The Impact of Total Quality Management on Health Services Improvement, Sana'a Hospitals, Yemen (2017-2020)

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Abstract

Background: Total quality management (TQM) plays a major role in quality health services improvement. The aims of the study are to identify the concepts of total quality management in health institutions to know the nature of the relationship between the application of TQM and improving the quality of health services in Sana'a Governorate. **Method:** This applied research is a descriptive cross-sectional study in which the TQM of 13 affiliated Sana'a Governorate hospitals during "2017-2020", were evaluated based on self-administered questionnaires. Data were collected by questionnaires including demographical variables, TQM dimensions variables. Data were analyzed by using SPSS version 16. **Results:** A total of 281 users 98.6% had responded. The employee's responses for sixth study dimensions were the top manager's commitment (TMC) 80.46%, customers focusing CF 81.55%, continuous improvement (CI) 82.32%, training (T) 71.51%, and strategic planning of the quality (SPQ) 74.76%, health services quality improvement (HSQI) 74.25%. There is a strong relationship between TQM and HSQI. There is no relationship between demographic factors gender, profession, years of experience, except age with TMC, T, HSQI, qualification with the TMC, CI, T, HSQI and job with all study variables. **Conclusion:** The application of TQM at hospitals in quality of health services improvement has several challenges, lacking staff experience and lacking leadership support, weakness of the training, customers focusing, continuous improvement, and strategic planning of the quality. Therefore, benefiting from the experiences of leading hospitals in implementing total quality management programs by sending some cadres to these hospitals for training and gaining experience or by hosting experienced cadres to conduct training courses is recommended.

1. Introduction

Total quality management (TQM) is a firm-wide management philosophy of continuously improving the quality of the products/services/processes by focusing on the customers' needs and expectations to enhance customer satisfaction and firm performance, in addition, TQM is a philosophical approach. The main purpose of such philosophy is to achieve a continuous improvement of quality and customer satisfaction. The manufacturer has some goals in ensuring total quality management [1] [2] [3] [4].

TQM in the health-care context: integrating the literature and directing future research [5].

It is a system implemented by the management of an organization to achieve the satisfaction contentment of customers/patients. It is can be used as a strategy to improve develop organizational performance which has grown in this era of globalization. The role of it was revealed in numerous research that forms in the enrichment of system quality and enhancement of both employee and organizational performance. It is known for continuous quality improvement, quality management and total quality control. It is held to be an innovative approach to the management of organizations. In the medical sector, it is integrating quality orientation in all processes and procedures in health-care delivery. It is now being widely adopted in the medical sector of many countries [6] [7] [8] [9].

There are eight key elements of total quality management (Leadership and responsibility of top management-Customer Orientation-Participation of all workers-Continuous improvement (Kaizen)-Preventive approach-Measurement and statistics-Group Work-Training of employees). [4]

Overall quality has become one of the most important requirements of modern management, and a condition of its success, it is no longer a luxury but has become the standard governing the survival and growth of modern organizations, in light of the great competition that the world is witnessing at this time, and in light of the scientific and technological progress that helped to have modern systems that help in the application and control of overall quality [6] [10] [11] [12].

The Union of American Physicians has set some conditions for quality in healthcare, which it defines as a service that continually contributes to the improvement or maintenance of the quality and/or duration of life. Some of these conditions are ensuring betterment of the patient's state of health within the optimal time, prioritizing early diagnosis and treatment, starting the provision of healthcare services in the shortest time possible and avoiding unnecessary de-

lays, acting in a sensitive manner towards the patient, informing the patient and cooperating with him/her and keeping regular medical records [4].

Health institutions are organizations that need to implement the quality system for a comprehensive way of dealing with people's lives and any mistake or neglect that will cause death or increase the suffering of patients [13].

The Yemeni hospital sector is an important and vital service sector, and is an important destination for all segments of society, and this sector has recently grown rapidly due to increased demand, but this quantitative growth must be accompanied by a qualitative improvement in the quality of service provided and despite the beginning of some hospitals in the application of accreditation systems in an effort to reach a high quality service that meets the aspirations of the beneficiary and improve the reputation of Yemeni health organizations, to reduce the travel of patients for treatment outside Yemen. So, the TQM in our country was impaired which may be due to a conflict and ware that continued for than 8 years [14].

There is no doubt that the application of comprehensive quality management principles can enhance the quality of treatment services that must meet the needs and expectations of patients, and achieve a good level of performance continuously as an interrelated process [11] [13] [15] [16]. As researcher information there were very limited studies in this field, so, this study examines the impact of success factors and accreditation systems on the application of comprehensive quality management principles in health services and their relationship to the level of improved performance.

2. Methodology

2.1. Study Design and Setting

Cross sectional study was conducted at Sana'a Governorate hospitals during 2017-2020. Public hospitals in Sana'a Governorate represent referral and implement to some extent quality improvement programs. The hospitals that included were; 26th of September Hospital-Matina, 22th of May Hospital-Hamddan District, AL shaheed Al-Durra Hospital-Jahanna, Al Wahda Hospital-Manakhah, Al-Er Hospital-Internal Al-Hima, Aomera hospital-Arahab, Sian Sanhan Hospital, Wallan Hospital-Bilad Al-Russ, Al-Manar Hospital-External Al-Hima, Safan Hospital, Maternity and Childhood Hospital, Beni Mansour Emergency Hospital and Hamadan General Hospital.

2.2. Study Population and Sampling

The study sample: 26% of the research communities (main hospitals in Sana'a governorate) were selected in a random sampling manner to represent the research sample, and the corresponding 285 members of the research community which reach to 1100 as a whole, according to the statistical table to determine the study sample for Morogan 1970. The researcher distributed 285 questionnaires to the respondents, and 281 questionnaires were retrieved, with missing 4 ques-

tionnaires, and 279 questionnaires were analyzed and to come up with accurate results as much as possible.

2.3. Questionnaires and Data Collection

The number of the questionnaire distributed was 285, 4 of them missed while the responses was 281 copies, 2 copies were canceled because they were not validated and 279 copies of the questionnaire responses were validated and suitable for analysis as seen in Table 1. The researcher considered this number of questionnaires sufficient to complete the research study.

Self-administered questionnaire was used which consists of two sections: Section one contains demographic data which include, gender, age, job title, profession, educational qualification, years of experience. The second section contains 44 questions about Total quality management and their sixth dimensions as the following:

First part: the commitment of the senior management, and it consists of 9 paragraphs.

The second part: focus on the customer, and it consists of 6 paragraphs.

The third part: continuous improvement, and it consists of 7 paragraphs.

The fourth part: the training and it consists of 8 paragraphs.

The fifth part: strategic planning for quality and it consists of 7 paragraphs.

The Sixth part: improving the quality of health services and it consists of 7 paragraphs.

The total number of all dimensions was 44 paragraphs.

2.4. Study Scale

Likert scale was used in this study, which has a measure range from 1 - 5 as 5 represent strongly agree and 1 represent strongly disagree.

2.5. Quality Assurance of Tools

Test of validity and reliability of the tool:

The researcher used an internal validity tool and the Pearson correlation coefficient to ensure the relevance of the paragraphs and the extent to which each statement of the axis phrase relates to the degree of the axis, and the correlation of each statement with the overall score of the tool. Regarding the stability of the tool *i.e.*, questionnaire, Alpha Cronbach's test was performed as shown in Table 2. It is evident from the below table that the value of the reliability coefficient for the study tool (the resolution) in general came (0.898), which means that the questionnaire has a very high stability, and the reliability of the sample members

Table 1. Sample distribution.

Distributor	retrieved	Missing	Excluded	Validated
285	281	4	2	279
100%	98.60%	1.40%	0.70%	97.89%

Table 2. Cronbach's alpha.

Series	Dimensions of coefficient	Stability factor	Degree credibility √ stability
1	The Commitment of top leaderships	0.913	0.956
2	Concentrated on the customers	0.919	0.959
3	Continuous improvement	0.917	0.958
4	Training	0.921	0.960
5	Strategic planning of the quality,	0.934	0.966
6	Quality improvement	0.911	0.954
	Total score of the tool	0.898	0.947

came (0.947). This means that the degree of reliability of the answers were very high, and this suggests that the sample they are homogeneous in response to the questionnaire and the results can be relied upon in generalizing them to the research community to a large extent.

2.6. Analysis and Data Management

Researcher relied on the Statistical Package for Social Sciences (SPSS) program in the process of data analysis and hypothesis testing, and the researcher used the following statistical methods:

1) Pearson's Correlation: to find out the extent of a relationship of the type of correlation between the study parts and its paragraphs, and the researcher used it to measure the internal consistency of the questionnaire statements and constructive validity.

2) Alpha Cronbach's test: to ensure the reliability of the research instrument and the reliability of the sample's opinions.

3) Frequencies and percentages: to describe the demographic variables of the research sample and the responses of the research sample individuals to the questionnaire statements.

4) The arithmetic mean, standard deviation, and approval percentage: to know the average opinions of the research sample and the extent of the deviation of the sample's answers from the default mean (3 marks) and to prove the approval or disagreement of the research sample on the part.

5) Chi-Square test: To test the statistical significance of the research hypotheses at the level of significance (0.05) by comparing the resulting value with the tabular value to ensure the validity of the research hypotheses.

6) Simple linear regression test to ensure the correctness of the hypothesis as a whole and to judge whether or not it is accepted, and to know the proportion of the effect of independent variables on the dependent variable.

7) A test (T-test) for two independent variables to test the differences between the mean of the responses of the study sample with respect to the variable of gender (male, female).

8) A test (one away anova) for more than two independent variables to test the differences between the averages of the responses of the study sample with respect to the variable of age, and a variable, the level Education, variable years of experience, and job title.

9) Least Significant Differences Test (LSD) to find out in favor of the differences between the averages of the study sample responses about the instrument parts resulting from the one a way anova test, P-value < 0.05 is considered a statistically significant cut off point.

2.7. Ethical Considerations

Approval was taken from the ministry of public health and population and managers of study hospitals and participants, where the researcher relied on submitting a request for prior approval from each respondent, and then the questionnaire distributed to the conciliators only.

3. Results

3.1. Reliability

Reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials. Although unreliability is always present to a certain extent, there will generally be a good deal of consistency in the results of a quality instrument gathered at different times. The tendency toward consistency found in repeated measurements is referred to as reliability. To determine the reliability and credibility of the data collection tool and the credibility of answers, the questionnaire was tested using Cronbach's Alpha to ascertain the extent of the stability of the questionnaire and the sincerity of the views of a sample. Table 2 shows the results of Cronbach's Alpha test to all the questions of the questionnaire.

As stated in Table 2 the value of the reliability coefficient for the data collection tool (questionnaire) came up 89% and this means that the stability is very good.

The first part of the questionnaire is the demographic variables, which contain personal information related to the respondents. To obtained Demographic variable we used the Descriptive Analysis.

To achieve the answers of the study variables, we used the Descriptive Statistics of the main five variables (Top manager's commitment, customer focusing, continuous improvement, training, and strategic planning of the quality, Health Services quality improvement).

Descriptive analysis includes the mean and the standard deviation for the dependent (Health Services quality improvement) and independent variables (top manager's commitment, customer focusing, continuous improvement, training, and strategic planning of the quality) for each statements and for all part (dimension), the result of each paragraphs and dimension compared with medium mean, if more that means there are approval of respondents while if less that

means there are no approval from respondents as seen in Table 3.

3.2. Demographic Variables

A total of 285 participants were recruited in the study from the Sana'a Governorate public hospitals with a response rate of 281 (98.60%) and we were analyzed validated with 279 (97.89%). Table 4 shows the demographic characteristics of respondents which revealed about more than half of the respondents were male 191 (68.46%). One-third of them were less than 30 years of age 108/279 (38.71%). Third of participants 89/279 (31.90%) had a higher diploma degree and one-third of them 108/279 (36.92%) had a nursing profession. And one-third 108/279 (38.71%) had administrative job beside technical tasks and 213/622 (34.24%) had less than 5 years of experience.

The respondents in the research sample were divided into two genders (male and female). As shown in Table 4, the number of male respondents was 191, and the female was 88. The percentage of two genders was 68.46% and 31.54% respectively. So that the most of the study sample were males the researcher attributes this to the increase in the number of males to females, as workers in the health sector are still predominantly male. In addition, the study hospitals are placed in the rural areas.

The age variable in the questionnaire was divided into six sections as shown in the following below, the number of <30 year's respondents was the highest with a percentage of 38.71%, followed by age group. 30 - <35 years with a percentage of 31.90% and the proportion gradually decreases from age groups. 35 - <40 years was 10.39%, after that the category 40 - <45 years was 7.89% & 45 - <50 was 6.45%, finally, more than 50 years was 4.66%.

The qualification variable in this part shows the results of the study were divided into five levels (PhD, master, bachelor, higher diploma, intermediate diploma). From Table 4 we can observe the distribution details in the educational levels between the sample of the research where the highest educational rate was higher diploma with 89, then bachelor, intermediate diploma was equal 88, then Master degree 9, and finally PhD with 5 respondents.

The type of work targeted three categories of respondents by nature as shown in Table 4. The number of Nurses was 108 and it was the highest percentage among the respondents, we can explain that the work of the nurse requires permanent presence in the workplace and this is what appeared in the results of the

Table 3. Interpreting the level of consents.

Mean-value	Percent-value	Level of approval	Level of approval
4.20 - 5	84% - 100%	strongly agree	Very high
3.40 - <4.19	68% - <84%	agree	high
2.60 - 3.39	52% - <68%	neutral	moderate
1.80 - <2.59	36% - <52%	disagree	low
<1.80	<36%	strongly disagree	Very low

Table 4. Demographics variables (n = 279).

Attribute	Distribution	Frequency	Percentage
Sex	Male	191	68.46%
	Female	88	31.54%
Age	<30 years	108	38.71%
	30 - <35 years	89	31.90%
	35 - <40 years	29	10.39%
	40 - < 45	22	7.89%
	45 - < 50 years	18	6.45%
	>50 years	13	4.66%
Qualification	PhD	5	1.79%
	Master	9	3.23%
	Bachelor	88	31.54%
	Higher diploma	89	31.90%
	Intermediate diploma	88	31.54%
Type of profession	Doctor	41	14.70%
	Nurse	108	36.92%
	Technical	48	17.20%
	Pharmacist	11	3.94%
	Other	76	27.24%
Type of jobs	Director of Department	24	8.60%
	Deputy of Department Director	9	3.23%
	Head of Department	58	20.79%
	Deputy of Department Head	17	6.09%
	Other job	171	61.29%
Experience	<5 years	213	34.24%
	5 - <10 years	197	31.67%
	10 - <15 years	115	18.49%
	>15 years	97	15.59%

search where the highest proportion among respondent 36.92%, unlike doctors and their role only for diagnosis and follow up only in the workplace making them 41 while technical was 48 whereas pharmacist was 11, other jobs were 76 respondents.

The period of experience for respondents was divided into five periods as shown in Table 4, the number of respondents with <5 years' experience was 213, after that 5 - <10 year was 197, and 10 - <15 years was 115, and >15 years for category 97 respondents. We note from Table 4 that the percentages of respondents who have years of experience more than 15 years were the lowest propor-

tion when compared to the rest of the experience either respondent who have little experience periods were the largest proportion.

3.3. The Study Variables

Descriptive analysis includes the mean and the standard deviation for the dependent and independent variables explained in the following sub-sections;

In the second part of the questionnaire, the Total Quality Management dimensions on health services quality improvement is explained and divided into five independent variables (top manger's commitment, customer focusing, continuous improvement, training, and strategic planning of the quality). Each section below contains paragraphs related to it. It has been formulated to be answered by the respondents from the same sample. Each paragraph analyzed and discussed as the following:

Table 5 shows that Continuous improvement 3 got the first rank with a mean 4.12, and standard deviation of 0.60. The highest percentage 82.32% of respondents agree while the Training in paragraph 4 ranked the last with a mean of 3.58 and a standard deviation of 0.74, with 71.51%, then paragraph 2, 1, 5, 6 came in between respectively that represent the customer focusing, top manager's commitment, strategic planning of the quality, and the health Services quality improvement parts.

The overall approval for the all-study variables the Continuous improvement came the highest consent level with (82.32%), concentrated on the customers, was (81.55%), Top management commitment (80.46%), strategic planning of the quality was (74.76%), Health Services quality improvement was (74.25%), finally training axis phrases were (71.51%) these reflect the situation of human resources in health sectors that lack of concentration from leaderships.

3.3. Testing Hypotheses of the Study

The researcher used to test the hypotheses statements the Chi-Square test to find out the significance of the differences in the responses of the study sample

Table 5. Descriptive statistics of all dimensions.

S	Dimensions	Mean	*SD	%	level	Rank
1	Top Manager's Commitment	4.02	0.66	80.46%	High	3
2	Customer Focusing	4.08	0.64	81.55%	High	2
3	Continuous Improvement	4.12	0.60	82.32%	High	1
4	Training	3.58	0.74	71.51%	High	6
5	Strategic Panning of the Quality	3.74	0.66	74.76%	High	4
6	Health Services Quality Improvement	3.71	0.68	74.25%	High	5

SD = Standard deviation.

individuals to each of the research hypotheses statements. If the chi-square computed is greater than the tabular chi-square value at a degree of freedom and the level of statistical significance was (<0.05), which means there were significant differences.

To accept or reject we used linear regression analysis to ascertain the effect of independent variables on dependent variables and determined the relationship and degree of influence as according to the rule of thumb proposed by Muijs (2004).

3.4. Correlation Analysis

According to Sekaran, in doing any study project which has several variables, further than knowing the means and standard derivation of the variables, the researcher would often like to recognize how one variable is related to another. Inter-correlation analysis indicates the nature, direction, and significance of the bivariate relationship of the variables used in the study.

This study concludes examines the nature of the relationship that exists between independent and dependent variables. To determine the relationship between the variables, person correlation was run between the variables, and a perfect positive correlation was found between two variables, which is represented by 1.0 (plus 1), or a perfect negative correlation which would −1.0 (Minus 1) as shown under **Figure 1**. Whereas, the correlation might range between −1.0 and +1.0, the researcher conducted this study to know if any correlation found between two variables is significant or not (*i.e.*; if it has occurred solely by chance or if there is a high probability of its actual existence). As for the information, a significance of P = 0.05 is the generally accepted conventional level in social sciences research.

Davis (1997) projected the rules of thumb that need to be used in interpreting the R-value obtained from intercorrelation analysis as shown in **Table 6**.

Table 7 illustrates the correlation matrix between the major variables. The relationship between variables was tested using Pearson's correlation coefficient.

The dependent and independent variables were discussed separately, in addition to the statistical analysis of all the samples of the research. Thus, Total Quality Management (top manger's commitment, customer focusing, continuous improvement, training, and strategic planning of the quality) has positively affects on Health services quality Improvement.
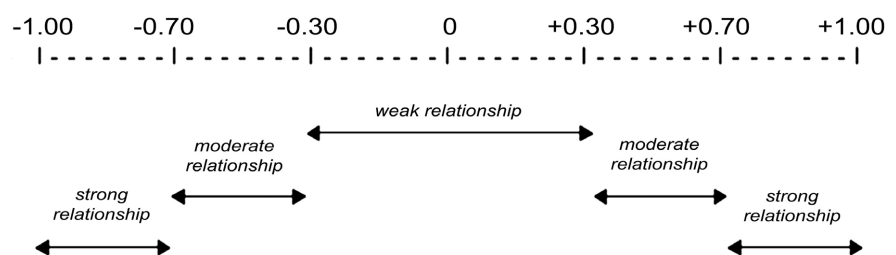

Figure 1. Interpreting correlation data.

Table 6. Interpreting the R-value for inter correlations.

R-value	Relationship
Above 0.70	Very strong relationship
0.50 - 0.69	Strong relationship
0.30 - 0.49	Moderate relationship
0.10 - 0.29	Low relationship
0.01 - 0.09	Very low relationship

Table 7. Correlation analysis. Adoption level Pearson correlation.

		TMC	CF	CI	T	SPQ	HSQI
TMC	Pearson Correlation	1	0.700**	0.777**	0.622**	0.501**	0.672**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000
	N	279	279	279	279	279	279
CF	Pearson Correlation	0.700**	1	0.776**	0.524**	0.465**	0.601**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000
	N	279	279	279	279	279	279
CI	Pearson Correlation	0.777**	0.700*	1	0.547**	0.437**	0.644*
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000
	N	279	279	279	279	279	279
T	Pearson Correlation	0.622**	0.524**	0.547**	1	0.536**	0.701**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000
	N	279	279	279	279	279	279
SPQ	Pearson Correlation	0.508**	0.565**	0.437**	0.536**	1	0.657**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000
	N	279	279	279	279	279	279
HSQI	Pearson Correlation	0.672**	0.601**	0.644**	0.701**	0.657**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	
	N	279	279	279	279	279	279
	Total Score	0.858**	0.809**	0.829**	0.806**	0.756**	0.871**

**Correlation is significant at the 0.01 level (2-tailed). TMC: Top Manager's Commitment; CF: Customer Focusing; CI: Continuous Improvement; T: Training; *SPQ: Strategic Planning of the Quality; HSQI: Health Services Quality Improvement.

The researcher deals here with the interpretation of the hypotheses of the field study, through the information obtained by the tables of statistical data analysis as well as the results of the statistical analysis to test the hypotheses, and the researcher will interpret the result of each statement separately in order to judge its correctness or lack thereof based on the statistical analysis General, and then test the validity of each hypothesis separately in order to accept or reject that hypothesis using simple linear regression.

The researcher used to test the hypotheses statements the Chi-Square test to

find out the significance of the differences in the responses of the study sample individuals to each of the research hypotheses statements. The following is a discussion and testing of the study hypotheses:

hypothesis: H1a

"There is no statistically significant relationship to the effect of (top manger commitment potentials) For health services quality improvement in the health sector".

hypothesis: H1b

"There is no statistically significant relationship to the effect of (customer focusing potentials) For health services quality improvement in the health sector".

hypothesis: H1c

"There is no statistically significant relationship to the effect of (continuous improvement potentials) For health services quality improvement in the health sector".

hypothesis: H1d

"There is no statistically significant relationship to the effect of (training potentials) For health services quality improvement in the health sector".

hypothesis: H1e

"There is no statistically significant relationship to the effect of (strategic planning of the quality potentials) For health services quality improvement in the health sector".

To prove these hypotheses, the Chi-Square test was used to test the presence of statistically significant differences between the numbers of agreeing, neutral and disagreeing with the previous results on each of the above hypothesis statements, and the results were as shown in Table 8.

Table 8 showed that the value of the chi-square computed that indicated the differences between the numbers of strongly agreeing answers, agreeing, neutral, disagreeing and disagreeing at all for all-hypothesis statements that the value of the chi-square amounted to (159.272-209.839-158.778-138.115-145.624), which is greater than the tabular chi-square value (37.65-27.58-27.58-36.41-32.67) at a degree of freedom (25-17-17-24-21) and the level of statistically significance (0.00). So that and depending on it; this indicates that there are statistically

Table 8. Kai^2 Test for the independent variables of TQM systems with dependent variable HSQI.

Independent variables	*X^2	**DF	***T-V	****P-Value	result
Top Manager's Commitment	159.272	25	37.65	0.000	supported
Customer Focusing	209.839	17	27.58	0.000	supported
Continuous Improvement	158.778	17	37.58	0.000	supported
Training	138.115	24	36.41	0.000	supported
Strategic Planning of the Quality,	145.624	21	32.67	0.000	supported

*X^2 = Chi square Value, **DF = Degree Freedom, ***T-Value = Tubular Value, ****P-Value = prevalence of significance.

significant differences at the less level of (0.05) between the answers and in favor of the corresponding answers.

To ensure acceptance or rejection of the hypothesis, the researcher used linear regression analysis to ascertain the effect of (top manager's commitment, customer focusing, continuous improvement, training, and strategic planning of the quality) of total quality management on Health services quality Improvement in the health sector.

Table 9 that appear the impact of the all axis (top manger commitment, customer focusing, continuous improvement, training, and strategic planning of the quality) on Health services quality Improvement in the health sector, and the existence of a statistically significant effect of this dimension in making Health services quality Improvement in the health sector, as the correlation coefficient reached (R = 0.672-0.601-0.644-0.701-0.774) It is a positive, large, statistically significant direct relationship, where the level of significance was (0.000), while the coefficient of determination (R^2 = 0.452-0.361-0.415-0.492-0.6) that is, 45.2%, 36.1%, 41.5%, 49.2%, 60% of the dependent variables are mainly due to the independent variable (top manger commitment, customer focusing, continuous improvement, training, and strategic planning of the quality potentials As for the rest (54.80%, 63.90%, 58.50%, 50.80%, 40.00%), it is based on other variables, and the degree of influence or tendency reached (B = 0.69, 0.639, 0.729, 0.643, 0.796), which means that (top manger commitment, customer focusing, continuous improvement, training, and strategic planning of the quality) in one degree results in an improvement in Health services quality Improvement in the health sector by 69%, 63.9%. 72.9%, 64.3%, 79.6% respectively. according to the rule of thumb proposed by Muijs (2004).

The significance of this effect is in addition, confirmed by the calculated T value, reaching (15.11-12.513-14.024-16.382-20.372), with a level of significance (0.000), which is less than the level of significance (0.05).

Through the above potential value of Chi square and value probability of T-test and correlation coefficient between two variables and coefficient determination, therefore all hypotheses were accepted and obtained the relationships between independents variables and dependent variable which states that:

Table 9. Independent variables of TQM systems potential on dependent variable HSQI.

H01a-d	*R	**R^2	***β	T-Test	****P-Value	conclusion
TMC X HSQI	0.672	0.452	0.69	15.11	0.000	Impact
CF X HSQI	0.601	0.361	0.639	12.513	0.000	Impact
CI X HSQI	0.644	0.415	0.729	14.024	0.000	Impact
T X HSQI	0.701	0.492	0.643	16.382	0.000	Impact
SPQ X HSQI	0.774	0.6	0.796	20.372	0.000	Impact

*R = Coloration, **R^2 = Factor Determination coefficient, ***β = Beta: degree of influence, ****P-Value = probability value at $\alpha < 0.01$.

"There is statistically significant relationship to the effect of (top manager's commitment potentials) For health services quality improvement in the health sector".

"There is a statistically significant relationship to the effect of (customer focusing potentials) For health services quality improvement in the health sector".

"There is statistically significant relationship to the effect of (continuous improvement potentials) For health services quality improvement in the health sector".

"There is statistically significant relationship to the effect of (training potentials) For health services quality improvement in the health sector".

"There is statistically significant relationship to the effect of (strategic planning of the quality potentials) For health services quality improvement in the health sector".

Hypothesis:

H2: There are statistically significant differences at the level of significance (0.05) between the averages of the study sample's scores on the effect of Health services quality Improvement in the health sector on due to demographic variables (gender, age, academic degree, profession, job, experience).

In order to test the validity of the hypothesis, it requires studying the responses of the study individuals on the impact of Total Quality Management dimensions in the health sector on Health services quality Improvement in the hospitals of the Sana'a Governorate—Yemen for each variable separately, as follows:

For this purpose, the researcher uses a T-test for two independent tests and (one away a nova) for more than two independent variables used to analysis and represent the results. Least Significant Differences Test (LSDT) was used to find out the favor of the differences between the averages of the study sample responses about the instrument diminutions resulting for any one of them from the one way a nova test. P-value < 0.05 is considered statistically significant cut off point.

Table 10 Showed that There are no statistically significant differences at the level of significance (0.05) for Demographical Variables and study diminutions (top management commitment, concentrated on the customers, continuous improvement, training, and strategic planning of the quality, health services quality improvement) due to gender, Job, Experience, except professions with all study variables, age with top management commitment, training and health services quality improvement where P-value less than (0.05) in favor of age > 50 years with mean = 4.36-3.95-4.04 (P-value = 0.006-0.014-0.023), with Qualification there are statistically significant differences with top management commitment and continuous improvement in favor of those who have master and high diploma degree with means = 4.20 - 4.18 (P-value = 0.018 - 0.012), respectively, in addition, the same with qualification in favor of those who have Ph.D. and Bachelor means = 4.35 - 4.0887 respectively.

Table 10. The correlations between demographical variables and study diminutions.

Axis's	Demography	The Commitment of top leaderships		Concentrated on the customers		Continuous improvement		Training		Strategic planning of the quality		Quality improvement	
		Means	P-Value	Means	P-Value	Means	P-Value	Means	P-Value	Means	P-Value	Means	P-Value
Gender	Male	4.07	0.085	4.07	0.688	4.13	0.297	3.57	0.867	3.74	0.989	3.76	0.088
	Female	3.93		4.10		4.09		3.59		3.74		3.61	
Age in Years	<30	4.08		4.10		4.15		3.62		3.91		3.82	
	30 - <35	4.10		4.15		4.16		3.63		3.76		3.68	
	35 - <40	3.81	0.006	3.94	0.089	4.03	0.066	3.61	0.014	3.70	0.140	3.64	0.023
	40 - <45	3.87		3.88		3.95		3.18		3.49		3.36	
	45 - <50	3.62		3.83		3.82		3.24		3.48		3.56	
	>50	4.36		4.33		4.40		3.95		3.90		4.04	
Qualification	diploma	4.11		4.21		4.20		3.61		3.71		3.72	
	BA	3.95		3.99		4.02		3.57		3.75		3.70	
	High Diploma	4.04	0.018	4.07	0.052	4.18	0.012	3.63	0.064	3.52	0.825	3.79	0.059
	Master	4.20		3.98		4.05		3.35		3.71		3.43	
	PhD	3.16		3.53		3.37		2.68		3.36		2.94	
Profession	Physician	3.54		3.66		3.63		3.30		3.62		3.32	
	Nurse	3.95		4.14		4.11		3.46		4.07		3.67	
	Technician	4.32	0.000	4.10	0.000	4.32	0.000	3.85	0.001	3.38	0.000	4.07	0.000
	Pharmacist	3.88		3.73		4.03		3.48		3.94		3.32	
	Other health professions	4.21		4.25		4.27		3.73		3.42		3.81	
Job	Department Manager	4.19		3.98		4.05		3.37		3.53		3.43	
	Deputy Department Manager	3.84		4.02		4.16		3.74		3.54		3.59	
	Head of Section	4.16	0.127	4.26	0.134	4.26	0.275	3.77	0.067	3.91	0.086	3.89	0.066
	Deputy Head of section	3.80		3.90		3.97		3.08		3.57		3.61	
	Other Jobs	3.99		4.05		4.09		3.58		3.74		3.71	
Experience (Years)	<5	4.01		4.10		4.13		3.67		3.80		3.81	
	05 - <10	4.07	0.724	4.10	0.797	4.17	0.605	3.55	0.087	3.69	0.438	3.74	0.055
	10 - <15	3.93		4.00		4.00		3.33		3.68		3.51	
	>15	4.06		4.02		4.09		3.48		3.64		3.47	

4. Discussion

The application of TQM systems in Sana'a Governorate hospitals and their role in Health services quality Improvement remains one of the main goals for the

local health sector leaderships. Adoption for its application and increased the training of health staffs is one of the challenges facing strengthening and developing the process of expanding the application of total quality management in Sana'a specially and in Yemen generally.

In our study, the majority of participants (68.46%) were male, aged < 30 years were (38.71%). Less than 5 years of experience (34.24%). Supervisor job in our study reached to 38.71%. While in other studies were found in United Arab Emirate is (38.80%), postgraduate qualification (47.20%) and supervision job (32.2%), senior staff 55% [17], while in Jordan the male was 39%, 20 - 35 years (47.5%), bachelor (53.8%), 6 - 10 years of experience (29.6%), supervisor job (13.1%), nurses (31.6%) [18], in other comparative study between Jordan and the United Arab Emirates, the results of the demographic variables of the two countries the male was (49.6%), <30 years (49.6%), bachelor (57.4%), supervisor job (51.9%), and <30 years of experience (41.1%), the nurse (13.2%) [19]. While, in Iran the study revealed that male (32%), 41 - 51 years (56%), bachelor's (76.6%), nurse (24.7%) [20]. On the other hand, the study of the impact of TQM in the Dimensions of the Social Responsibility in Jordanian Public and Private Hospitals where the rate of male was (49.5%), <35 years (39.5%), bachelor (60.1%), supervisor job (54.8%) [21]. The difference could be due to the change of cultural and religious customs and traditions of societies and countries and the extent of commitment and preservation, which considers Yemen as one of these conservative societies. In addition, the staffs in Yemen suffered from imbalance distribution of high graduate staffs who preferred the working in main city, and it may be due to the nature of the provided health services and availability of medical equipment's in rural hospitals.

Furthermore, all of those can be explained that the health community in Yemen were younger and productive and enjoyed a good qualification rate and few years of experience may be due to the high turnover of replacement for the staff.

The main limitation in our study was that it was conducted at Sana'a Governorate hospital from the ministry quality teams. Therefore; findings of our study may provide a good evidence-based data to the ministry of public health to develop strategic implementation of the TQM in other Governorate hospitals in Yemen. In addition, the authors were explained these results that may be reflect the migration of new health workers to search for jobs in far areas.

Top manager's commitment in this study revealed high rate which was reached to (80.46%) toward TQM. Similar results were reported from studies in USE research paper that is examines the impact of TQM elements on hospital service quality focusing on accredited hospitals in Dubai, the value of top manager's Commitment (TMC: B = 0.178, t = 4.411, $\rho < 0.01$) [17]. In addition, the studies in Jordon and United state of emirate which appeared the TMC was (74.64%), (76.28%) respectively in favor of USE. [19], While in other study the top manager's commitment means = 3.8 (76%) (P-value = 0.05 < 0.05), [20]. In addition, in other research appeared the top manager's commitment have the high role and effect implementation of TQM [22]. In other study revealed rela-

tion of TQM with customers satisfaction [23].

These results show the highly response of the local health leadership for the choice of governorate from the ministry of public health for the implementation of TQM in direct supervision from the ministry as a pilot before generalized to all health governorate hospitals.

In addition, the findings of this study showed high rate of customer focusing (81.55%) of the hospitals TQM. Similar rates were reported from studies in USE including Customer Focus (CF: B = 0.199, t = 3.676, ρ < 0.01) [17], while in other study like Jordan (79.82%) and in USE (76.36%) in favor in this part for Jordon hospitals [19]. In addition, in another research the customer focus means = 3.7 (74%) (P-value = 0.35 > 0.05) [20].

These results show the ability of these systems to focus on customers which reflect directly on HSQI. Therefore, these findings may be due to the highly supervision from all health sector levels that led to more concentrations on customers.

Furthermore, the findings showed the high rate of continuous improvement components (82.32%) of the hospitals TQM. In similar study the rates were reported from USE including Continuous Improvement (CI: B = 0.296, t = 5.499, ρ < 0.01) [17]. While in Jordan the rate reached to (76%) and USE (77.50%) in favor of USE hospitals [19]. In addition, in another research appeared CI with means = 3.4(68%) (P-value = 0.001 < 0.05) [20].

Those findings mean the continuous improvement in principles of total quality management which line the expectation of customers from Sana'a hospitals leadership and staffs. Those results may be attributed to the accompanied of two factors which was the desired from all to implementation of this pilot with the presence of support from many donors.

Besides, our findings presented with high rate of training of staffs (71.51%) of the hospitals in TQM. However, opposite rates were reported from other countries including USE including Employee Training & Education (ETE: B = 0.010, t = 0.224, ρ > 0.05) [17]. Those findings mean the supported of training of health workers from managers of hospitals which effect on total quality management which by its role reflected directly of the hospitals TQM. While gaps may reflect the highly feeling of the staffs to more training in quality components and other complementary issues.

In addition, the findings showed the high rate of strategic planning of quality (74.76%) of the hospitals TQM.

In addition to other factors measured In USE research paper that is examines the impact of TQM elements on hospital service quality focusing on accredited hospitals in Dubai, the value of Organization Culture (OC: B = 0.373, t = 6.469, ρ < 0.01), Teamwork & Participation (TWP: B = 0.138, t = 2.861, ρ < 0.01), Process Management (PM: B = 0.124, t = 2.247, ρ < 0.05), while Recognition & Reward appeared with no effect on HSQI (RR: B = 0.025, t = 0.718, ρ > 0.05) [17].

Those findings mean the supported of strategic planning of quality from managers of hospitals which effect on total quality management which by role is

reflected directly on TQM. In other hands these data may be related to the good supported from trainers to help these hospitals to accept the skills of developed strategic quality plans in the presence of technical support from the supported donors.

In this research the strong effect of all TQM component on HSQI, similar results appeared in USE study results revealed that the all dimensions of TQM had a positive effect on HSQI, while the training of staff appeared unsupported to the positive effect on HSQI, in addition to the positive effect of CI on HSQI, finally showed the positive effect of CF on HSQI [17]. In other study in Jordon obtained a positive correlation between TQM principles and overall hospital effectiveness (B = 0.881, t = 46.61, R = 0.818, R 2 = 0.669, F = 2172.78, P = 0.000) [18]. While in Palestine the study obtained a positive correlation between TQM principles and Perceived service quality (B = 0.784, t = 13.081, P = 0.000) [24]. In another study In addition, obtained the positive relations between TQM and perceived service quality on patient satisfaction [25], whereas in Bangladesh the study result's appeared that the positive relation of TQM practices on patient satisfaction [26]. In Nigeria the findings indicate a positive relationship between leadership and productivity in organizations. Customer focus significantly affects customer satisfaction and that shared vision by all stakeholders has a significant positive effect on effective service delivery [27].

The hypotheses of this study were tested, and we accepted the hypothesis that confirms the presence of statistically significant differences in the HSQI which is attributed to the axis of TQM. In addition, there is a significant impact between the TQM and HSQI (top manager's commitment = 45.2%, focus on customers = 36.1%, continuous improvement = 41.5%, training = 49.2% and strategic planning of the quality = 60.0%), and the overall impact effect of TQM on HSQ (46.4%).

In other study performed in USE the result revealed that the TQM has a positive effects on hospital service quality while Training of staff appeared unsupported to the positive effect of it on HSQI, in addition to a positive effect of CI on HSQ, finally showed the positive effect of CF on HSQ. [17]. However, other rates were reported from other countries including Kenya, island [28] [29]. This may be attributed to available of quality programmers which implemented in Sana'a governorate hospitals from long time, top management commit, focus on customers, continuous improvement in principles of total quality management which line the expectation of customers, training of health workers in these hospitals, strategic planning of quality.

The study revealed a significant correlation between an overall insignificant relationship between TQM factors and quality healthcare services (P-0.796, Cl, 0.005). In addition, in Iran the study revealed the relation between TQM and service quality gaps components [30].

Our study, showed that there are no statistically significant differences at the level of significance (0.05) for Demographic Variables and study dimension

(top manager's commitment, customer focusing, continuous improvement in principles of total quality management which line the expectation of customers, training of health workers in these hospitals, strategic planning of quality) due to gender, job, experience variable except age with top manager's commitment, training, strategic planning of quality, where P-value less than (0.05), In addition, qualification with top manager's commitment-continuous improvement while with profession there were differences with all TQM Dimensions.

In other study done in island the result obtained that TQM have no statistical significance (P = 0000) relationship with experience P = 0.546, while with job variable appeared effect P-value = 0.041. Top manger commitment, customer focusing and satisfaction, and training had an overall P-value of less than 0.05, making these HSQI principles not statistically significant in association with the TQM knowledge of the participants. These findings suggest that top manager's needs to give these elements more attention during the planning stage of TQM [28]. These results were similar to the studies that were done in Yemen, In addition, in Kenya which found a significant effect during the application of TQM on HSQI [29].

5. Conclusions

HSQI at Sana'a Governorate hospitals continue to suffer from maturation of TQM principles (top manager's commitment, customer focusing, continuous improvement, training, and strategic planning of the quality) and the presence of the top manager's support and well continuous training which associated with continuous improvement and concentrations on the customers in design all these in implemented quality plan will play a major role in achieving the improvement of health services quality. Therefore, raising awareness among hospital leaders of the importance and necessity of enforcing and applying TQM in their hospitals is needed. In addition, establishing and providing advanced training programs, updating and developing the process which focuses on customers in a continuous manner are recommended.

The total quality management in hospitals in Sana'a governorate and in Yemen must be implemented with leadership support who push the wheel of quality forward, enhance the culture of customer focus, create the appropriate environment for continuous improvement, support and respond to the training needs of workers and encourage everyone to develop a strategic plan for quality, which in turn will contribute to improving the quality of health services provided to beneficiaries in hospitals. The study recommended that healthcare facilities should invest in TQM in order to promote the healthcare quality services improvement.

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Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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