super indent | 43 | 4 |
| | Medical Officer | 52 | 5 |
| | Clinical /non-clinical head of departments | 754 | 75 |
| | Operations Manager/Quality Manager/HR/Marketing Manager | 32 | 3 |
| | Others (Management representatives, Service manager, Customer Relations Officer) | 27 | 3 |
| 2. | Gender | | |
| | Male | 691 | 68 |
| | Female | 321 | 32 |
| 3. | Years of Experience | | |
| | Less than 5 years | 354 | 35 |
| | More than 5 years | 658 | 65 |
| 4. | Department/service | | |
| | Clinical service | 613 | 61 |
| | Non clinical service | 334 | 33 |
| | Quality/HR | 38 | 4 |
| | Customer relations | 14 | 1 |
| | Marketing | 13 | 1 |
| | Total | 1012 | 100 |

Source : Primary data
 In the present study, 68 percent of the respondents were male and the remaining 32 percent were female group. Almost 75 percent of the respondents belong to head of departments of clinical and non-clinical departments. 65 percent of the respondents were having more than five years of experience in the current hospital they are associated with. 61 percent of respondents are from clinical department and 33 percent from non-clinical department.

Reliability & Validity Analysis

The reliability of the TQM constructs has to be examined to support any measures of validity that may be deployed [26]. Reliability analysis is the most widely used technique to

measure internal consistency among a group of items combined to form a single scale and reflects homogeneity scale in order to represent the factor. Using the SPSS 17.0, internal consistency analysis was performed for each statement separately. The reliability coefficient value of the study variables is beyond the minimum acceptable level of 0.70, as per the prior research done by (Nunnally and Bernstein, 1994). After the pilot study, the number of statements of TQM practices were reduced from 69 to 60. The reliability coefficient of the statements was found to be 0.879. This imply that the items developed for measuring TQM practices of hospital are reliable and eligible for further statistical analysis.

Table 2. Internal Consistency (Scale Reliability)

| Measure | Sample size | Number of items before pilot study | Reliability coefficient before pilot study | Items deleted | Final number of items | Final reliability |
|---------------|-------------|------------------------------------|--|---------------|-----------------------|-------------------|
| TQM Practices | n=1012 | 69 | 0.796 | 9 | 60 | 0.879 |

Source: Primary data

Validity Analysis

In this research, all the 60 variables used are believed to have both face validity and content validity. Moreover, the majority of the items are developed based on prior research which have already been subject to the test of reliability and validity. In addition to this, the content validity of the research instrument was also found to be good because of the sound literature support and thorough evaluation by subject experts and field practitioners. In order to be valid, the items of the instrument were modified, few were added and few were deleted based on the review of experts before applying analytical tools.

FACTOR ANALYSIS – PRINCIPAL COMPONENT ANALYSIS

In the present study, TQM practices were grouped into reliable factors by using exploratory factor analysis. The factors extracted were used for further investigation. The principal component analysis with “*varimax*” rotation was used to develop the factor analysis (Hair et al., 2006). The rotated factor matrix displays how each variable ‘loads’ or ‘belongs’ on each factor.

Principal component analysis: There are many methods of factor analysis out of which, the principal component method of factor analysis is designed to reduce the number of variables into finite factors based on the degree of association that exists between the variables under study. One of the uses of factor analysis is for the development and validation of scales in any research. Factor analysis can be used to identify

groups of similar items there by, reduce the number of variables used in further analysis. Thus a factor can be interpreted by assessing the pattern of factor loadings. The analysis was done by using software SPSS 17.0.

For the present study, factor analysis was used to deduce statements to represent” TQM practices” into finite number of factors to facilitate the study. Factor analysis was development based on the data collected from 1012 respondents selected for the study.

Factors for measuring TQM Practices

For the current study, factor analysis is used to reduce the number of variables that are used to measure the perception of respondents on quality practices. Respondents were asked to give their opinion on five point likert scale (1-very low to 5-very high) for 60 variables of “TQM practices”. The items of the principal component method yielded ten factors. Bartlett’s test of sphericity

Table 3. Factor Analysis – KMO and Bartlett Test

| | | |
|--|-----------------------|----------|
| Kaiser-Meyer-Olkin (KMO) measure for sampling adequacy | 0.871 | |
| Bartlett test of Sphericity | Approximate Chisquare | 17345.57 |
| | Sig. value | 0.000* |
| *significant at zero level of significance | | |

Source : Primary data

Kaiser-Meyer-Olkin Test for Sampling Adequacy & Bartlett’s test of sphericity

Bartlett’s test of sphericity is a test statistic used to examine the hypothesis that the variables are uncorrelated in the population. For the 60 variables under study, the significance value of Bartlett’s Test is 0.000, this leads to rejection of the idea that the correlation matrix is identity matrix. The Kaiser-Meyer-Olkin (KMO) measure for sampling adequacy is an index used to examine the appropriateness of factor analysis. It compares the magnitudes of observed correlation coefficients to magnitude of partial correlation coefficients. The KMO value varies from 0 to 1. High value (between 0.5 and 1.0) indicates factor analysis is appropriate. Small values of KMO Statistic indicate that correlations between pair of variables cannot be explained by other variables, and hence, factor analysis is not suitable (Malhotra, 2010, Nithya and Selvaraj, 2015). The KMO value found for this study is 0.884, which is nearer to 1. Hence, this value is acceptable and justifies the appropriateness of factor analysis.

Table 4. Components of Factor Analysis

| Factor Label | Statement | Communalities | Factor Loading | Eigen Values | Reliability | % of variance explained | Cumulative % of variance explained | Mean Score |
|--------------------------------|-----------|---------------|----------------|--------------|-------------|-------------------------|------------------------------------|------------|
| Top Management Commitment | S1 | .959 | 0.863 | 12.319 | 0.928 | 20.531 | 20.531 | 4.11 |
| | S2 | .952 | 0.834 | | | | | |
| | S3 | .904 | 0.821 | | | | | |
| | S4 | .907 | 0.796 | | | | | |
| | S5 | .914 | 0.775 | | | | | |
| | S6 | .889 | 0.714 | | | | | |
| Customer Focus | S7 | .944 | 0.713 | 10.920 | 0.908 | 18.200 | 38.731 | 3.67 |
| | S8 | .974 | 0.708 | | | | | |
| | S9 | .946 | 0.689 | | | | | |
| | S10 | .950 | 0.624 | | | | | |
| | S11 | .932 | 0.606 | | | | | |
| | S12 | .946 | 0.587 | | | | | |
| | S13 | .942 | 0.578 | | | | | |
| | S14 | .959 | 0.557 | | | | | |
| Knowledge and Training | S15 | .987 | 0.743 | 6.736 | 0.915 | 11.226 | 49.957 | 3.92 |
| | S16 | .950 | 0.671 | | | | | |
| | S17 | .987 | 0.655 | | | | | |
| | S18 | .976 | 0.636 | | | | | |
| | S19 | .976 | 0.584 | | | | | |
| Continuous Process Improvement | S20 | .939 | 0.743 | 6.623 | 0.887 | 11.038 | 60.995 | 3.66 |
| | S21 | .987 | 0.808 | | | | | |
| | S22 | .922 | 0.762 | | | | | |
| | S23 | .924 | 0.764 | | | | | |
| | S24 | .959 | 0.703 | | | | | |
| | S25 | .952 | 0.680 | | | | | |
| Employee Involvement | S26 | .904 | 0.743 | 4.759 | 0.879 | 7.731 | 68.726 | 3.69 |
| | S27 | .907 | 0.725 | | | | | |
| | S28 | .914 | 0.679 | | | | | |
| | S29 | .889 | 0.654 | | | | | |
| | S30 | .944 | 0.653 | | | | | |
| | S31 | .974 | 0.633 | | | | | |
| Process Management | S32 | .946 | 0.707 | 4.383 | 0.831 | 7.305 | 76.031 | 3.56 |
| | S33 | .950 | 0.688 | | | | | |
| | S34 | .932 | 0.683 | | | | | |
| | S35 | .946 | 0.617 | | | | | |
| | S34 | .942 | 0.593 | | | | | |

| Factor Label | Statement | Communalities | Factor Loading | Eigen Values | Reliability | % of variance explained | Cumulative % of variance explained | Mean Score |
|----------------------------|-----------|---------------|----------------|--------------|-------------|-------------------------|------------------------------------|------------|
| Quality system and culture | S37 | .959 | 0.767 | 3.563 | 0.911 | 5.938 | 81.969 | 4.05 |
| | S38 | .987 | 0.749 | | | | | |
| | S39 | .950 | 0.694 | | | | | |
| | S40 | .987 | 0.672 | | | | | |
| | S41 | .976 | 0.628 | | | | | |
| | S42 | .976 | 0.588 | | | | | |
| | S43 | .939 | 0.587 | | | | | |
| | S44 | .987 | 0.577 | | | | | |
| Employee Encouragement | S45 | .922 | 0.569 | 2.468 | 0.903 | 4.113 | 86.082 | 3.59 |
| | S46 | .924 | 0.778 | | | | | |
| | S47 | .959 | 0.766 | | | | | |
| | S48 | .952 | 0.712 | | | | | |
| | S49 | .904 | 0.753 | | | | | |
| | S50 | .907 | 0.722 | | | | | |
| Teamwork | S51 | .914 | 0.658 | 1.898 | 0.874 | 3.164 | 89.246 | 3.79 |
| | S52 | .889 | 0.726 | | | | | |
| | S53 | .944 | 0.651 | | | | | |
| | S54 | .974 | 0.583 | | | | | |
| Communication | S55 | .946 | 0.562 | 1.683 | 0.896 | 2.805 | 92.051 | 3.77 |
| | S56 | .950 | 0.664 | | | | | |
| | S57 | .932 | 0.636 | | | | | |
| | S58 | .946 | 0.573 | | | | | |
| | S59 | .942 | 0.561 | | | | | |
| | S60 | .959 | 0.561 | | | | | |

Source : Primary data

Components of Factor Analysis (Communalities, Eigen values, percentage of variance explained)

A low communality figure indicates that the variable is statistically independent and cannot be combined with other variables whereas the extracted Communalities are high (greater than 0.5), and hence, acceptable for all the factors formed in the present study. Eigen value represents the total variance explained by each factor [28]. However, it is required that the maximum amount of variance should be explained in minimum number of components. Only those factors are extracted for which the Eigen values are greater than one. Thus, the factors extracted in the study are 10 in number and together contribute 92.051 percent of total variance. This is a very good percentage of variance to be explained for the appropriateness of the factor analysis. Thus extracting 10 factors from total 60 variables for measuring the

executive's perception on TQM practices is found good by all means.

Varimax rotation

The method of rotation used for this study is *Varimax* rotation, which is the most commonly used rotation method. Interpretation is done by identifying the variables that have very high loadings on the same factor. These factors can then be interpreted in terms of the Variables that load highly on it. The relationships between the observed variables and the newly produced factors are revealed in the form of factor loadings. These are the coefficients within the matrix that indicate the importance of the factor. For better data reduction those variables that had the factor loadings more than 0.55 were considered under each factor. Fortunately, all the variables have the factor loading more than 0.55 so all the 60 variables are considered for loading on extracted two factors.

Construct validity

Construct validity is the degree to which a measure is linked to other measures in a constant manner on the basis of theoretical background (Bayraktar et al. 2008). The Kaiser-Meyer Olkin (KMO) measure of sampling adequacy was 0.871 which is greater than 0.60 indicates the presence of sufficient inter correlations. The Barlett's test of sphericity was given by $p=0.000$ which is less than 0.01. The measure of sampling adequacy is well above the acceptable level of 0.50. Hence, the set of variables under TQM Practices is adequate to represent to TQM construct.

Factor Labelling & Mean Score

From the factor analysis, it was found that TQM practices can be measured through ten factors which cover almost all the characteristics to measure the TQM practice of hospitals. Among the ten factors, the factor top management commitment is having highest mean value 4.11, followed by knowledge and training with a mean value of 3.92 and quality system and culture with mean value of 3.80. This shows that, according to respondents opinion, top management is showing interest in TQM practices and factors 'knowledge and training' and 'quality system and culture' are trailing next with the mean values of 3.92 and 3.80 respectively. This shows that in the selected network hospitals, these factors are playing significant role in making its performance to be high in the network hospitals. Process management and employee encouragement are found to be least with mean values 3.56 and 3.59 respectively.

Managerial Implications

The important factors extracted for TQM practices by the current study are top management quality, customer focus, knowledge and training, continuous process improvement, employee involvement, process management, quality systems and culture, employee encouragement, teamwork and communication and the findings of the present study is akin to the findings of (Fotopoulos and Psomas, 2009; Sadigkolu and Zahir, 2010; Kumar et al., 2011; Talib and Rehman, 2010a; Dalhgard et al., 1998; Sila and Ebrimphour, 2005; Talib et. al., 2013; Nithya and Selvaraj, 2015).

CONCLUSION

All the items used in the constructs were well supported by sufficient literature and statistical reliability and validity test. This shows that, the data used for the present study is highly reliable and valid in nature. The factor analysis was employed to the 60 items which has extracted ten factors as a result of factor reduction method. The analysis used varimax rotation which indicated that the relationship between the factors and individual variable of constructs. This rotated component matrix is used to generate factors. The variables with very high loadings on the same factors constituted a factor. In this way, the 'TQM practices' has generated ten factors. These factors were designed to meet the variation in nature of

network hospitals. Thus, the network hospitals can design their quality framework based on these ten factors to develop hospital quality management for a quality delivery of service.

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CONFLICT OF INTEREST

There is no conflict of interest with the current work.

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