

# **Framework for Implementing Quality Management in West Bank Construction Projects**

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## **Abstract**

Firms world-wide are actively engaged to achieve internationally accepted quality levels to ensure their position in the emerging international market especially those from developing economies. Unfortunately the Construction industry, generally, has lagged behind other industries in implementing Total Quality Management (TQM) which provide excellence in customer satisfaction through continuous improvements of products, processes or services. The main reason for construction lagging has been the perception that TQM is for manufacturing and service sectors rather than the construction sector. The objective of this research is to study the implementation of quality management of construction projects in West Bank. Construction sector is considered as a vital sector in today's economy, due to the development in construction which is taking place in the world in general and the West Bank. A survey of 300 contracting companies registered with the Palestinian Contracting Union (PCU) was conducted to establish the current quality management practices and managers perception of factors required for a successful implementation of TQM. The data is analyzed using descriptive Statistics especially the SPSS software. Depending on the distributed questionnaire a framework were developed to facilitate the successful implementation of TQM in construction projects in West Bank, and finally the recommendation from the researcher perspective is written.

**Keywords:** Framework, Quality Management, Construction Projects, West Bank

## **1. Introduction**

Attainment of acceptable levels of quality in the construction industry has long been a problem. Great expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or non-existent quality management procedures especially in construction projects. But we have to keep in mind that the quality issues in construction management is not an easy task because this industry has numerous problems because of its complicated nature of operation, major and minor activities and this industry is comprised of a multitude of occupations, professions and organizations. In Palestine, construction projects can provide a robust platform for refreshing the economy and for building a stable and autonomous economy during steady political conditions. In 1993, neglect of such systems, services, and institutions, however, has harmed the quality of life of Palestinians and their health and environment. But, after Oslo we can assume a period in which the Palestinian authority was formed and seeds for stable economy was merged, that's positively impacted the construction sector. However, project performance in Palestine return to suffering since conflict erupted in September 2000 after the collapse in Israel-Palestinian negotiation on permanent-status issues, in addition to the Jewish breaking in to Al-Aqsa mosque.

### **1.1 Project Management**

Project management, is the application of knowledge, skills and techniques to execute projects effectively within time, cost, and quality, which are called the project management triangle. It's a strategic competency for organizations, enabling them to tie project results to business goals — and thus, better compete in their markets and develop the market share (1). Project management is really important when the project faces changes, either these changes is internal or external, and when we need to make alternative solutions or implement contingency plans, especially in argent cases in which the manager can't keep the original plan. This is especially true in Palestine, which suffers from a considerable instability in political, economic, or even the social condition; project managers face many challenges and must always be creative and flexible in order to deal with difficult and sometimes unforeseen circumstances.

### **1.2 Quality definition**

The British Standard Institution defines quality as “the totality of features and characteristics of a product or service that bear on its ability to satisfy stated and applied needs” (2). Another definition is “fitness for purpose/use”. This

definition is driven by customer satisfaction, and has become the principal definition of quality in manufacturing and service industry (3). A guide to the project management, states that project quality management is a subset of project management that includes the process required to insure that the project will satisfy the needs for which it was undertaken. It consists of quality planning, quality assurance and quality control (PMI, 2000). Quality system is defined as “organizational structures, procedures, processes and resources for implementing quality management (2). W. Edwards Deming defined quality as Good quality means a predictable degree of uniformity and dependability with a quality standard suited to the customer. (4). The underlying philosophy of all definitions is the same which is consistency of conformance to specifications and performance, and keeping the customer in mind. One important definition for quality should be mentioned in this manner which is quality is proportional to variability, in other words, as the quality increased the variability will be decreased (5).

### **1.3 Previous Studies**

Several re-researchers (6; 7) stated that many companies appreciate the necessity of the quality cost system; however, they continue to lack one. As a result, the companies are not able to recognize how much they lose because of poor quality (7). This implies gap between existing theory and practical application regarding quality management. TQM has the potential to improve business results, greater customer orientation and satisfaction, worker involvement and fulfillment, team working and better management of workers within companies. However, construction firms have been continually struggling with its implementation (8). The implementation of a TQM philosophy within the organization requires a cultural change (9) and it's being recognized as an important aspect of total quality development (10).

TQM is greater than sum of quality, quality assurance and total quality. TQM is about continuously improving customer satisfaction by quality-led companywide management system. This goes beyond the mere application of total quality as a form of management itself (11). TQM is a journey and not a destination (12). The definition of TQM varies from organization to organization and even from individual to individual. Accordingly Saylor describe TQM as "both a philosophy and a set of principles "which are the foundation of a continuous improvement of the organization, which gives an implicit picture of philosophical component of TQM based on "continuous improvement" as the heart of TQM in all aspects of the business (13). In construction industry, the quality is generally considered to be very costly, and QC or QC/QA organizations are established only as a result of contractual requirements. In construction industry, production is different from factory or plant production; therefore quality considerations need special care. Especially when the production (construction/installation) is not in place, cost of remedial works may go extremely high if attention is not paid to quality assurance (14).

### **1.4 Quality Assurance and Quality Control**

QA involves establishing project related policies, procedures, standards, training, guidelines, and system necessary to produce quality. The design professional and constructor are responsible for developing an appropriate program for each project. QA provides protection against quality problems through early warnings of trouble ahead. Such early warnings play an important role in the prevention of both internal and external problems; this procedure should be developed before starting the construction phase. On the other hand, quality control (QC) can be defined as the specific implementation of the QA program and related activities. Effective QC reduces the possibility of changes, mistakes and omissions, which in turn result in fewer conflicts and disputes; on other words in this stage we make sure that we are conforming to the original plan, we emphasizing the necessity to stick to the plan to avoid any un-predictable problems. (15).

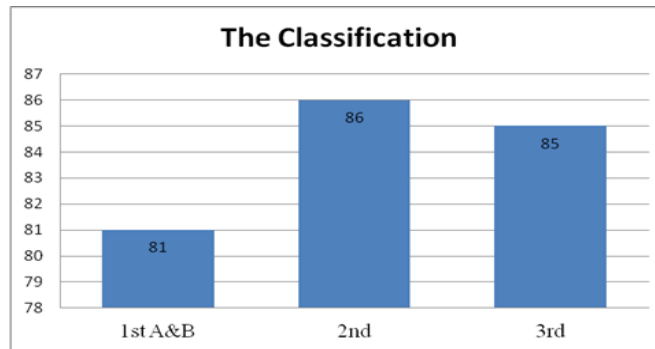
**1.5 The New Model for TQM**

Models	Models	Focuses	Most important elements have an impact on construction industry
<b>TQMEF (TQM-Efficiency) Model</b>	Process & Efficiency, Customer Focused Performance, People Management, Team Building & Business partner Development	Process & Efficiency	Processes, Customer, people management
<b>Oakland Model</b>	(3C) Culture, Communication, Commitment + (4P) Planning, Performance, Processes + People	Commitment	Commitment, Culture, people, processes
<b>MBNQA (Malcolm Baldrige National Quality Award)</b>	Leadership, Strategic Planning, Customer & Market, Information and analysis, Human Resource Focus, Process management, Business Results	Leadership	Leadership, Human Resources, processes
<b>EFQM (European Foundation Quality Management)</b>	Leadership, People, Policy & Strategy + Partnership & Resources + Processes + People Satisfaction+ Customer Satisfaction + Impact on Society + Key Performance	Leadership	Leadership, People, Customers, Processes, Society

**1.6 Construction sector in Palestine**

The construction sector is one of the key economic sectors and the main force motivating the Palestinian national economy. In 1994, the construction sector has witnessed noticeable expansion. This has resulted in the recovery of the construction contracting profession and subsidiary industries; the construction sector has occupied the foremost position among the rest of sectors, mainly attracting investments and creating new jobs (16); Construction sector contributes 33% to the Palestinian gross domestic product (GDP) (16). Employs about 10.8% of laborers directly, and 30% indirectly in factories related to the construction sector and other service and productive sectors. This is a large proportion covered by this sector, thus positively affecting various economic, social, educational and vocational sectors in addition to other Palestinian institutions (17).

The number of members classified contractors throughout West Bank have been (379) (17). According to latest classification made for the year 2009-2010; (381) member have been classified in West Bank (16). In 2011 the number of contractors increased to reach 422 contractors in West Bank(17), Figure 1 illustrates the three main categories A, B and C which represent 252 companies, the contractors in Palestine are classified according to their capital, engineering and technical staff, experience, history of the achieved projects, and other issues.(18).



**Figure 1-1** the Contractors Classification in Palestine. (18).

**1.7 Cost of Quality**

The most important category or model for quality costs is Prevent, Appraisal, and Failure model - PAF, which was first simplified by Feigenbaum in 1956 (19). Prevention costs are incurred to prevent nonconforming units from being produced. The purpose of those costs is to make sure that defects are not occurring in the first place by assuring that standards of organizational quality and customer satisfaction are met. Examples of prevention costs include education and training, continuous improvement efforts, quality administration staff, process control, market research, field testing and preventive maintenance. Appraisal costs come from the costs of necessary activities to check, verify, and determine the actual level of quality achieved relative to the desired levels of customer satisfaction and organizational quality standards. Appraisal costs are incurred to identify the units that nonconforming to standards before these are shipped to the customer. Examples of appraisal costs include receiving or incoming inspection, internal product audit,

inspection activities, inventory counts, quality administration salaries, supplier evaluation and audit reports. Failure Costs, the costs incurred by a company because the product or service did not meet the requirements, standards or the specification, and the product had to be fixed or replaced or the service had to be repeated or even rejected by the client. These failure costs can be further detailed into two sub-groups – internal or external failures. Internal failures include all the costs resulting from the defects or the parts that nonconforming the specification that are found before the product or service shipped to the customer. Examples include scrap, rework, extra inventory, re-design, salvage, corrective action reports and overtime due to nonconforming product or service.

External failures are all the costs incurred by the company resulting when the customer finds the failure or dealing directly with the deficient service. Examples of these costs include warranty, customer complaint administration, replacement product, recalls, shipping costs, analysis of warranty data, customer follow-up and field service departments, claims and dispute, and the worse thing is the implication of such failure which include the bad reputation, and losing in the market share, in addition to lose the quality as a major weapon for reaching and sustaining the competitive advantage.

## 2. Methodology

The researcher chose the three main categories A, B and C; because it was found that about 95% of the total projects' values were executed by the first three degrees of the registered classified contractors (PCU records). Therefore, the researcher decided to focus this study on the contractors of these three degrees because they have the most noticeable effect on the execution of the projects in the West Bank but as aforementioned the other classified contractor will be consulted with inferior priority. The sample consisted of 300 contractors who work in West Bank in the 2013/2014, the respondents is 230. Those contractors aged from 20 to- more than 60 years, their qualifications ranged from (Diploma to Ph.D. and other qualifications). Moreover, the respondents were varied in terms of job title and years of experiences. The demographic variables are shown in Table 2.1 and 2.2.

**Table 2-1** Distribution of Sample According to Study Independent Variables of the Contractor

Variable	Class	Frequency	Percentage %	Rank
Qualification	Diploma	21	9.1	3
	B.A	148	64.3	1
	M.A	51	22.2	2
	Ph.D.	4	1.7	5
	Others	6	2.6	4
Age	20-29	108	47.0	1
	30-39	78	33.9	2
	40-49	24	10.4	3
	50-59	17	7.4	4
	More than 60	3	1.3	5
Job Title	Resident engineer	111	48.3	1
	Quality control manager	12	5.2	5
	General Manager	38	16.5	3
	Director	18	7.8	4
	Others	51	22.2	2
Years of Experience	Less than 5 years	99	43.0	1
	5-9	51	22.2	2
	10-14	36	15.7	3
	15-19	18	7.8	5
	More than 20	26	11.3	4
Total		230	100%	

### 2.1 Instrumentation

To achieve the objectives of the study, the researcher used a 30-item questionnaire adapted from the researcher's own experience in the field of engineering. The questionnaire consisted of three sections; the first one focused on the demographic profile of the contractor and the company such as ( qualification, age , job title, experience , the main-sector of projects that company dealing with, number of projects that the company has accomplished so far , the number of employees that the company has and the number of engineers that the company has) , whereas the second and third ones consisted of the following domains: (critical successes variables (dependent and independent) which can have an impact on quality management, number of barriers for implementing quality management in construction projects, number of benefits for implementing quality management in construction projects and number of techniques

for implementing quality management in construction projects) . The scores of responses to each item were calculated according to a five-point Likert scale, in which strongly agree=5 points, agree=4 points, undecided = 3 points, disagree = 2 points and strongly disagree = 1 point.

## 2.2 Study Barriers

They are many constraints and barriers that faced the researcher during the conduction of the research. The most important barrier was determining the number of the contractors because it is allowed for the contracting companies to have several classifications in different specializations, so one company may be counted several time. Most of the contractors showed lack of cooperation, they considered the research as an academic material lacking the ability to be practiced and implemented; some contractors delegated the answers to office engineers, or to an inferior position in the firm. The researcher had no control to ensure the most appropriate person was assigned by each company to be interviewed although they had done their best. The willingness of the respondents to reveal weaknesses in their respective organization was uncertain due to cultural issues in which persons did not like to show their weakness even if the researcher keep reminding them that this is a research for academic purposes only. Due to work commitment, some respondents could not fully concentrated on during the interview sessions, this caused the intended in-depth interview could not be fully achieved. The contractors did not have enough time to respond due to the work pressure, so the researcher had to keep reminding them to respond to the questionnaire to achieve a good percentage of responsiveness.

**Table 2-2** Distribution of Sample According to Study Independent Variables of the company

Variable	Class	Frequency	Percentage %	Rank
The main-sector of projects that company dealing with	Building	104	45.2	2
	infrastructure	111	48.3	1
	Electro-mechanical	6	2.6	4
	others	9	3.9	3
Number of projects that the company has accomplished so far	0-9	54	23.5	2
	10-49	78	33.9	1
	50-100	44	19.1	3
	more than 100	54	23.5	2
Number of employees that the company have	Less than 50	95	41.3	1
	50-100	48	20.9	2
	100-150	63	27.4	1
	150-200	15	6.5	3
	More than 200	9	3.9	4
Number of engineers that the company have	Less than 5	62	27.0	1
	5-10	60	26.1	2
	10-15	36	15.7	4
	15-20	18	7.8	5
	More than 20	54	23.5	3
Total		230	100%	

## 3. Data Analysis

The data collected were analyzed using Statistical Package for Social Science (SPSS) to provide answers to the questions of the study. Means, frequencies, standard deviations, One-Way Analysis of Variance (ANOVA), were used to find out descriptive statistical analysis. To analyze the findings, the researcher used the following scale to represent the estimation level of contractors' responses: 3.5 and more represent High level, 2.5-3.49 represents medium level, and less than 2.5 represents Low level.

**Table 3-1** Main factors affecting quality management in construction

No.	Item	Means	standard deviations	Estimation level	Rank
1.	Leadership and Top Management Commitment(I)	3.83	1.02	High	7
2.	Overall customer management(I)	3.72	0.88	High	10
3.	Training and education(I)	4.04	0.71	High	2
4.	Skilled work force(I)	4.05	0.94	High	1
5.	People management and empowerment(I)	3.85	0.82	High	5
6.	Supplier partnership (I)	3.81	0.85	High	8
7.	Rewards and recognition(I)	3.84	0.87	High	6
8.	Effective communication(I)	3.88	0.85	High	4
9.	Subcontractors' involvement (I)	3.42	1.04	High	12
10.	Organizational culture (D)	3.84	0.90	High	6
11.	Construction teamwork satisfaction(D)	3.73	0.93	High	9
12.	Client satisfaction(D)	3.72	0.96	High	10
13.	Project performance(D)	3.98	0.95	High	3
Total		3.82	0.63	High	

**Table 3-2** Means and Standard Deviations of the barriers for implementing quality management in construction projects

No.	Item	Means	standard deviations	Estimation level	Rank
1.	Lack of knowledge and skills	4.06	0.89	High	1
2.	Product problems	3.58	0.97	High	9
3.	Turnover in company	3.48	1.16	Medium	11
4.	Lack of consultant supervision	3.64	0.92	High	8
5.	Unrealistic deadline	3.71	1.00	High	5
6.	Worker personality and attitude	3.79	0.96	High	4
7.	Ineffective communication	3.91	0.87	High	2
8.	Lack of coordination between the site and office	3.81	0.98	High	3
9.	Too much of paper work and documentation	3.26	1.28	Medium	13
10.	Problems with sub-contractors	3.70	1.06	High	6
11.	Difficulties in understanding the quality system	3.58	0.96	High	9
12.	Unwillingness of Project Staff to Accept the Quality System	3.45	1.07	Medium	12
13.	Lack of proper equipment and tools	3.70	0.95	High	6
14.	Bad, and hard working conditions	3.42	1.09	Medium	13
15.	Working with inexperienced people	3.67	1.02	High	7
16.	Awarding the contracts to the lowest bidders	3.54	1.25	High	10
17.	Contractors union environment	3.40	0.93	Medium	14
Total		3.64	0.58	High	

**Table 3-3** Means and Standard Deviations of the benefits for implementing quality management in construction projects

No.	Item	Means	standard deviations	Estimation level	Rank
1.	Helps to identify the problems area	3.98	0.93	High	7
2.	Helps in improve cost estimating	4.03	0.76	High	4
3.	Achieve the desired outcomes and keep the customer satisfied	4.02	0.68	High	5
4.	Improve warranty claims	3.87	0.79	High	8
5.	Attain and sustain the competitive advantage	4.05	0.75	High	3
6.	Keep improving the performance	4.16	0.81	High	1
7.	Maintain a consistent level of products and services	4.01	0.75	High	6
8.	Improved safety	4.01	0.83	High	6
9.	Increase the firm market share	4.01	0.83	High	6
10.	Develop the firm image and being a qualified competitor –market position-	4.07	0.91	High	2
11.	Reduced rework	4.02	0.74	High	5
12.	Improved employee job satisfaction	3.84	0.84	High	9
13.	Lower employee turnover	3.66	0.97	High	10
14.	Improved schedule performance	3.95	0.87	High	7
Total		3.98	0.59	High	

**Table 3-4** Means and Standard Deviations of the techniques for implementing quality management in construction projects

No.	Item	Means	standard deviations	Estimation level	Rank
1.	project quality plan	4.03	0.93	High	3
2.	Daily report	3.86	0.89	High	7
3.	weekly or bi-weekly site reports	3.75	0.95	High	6
4.	work method statement	3.98	0.80	High	4
5.	inspection	4.10	0.83	High	2
6.	laboratory experiment	4.18	0.85	High	1
7.	direct supervision	3.92	1.07	High	5
Total		3.97	0.69	High	

**Table 3-5** The responses to the knowledge of quality that contractors' have about implementing quality management in construction project in West Bank

Variable	Class	Frequency	Percentage %
In your opinion, which of these words best define quality?	Fitness to use	66	28.7
	Appearance	18	7.8
	Teamwork	15	6.5
	value for money	24	10.4
	Increase profit	30	13.0
	Satisfying customer	12	5.2
	Reliability	32	13.9
	Inversely proportional to variability, consistency	30	13.0
	Others.	3	1.3
What is your organizations' perception of quality?	Contract Requirement	84	36.5
	Marketing Tool	21	9.1
	Management Approach	62	27.0
	competitive advantage	48	20.9
	Others.	15	6.5
Do you have a quality system in your organization?	Yes	108	47.0
	No	66	28.7
	In process	41	17.8
	Don't know	15	6.5
	Yes	81	35.2

Does your company have a quality department?	No	87	37.8
	In process	44	19.1
	Don't know	18	7.8
Did your company get the ISO certificate?	Yes	48	20.9
	No	114	49.6
	In process	32	13.9
Do you think that achieving the ISO certificate is an indicator for good performance and maintaining a consistent level of quality?	Don't know	36	15.7
	Strongly Agree	83	36.1
	Agree	114	49.6
	Disagree	24	10.4
	Strongly Disagree	6	2.6
Do you think that achieving the ISO certificate is an indicator for good performance and maintaining a consistent level of quality?	Others.	3	1.3
	Strongly Agree	83	36.1
	Agree	114	49.6
	Disagree	24	10.4
	Strongly Disagree	6	2.6
Did you motivate your employees and your engineers to keep the quality concept in mind?	Others.	3	1.3
	always	98	42.6
	never	51	22.2
	sometimes	81	35.2
Does your company award the employee or the engineer who maintain the quality in their performance?	?		
	Yes	83	36.1
	No	72	31.3
	Sometimes	63	27.4
How would you rate the customer satisfaction in your company?	Don't know	12	5.2
	None	21	9.1
	Low	45	19.6
	Medium	57	24.8
	High	72	31.3
From your point of view which is the most important?	Very high	35	15.2
	Cost	45	19.6
	Time	30	13.0
	Quality	98	42.6
	Safety	45	19.6
Will a total quality management TQM program be beneficial to your organization?	Others.	12	5.2
	yes	96	41.7
	No	77	33.5
Total	Don't know	57	24.8
		230	100%



**Table 3-6** The responses According to the data acquisition method

Variable	Class	Frequency	Percentage %
Do you collect data to measure the performance of operations?	yes	96	41.7
	No	77	33.5
	Don't know	57	24.8
How do you measure customer satisfaction?	Not measured	101	43.9
	Questionnaire survey	45	19.6
	By the number of complaints	75	32.6
	Others.	9	3.9
If your company has a quality system, do you think there is a relation between the quality implementation in construction projects and increasing the customer satisfaction?	Yes	155	67.4
	No	36	15.7
	Sometimes	39	17.0
If your company has a quality system, do you think there is a relation between the quality implementation in construction projects and increasing the company performance?	Yes	149	64.8
	No	33	14.3
	Sometimes	48	20.9
Do you think that rating the suppliers/subcontractors based on quality performance is?	Not Significant	36	15.7
	Moderately Significant	45	19.6
	Slightly Significant	66	28.7
	Very Significant	44	19.1
	Exceedingly Significant	39	17.0
Are suppliers/subcontractors rated based on quality performance?	Yes	96	41.7
	No	54	23.5
	Sometimes	56	24.3
	Don't Know	24	10.4
Did the suppliers/subcontractors pay for the defects they made in regard to quality?	Yes	152	66.1
	No	21	9.1
	Sometimes	51	22.2
	Don't Know	6	2.6
Total		230	100%

### 3.1 Results:

Depending on the results that we have found after analyzing the data that we collected through our distributed questionnaire and the interviews that we conducted we can develop the framework that we think it will help in developing the quality perception through the construction projects in West Bank. Based on the results of the distributed questionnaire, we conclude the following which leads to the importance of the proposed framework that we will illustrate in the next chapter:

- \_ 28.7 % of the respondents have no Quality System in their firms and organizations.
- \_ 37.8% of the respondents has no quality department in the organizational structure of their firms.
- \_ 49.6% of the respondents has no ISO-Certificate in their firms and organizations.
- \_ 28.7% of the respondents rating the customer satisfaction with low or none degree which is an evidence of low awareness of customer relation issues and its direct relation with the successful implementing of total quality system.
- \_ 42.6% of the respondents rank the quality as the most important factor among the work factor that affecting the construction project, on the other hand, 41.7% of the sample believe that the TQM will be beneficial for the organization; and that insist the importance of creation a framework that facilitate the developing and implementing a TQM in the construction projects in West Bank.

According to Table 3-1 that discussed the critical factors that affect the implementation of quality system in the construction projects, the highest item with the first rank is the skilled work force with score of 4.05 and this lead to create training program in the construction organizations for the labor and Technicians to increase their abilities, capabilities and skills.

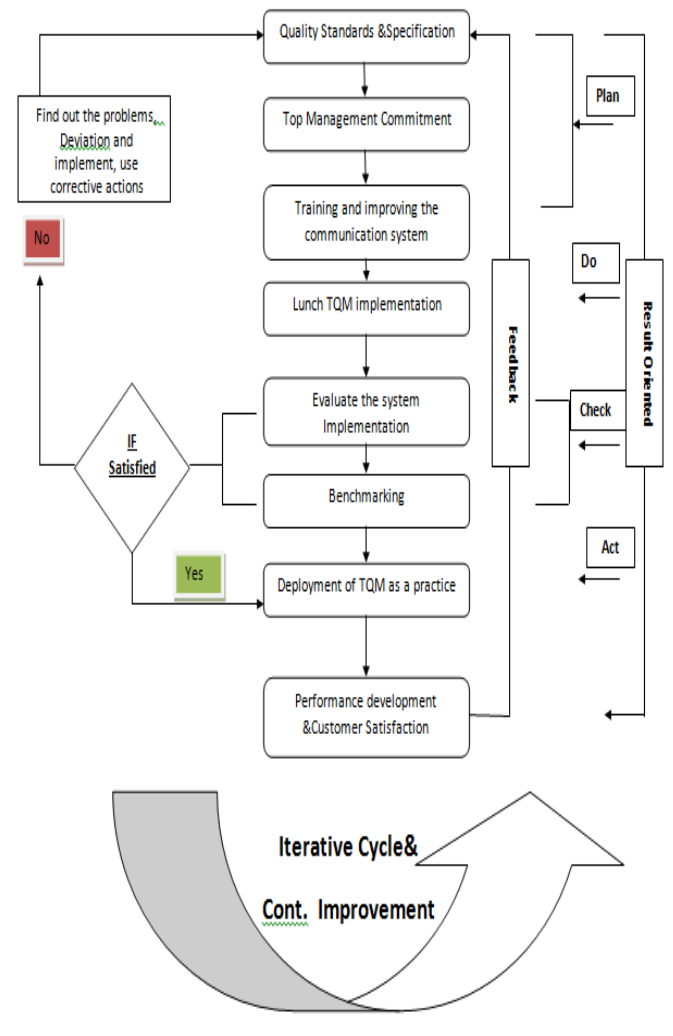
According to Table 3-2 regarding the barriers that faced the quality system in construction projects; the highest rank is the lack of the knowledge and skills which recorded the highest rank with 4.06, in the same way creation of training and internship will be discussed in the framework that will be proposed in the next chapter. Regarding the benefits of implementing quality system in construction project according to Table 3-3 the highest rank is keep improving performance; as a result of that we suggest to make the auditing and feedback of quality as a continues process and to

make the benchmarking in which we compare our current performance with rivals and competitors and in the same time with our performance last periods. Regarding techniques according to table 3-4 the respondents ranked the lap experiment as the most important tool to be used to improve the quality in the construction project, so the top management commitment to conduct the required experiment is very essential to keep an accepted and consistent level of quality in the project.

On the other hand we have to launch a training session for the contractors engineers to improve their perception about the lap experiment to make them consider it as a crucial process to make sure of the quality of the performance, structure and component of materials; rather than consider it as a rubber stamp process, or a routine process with no beneficial result. One more thing that worth to be mentioned is that the daily report, weekly and biweekly reports are the least important technique to enhance the quality issues in the construction project according to our sample. Maybe the contracting companies consider the documentation issue is an exhausting process with no advantage regarding the quality. Despite of the contractors consider the documentation is very useful in the auditing, monitoring issues but not for quality purposes.

#### 4. The Framework

The developed framework is based on the TQM literature, critical success factors perceived by quality managers in construction projects in West Bank basically the information we attained from the distributed questionnaire, and the interviews we conducted with respondents to get a deeper level of understanding about implementing quality management in construction projects in West Bank.



**Figure 4-1** The developed Framework

#### 4.1 Quality standards and specification

Standards are the measures that specify if the product or the final outcomes are accepted or as required, the primary purpose of standards is to protect the public health and safety (15) compliance with standards should be an issue addressed early in the design phase especially in the construction projects. Specification is the set of documents given to the contractor that provide technical information on materials, performance of the constructed project, and quality requirements. Providing the contracting company with these two sets of documents will be very useful toward implementing quality management in construction projects in West Bank.

#### **4.2 Top management commitment**

The successful quality management implementation is highly dependent on the level of top management commitment to this concept and how much they concern about implementing the quality in their projects. This requires that top management commitment to quality must convey the philosophy that quality will receive a higher priority over cost or schedule, and that on the long run, consistent, permanent and superior quality will lead to improvement in cost and delivery performance.

#### **4.3 Training and improving the communication system**

Feigenbaum (1961) pointed out that the importance of training is to ensure that the skills of the workforce do not become obsolete in a dynamic environment of change, in other words to develop the skills, refreshing the information and increasing the knowledge. In contrast to the prevailing assumption, TQM training should be directed at all levels of the organization since senior managers who understand the TQM process are not only able to break down barriers within their own organizations, as we aforementioned that the top management should set the examples they want the others to live by, and they can also serve as role models for others who may resist to change.

In construction sector in Palestine as we noticed through the distributed questionnaire there is lack in recognition to the training significance as a pivot tool to achieve the required level of quality throughout the construction projects in West Bank. On the other hand, Effective communication is part of the cement that holds together the bricks of the total quality process. In Construction sector in West Bank, its noticeable the defects in the communication and even the coordination issues especially in the large projects, lack of communication can generate a distrust situation between the office and the site, that will lead to critical problems that can negatively affect the project and the construction firm as all, so in our framework we highly consider the communication issues.

More than one initiative tried to improve communication and flow management (20), others endeavored to enhance say briefing, designing or tendering activities (21). They either addressed only one or two quality issues, such as communication issue; here we are trying to develop a comprehensive framework to facilitate the implementation of quality throughout the construction projects; as a result of that the communication issue should be deeply discussed.

#### **4.4 Lunch TQM implementation**

In this stage we moving from the planning phase to the implementation phase, in which we make a projection from the plans and instruction to the project site, in this phase we have to make sure that we are not deviating away from the approved plans, we have to keep the agreed direction, or at least implement with in-noticeable differences.

#### **4.5 Evaluate the system Implementation**

In this stage we evaluate the implementation process, checking the initial indications that we have for the implementation phase, this stage could be considered as go or not go indicator if the initial results is inadequate so we have to stop right there, before more losses, or at least using another plan that could be more consistent with the current situation on the other hand and if the initial results is satisfied we have to go through the whole process.

#### **4.6 Benchmarking**

In this stage we compare our firm, or project and its performance indicators to other related competitors, or even our performance in the past to see the differences . Dimensions typically measured are quality, time and cost. This then allows our firm to develop plans on how to make improvements or adapt specific best practices, usually with the aim of increasing some aspect of performance. In this stage and previous one we can crystallize a clear decision, if we are going deeper in this framework or go back and make essential, or slight changes to make a noticeable improvement for our project performance related to quality issues.

#### **4.7 Deployment of TQM as a practice**

If we are satisfied with the results that we have found through the last two stages then we have to deploy the quality as dominant tendency in our construction projects. The main core for this step is to make the quality management as a practice rather than an event, A review of the essential elements of TQM, and based on the questionnaire results

exposed a lack of practical application of the processes within the construction industry. The main factors included a lack of adequate budget, failure to plan adequately for quality, inadequate training at all levels except for top or senior management positions, and little recognition given to those who strive for quality improvement on their projects.

The proposed framework is an iterative process, due to the complexity inherent in the construction projects. So what we trying to do through this framework is to make the quality implementation in construction projects as prevailing pattern that everyone related to the project committed to.

## **5. Recommendations**

The following are practical recommendations to the all interested institutes; owners and to contractors which could lead to better quality system practices in West Bank:

1. The funder is recommended to introduce polices toward awarding tenders to the most accurate cost and not necessarily to the lowest price, the accurate cost for sure will take into account the quality issues.
2. The funder, owner, or generally the client is advised to make high control and upgrade the contracts items and do not allow any violation regarding the quality issues, and to motivate the contractors not to treat the quality issues as a contractual requirement, but to encourage him to stick to the quality management concepts.
3. It is highly recommended to PCU and Association of Engineers to conduct continuous training and education programs through training courses, lectures, seminars, and workshops that helps them to be familiar with quality concepts and primarily its benefits. These training programs aim to increase contractors realizing and understanding of quality importance and to improve their practices for future quality management.
4. Contractors are advised to review all contracts documents very well before signing the contract. They should give themselves enough time to study these documents and make necessarily site visits to take a good picture of the contract conditions and the quality issues related to the proposed work. Moreover, they should take advice, support, and assistance from experts to explain any ambiguous item or unclear sentences, moreover they should review the method of statement they submitted to the consultant this method of statement should be reliable and applicable.
5. Contractors are advised to move seriously toward achieving a comprehensive quality system in their organizations, that include creating a quality department in the organization structure; hiring a quality control engineers; and to achieve a certified degrees in quality commitment the ISO certificate as an example.
6. Contractors should think deeply before making any sub-contracting with other firms, evaluate the situation and the condition, if it's beneficial or it will harm the firm interest and damage the quality system of the firm, this may lead to lose the competitive advantage of being a considerable rival in the construction sector.
7. The contractors should think deeply about the tradeoff of the projects component, because the quality is more important than the cost in some cases to keep the firm reputation, so they have to judge after evaluating the whole situation rather than thinking based on the cost perspective.
8. Successful implementation of TQM in the construction projects can be achieved through developing effective quality management system, persistence, and positive hands on leadership. Accomplishment in quality performance requires that top management should be dedicated to that ambition. In other words, those in top management must provide the initiative, direction commitment, resources for successful quality assurance practices and must support the quality program in the organization if such a program is to be successful.

### **5.1 Future Research**

Future research should look at performance of quality management practices of these firms in relation to customer satisfaction, employee satisfaction and product adequacy (quality and organizational efficiency in relation to cost and time). And again, further studies should look at the relationship between the factors and with the performance of quality management practices. Maybe make a research of trading off the projects component through the construction project on quality based, in which a criterion should be established to prioritize the trading off throughout the project life cycle or phases. One more research is the effect of human factor on the quality issues in the construction project in West Bank, in other words how can the human touch affect the quality in construction in West Bank, or evaluating the current status of the quality issues in the construction projects in West Bank, or assessment for the most important barriers affecting the deployment of quality concept in the construction sector in the Palestinian state.

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