

Title: Total Quality Management Practices In Rhd: A Case Study

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ABSTRACT

RHD, a public organization under the Road Transport and Highways Division of the Ministry of Road Transport and Bridges is responsible to enhance the traffic capacity and safety for efficient transshipment of goods and passengers on transnational boundary, national, regional, and Zilla highways. But in recent years the quality of works and services of RHD has failed to meet the standard required by the specifications. With this background the objective of this report is to evaluate the use of TQM tools to improve the performance of the supply chain in RHD. Primary data were collected through questionnaires survey from 34 engineers of different grades and secondary information were collected from the RHD website, journals, magazines, and different publications. Analysis shows to ensure quality in RHD it is necessary to conduct Quality Assurance Audit (QAA) through a third party. Also, an intensive and robust training program regarding TQM must be introduced for all levels of employees. Moreover, it is important to conduct studies with the uses of new technologies like IoT, AI, Block chain, etc. to improve quality-related difficulties and other supply chain processes in RHD to face upcoming challenge with the help of TQM approach in order to ensure value for money for the public fund.

Keywords

Total quality management, Roads and Highways Department, Quality assurance audit, Public service organization, Value for money

Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020

Introduction

The total quality management (TQM) process is considered as a modern system in the field of quality after quality control, quality assurance, and ISO in the public sector. Recently many public organizations have utilized the implementation of total quality management, with a view to evaluate the level of quality and to improve it. A quantitative research approach was adopted in this study, where the questionnaires were distributed to 60 engineers through 'Google form' but questionnaires returned with completed form from 34 engineers. For analyzing purpose chi-square tests, frequencies, and response rates are used in this report. RHD has a sustainable capacity to plan, manage, and deliver its full range of responsibility in respect of the main road and bridge network and to be accountable for these duties. RHD's supply chain is extremely fragmented; its process is somehow different. Total Quality Management has proved to be a useful tool in ensuring the achievement of set standards and successful serviceability improvement in the public service sector. It is believed that the benefits of higher user satisfaction, better quality in road construction are often obtained following the adoption of TQM by the public sector like RHD.

Materials And Methods:

There are around 400 engineers work in RHD. Data was collected from these engineers with respect to the objectives and aims of this study. Out of the 60 Questionnaires that were the distribution to engineers, 34 engineers returned the questionnaires completed; giving the response rate 57%.

Development Of Questionnaires

To find out TQM practice in RHD, in questionnaires, 38 nos of questions were prepared, which consist of six parts. Part one for the general information of respondent, part two for concern for TQM, part three considers a Quality perspective organizational improvement, part four for Data Acquisition of TQM, part five for Improvement strategy regarding quality and part six for others.

Requirements Of Data

The requirements of data collected were dictated by the method of data analysis for this study. In view of the analysis procedures, the data as collected from different grades of engineers of RHD by using structured questionnaires. The questionnaires were distributed to 34 engineers of RHD questions regarding the quality and TQM practice in RHD. Each questionnaire was divided into six parts consisting of thirty-eight questions. The data collected were analyzed using the chi-square values, ranking, percentage, arithmetic mean, and frequency and with the level of significance at 0.05. Each part of the questionnaires is explained thus:

Part one of the questionnaires (5 questions) for general information like Name, Job title, job role, present position, and overall experience.

Part two of the questionnaires (8 Parameters) pertains to the concern about TQM gives the parameters relating to the best definitions of quality, quality management tools, understand TQM, quality accountability, long-term quality outcome. TQM works in RHD, the purpose of TQM, TQM program in RHD.

Part three of the questionnaires (7 Parameters) captures parameters relating to the Quality perspective organizational improvements- i.e perception of quality, the importance of service quality, measure user satisfaction, gathering user suggestions, rate the potential for improving quality improvement program, prefer in order of importance.

Part four of the questionnaires (6 Parameters) depicts the variables that help in data acquisition of TQM for the organizations; methods such as collect data to measure the performance, how the organization solves the quality-related problems how to rate user satisfaction. Are employee empowered to make signified changes, percentage of employee awareness of the importance of quality, types of quality improved program organization have.

Part five of the questionnaires (7 Parameters) present the improvement strategy regarding quality asking questions about formal training gives to the employees, are organization rated supplier, employee involvement in TQM implementation, about the quality audit.

Part six of the questionnaires (5 Parameters) presents the others asking questions about the approach of the organization during construction, approach in decision making, Contractor's quality approach, time-based management system, and finally obstacles in the implementation of TQM program.

Collection Of Data

The data collected from 34 engineers of different grades of RHD as detailed below and information has been utilized for further analysis. Table 1.1.1 shows the status of questionnaires that were distributed to the engineers. The response rate is 57 percent which is considered to be acceptable.

Data Analysis

The Chi-square test of independence was used in this study for data analysis. In response to the object to this study, chi-square values and the arithmetic mean were calculated for all five parts of the questionnaires relating to the effectiveness of the implementation of TQM rules and principles, the chi-square value identifies the significance level of the statistical indication of data analyzed. If the draw out chi-square values more or equals the scheduled chi-square values at the indication level of (0.05) which equals 3.84, this means that there are differences of statistical indication in favor of the higher repetition of the answer and indicates also that the said the higher answer is affecting more than other answers but if the chi-square values are less than the scheduled chi-square values amounting to 3.84, this means that there are no differences of statistical indications and that all answers are having the same effect.

1.6(I) PART-1: GENERAL INFORMATION

RHD is a specialized department of Government of Bangladesh, which main responsibility is to build roads, bridge and culvert, and ferry operations. At present, there is a different grade of graduate engineer works in RHD. They are Assistant Engineer, Sub-Divisional Engineer, Executive Engineer, Superintending Engineer, Additional Chief Engineer, and Chief Engineer. A total number of sanction post for graduate engineer were 523, but regular graduate engineer are around 400. So, distributed questionnaires to 60 number engineers and questionnaires return from 34

number of engineers. In General Information there are name, job title, job role, present position, and overall experience. Distributed questionnaires to Assistant Engineer to Additional Chief Engineer. But as Executive Engineer, are working in mainly field level 22% of responded is Executive Engineers.

1.6(II) PART-3: CONCERN ABOUT TQM

In order to establish the knowledge base of the respondent in the field of TQM, the respondents were asked to identify answers to questions asked based on their experience. From Table 1.2.1, it is observed that sixty-seven (67%) engineers defined quality as conformance to standards. It could be perceived from this analysis that conformance to standards must become the focus of overall thinking for continuous process in improving quality. Twenty three (23) engineers believe that RHD has formal quality management tools, while twenty-seven respondents (79%) have an idea about long-term quality outcomes. However, only 12% of engineer respondents that fit for purpose defines quality. When the engineers were asked the question "Do you think that TQM will work in RHD?", seventeen i.e half of respondents (50%) felt that TQM will work to some extent, while thirty-eight (38%) of respondents believed that TQM will work very well in RHD.

Most of the Engineers (94%) believe that the TQM program will be beneficial to the organization. 73% of them said that TQM can be used in construction management and 21% stated that it can be used to improve project design.

According to Table 1.2.2: question eight 'do you understand word TQM?' obtained rank one as it is chi-square value reached 56.87 as a result of the higher repetition answers by respondents, whereas the second rank was occupied by question nine; Do you know quality accountability? as its chi-square value reached 51.38 and the most frequent variable was "Yes". The most frequent variable for question twelve 'what is the purpose of TQM in RHD to improve' was "construction management" obtaining the third rank as its chi-square value reached 45.76.

The fourth rank was question seven 'Has RHD a formal quality management tools' as its chi-square value reached 34.84. The most frequent variable for question eleven; 'Do you think that TQM will work in RHD?' was to some extent obtaining the fifth rank as its chi-square value reached 34.26. The sixth rank was question six "which words best define quality?", as it's chi-square value reached 33.53. Question ten "Do you have an idea about the long-term outcome?" obtaining the seventh rank as its chi-square value reached 32.63, and finally question thirteen 'would a TQM program be beneficial in your organization, which obtained the eighth rank as its chi-square value reached 26.48 that is the lowest significance.

Table 1.1.1: Total Number of Questionnaires distributed to the Engineers

Grande of Engineers	Total No. of Engineers	Questionnaires Distributed	Questionnaires Returned and Analyzed
Different grade	400	60	34

Question no. 1 to 5 as Name, Job title, Job role, Present position
and overall experience

Table 1.2.1: Concern about TQM

No. Question	Freq.	Ranking	Response Rate
6. Which words best define Quality			
1. Conformance to Standards	23	1. Conformance to Standards	67 %
2. Satisfying User	5	2. Satisfying User	15 %
3. Fit for Purpose	4	3. Fit for Purpose	12 %
4. Others	2	4. Others	6 %

No. Question	Freq.	Ranking	Response Rate
7. Has RHD a formal quality management tools ?			
0. 1. Yes	23	1. 1. Yes	67 %
2. 2. No	6	2. 2. No	18 %
2. 3. Can't say (Undecided)	4	3. 3. Can't say	12 %
4. 4. Others	1	5. 4. Others	3 %

No. Question	Freq.	Ranking	Response Rate
8. Do you understand word TQM ?			
0. 1. Yes	32	1. 1. Yes	94 %
2. 2. No	2	2. 2. No	6 %
2. 3. Can't say	0	3. 3. Can't say	0 %

No. Question	Freq.	Ranking	Response Rate
9. Do you know quality accountability ?			
4. 1. Yes	31	5. 1. Yes	91 %
2. 2. No	2	2. 2. No	6 %
6. 3. Can't say	1	7. 3. Can't say	3 %

No. Question	Freq.	Ranking	Response Rate
10. Do you have idea about long-term Quality outcome?			
8. 1. Yes	27	9. 1. Yes	79 %
2. 2. No	3	2. 2. No	12 %
10. 3. Can't say	4	11. 3. Can't say	9 %

No. Question	Freq.	Ranking	Response Rate
11. Do you think that TQM will work in RHD ?			
12. 1. Very well	13	3. 1. To some extent	50 %
2. 2. To some extent	17	2. 2. Very well	38 %
2. 3. Won't work	2	2. 3. Won't work	6 %
3. 4. Can't say	1	3. 4. Can't say	3 %
14. 5. Others	1	15. 5. Others	3 %

No. Question	Freq.	Ranking	Response Rate
12. What is the purpose of TQM in RHD to improve ?			
16. 1. Project design	7	1. Construction Management	73 %
2. 2. Cost estimating	0	2. 2. Project design	21 %
2. 3. Construction Management	25	2. 3. Others	6 %
18. 4. Others	2	19. 4. Cost estimating	0 %

No. Question	Freq.	Ranking	Response Rate
13. Would a TQM program be beneficial to your organisation ?			
20. 1. Yes	32	21. 1. Yes	94 %
2. 2. No	0	2. 2. Can't say	6 %
22. 3. Can't say	2	23. 3. No	0 %

Table 1.2.2: Ranking Dimension of Concern about TQM by using chi-square value

Q.No.	Question Statement Dimension / Variable	Arithmetic Mean	Chi-square Values	Level of Significances	Rank
8.	Do You understand word TQM	11.30	56.87	Significance	1
9.	Do you Know Quality accountability	11.30	51.38	Significance	2
12.	What is the purpose of TQM in RHD to improved?	8.50	45.76	Significance	3
7.	Has RHD a formal quality management tools	8.50	34.48	Significance	4
11.	Do you think that TQM will work in RHD	6.80	34.26	Significance	5
6.	Which words best define quality	8.50	33.53	Significance	6
10.	Do you have idea about long-term outcome	11.30	32.63	Significance	7
13.	Would a TQM Program be beneficial in your Organisation	17.00	26.48	Significance	8
	General Arithmetic Mean	10.40			

Table 1.3.1: Quality Perspective organisation improvement

No. Question	Freq.	Ranking	Response Rate
14 What is RHD perception of quality ?			
1. Elimination of defects	16	1. Elimination of defects	47 %
2. A tool to increase profits	2	2. A Competitive advantage	32 %
3. A Competitive advantage	11	3. Others	15 %
4. Others	5	4. A tool to increase profits	6%

No. Question	Freq.	Ranking	Response Rate
15. How would you rate the importance of service quality ?			
24. 1. Very important	28	1. Very important	82 %
2. 2. Important	4	2. 2. Important	12 %
2. 3. Somewhat Important	6	4. 3. Not important	3 %
3. 4. Not important	1	5. 4. Can't say	3 %
26. 5. Can't say	1	27.	

No. Question	Freq.	Ranking	Response Rate
16. How do you measure user satisfaction ?			
28. 1. Questionnaire survey	16	29. 1. Questionnaire survey	47 %
2. 2. By the number of complaints	11	2. 2. By the number of complaints	32 %
2. 3. Other method	3	4. 3. Not measurable	12 %
30. 4. Not measurable	4	31. 4. Other method	9 %

No. Question	Freq.	Ranking	Response Rate
17. Do you have a system for gathering user suggestion ?			
32. 1. Yes	14	33. 1. No	47 %
2. 2. No	16	2. 2. Yes	41 %
2. 3. Can't say	3	4. 3. Can't say	9 %
34. 4. Others	1	35. 4. Others	3 %

No. Question	Freq.	Ranking	Response Rate
18. Rate the potential for implement within the following process?			
1. On site supervision	8	1. On site supervision	21 %
2. Testing procurement and job site	7	2. Testing procurement and job site	20 %
3. Certification of materials	5	3. On-site safety management	20 %
4. On-site safety management	7	4. Certification of materials	16 %
5. Personal Management of employees	3	Coordination with other members of project	14 %
5. Coordination with other members of project	4	6. Personal Management of employees	9 %

No. Question	Freq.	Ranking	Response Rate
19. Does RHD have a quality improvement program?			
1. A quality improvement program implemented recently	89	1. Such plan is under consideration	29 %
2. 2. Such plan is under consideration	10	2. 2.5. Can't say	27 %
2. 3. No	6	2.5. A quality improvement program	27 %

				implemented recently		
	39. 4. Can't say		9	40. 4. No		17 %
	No. Question		Freq.	Ranking		Response Rate
20.	Which one would you prefer in order of importance ?					
	1. Cost		8	1. Quality		30 %
	2. Scope		7	2. Safety		24 %
	3. Time (Schedule)		5	3. Time (Schedule)		23 %
	4. Quality		7	4. Cost		15 %
	5. Safety		4	5. Scope		10 %

Table 1.3.2: Significance of Dimensions Quality Perspective Organisation Improvement by Using Chi-square Value

Q.No. in Questionnaires	Question Statement Dimension / Variable	Arithmetic Mean	Chi-square Values	Level of Significances	Rank
15.	How would you rate importance of service Quality	6.80	83.94	Significance	1
17.	Do you have a system for gathering user suggestion	8.50	20.36	Significance	2
14.	What is RHD Perception of Quality	8.50	13.77	Significance	3
16.	How do you measure user satisfaction	8.50	13.30	Significance	4
18.	Please rate the potential for improvement with the following processes	5.67	3.41	Not Significance	5
20	Which one would you prefer in order of importance	6.80	3.36	Not Significance	6
19.	Does RHD have a quality improvement program	8.50	1.06	Not Significance	7
	General Arithmetic Mean	7.61			

Table 1.4.1: Data Acquisition of TQM

	No. Question		Freq.		Ranking		Response Rate
21.	Do you collect data to measure the performance of RHD ?						
	1. Yes		14		1. No		53 %
	2. 2. No		18		2. Yes		41 %
	3. Can't say		2		3. Can't say		6 %

	No. Question		Freq.		RankingResponse Rate	
22.	How does your organisation solves quality related problem ?					
	41. 1. Assign individual to solve		6		1. Set-up multidisciplinary team for each problem	41 %
	2. Set-up multidisciplinary team for each problem		14		2. 2. A permanent team is available	23 %
	2. 3. A permanent team is available		8		3. Assign individual to solve implemented recently	18 %
	43. 4. Other		6		44. 4. Other	18 %

	No. Question		Freq.		Ranking		Response Rate
23.	How would you rate user satisfaction ?						
	45. 1. Very important		19		46. 1. Very important		56 %
	2. 2. Important		11		2. 2. Important		32 %
	3. 3. Somewhat important		3		3. 3. Somewhat important		9 %
	2. 4. Not important		1		2. 4. Not important		3 %
	47. 5. Can't say		0		48. 5. Can't say		0 %

	No. Question		Freq.		Ranking		Response Rate
24.	Are employees empowered to make significant changes in construction, operation or methodology ?						
	49. 1. Full empowered		13		1. Only key personal are empowered		41 %
	2. 2. Only key personal are empowered		14		2. 2. Full empowered		38 %
	3. 3. Empowered is not need		0		3. 3. Can't say		12 %
	2. 4. Can't say		4		2. 4. Others		9 %
	50. 5. Others		3		1. 5. Empowered is not need		0 %

	No. Question		Freq.		Ranking		Response Rate
25.	Percentage of employees who are aware of the importance of quality ?						
	52. 1. 100 %		9		53. 1. 50 %		36 %
	2. 2. 50 %		12		2. 2. 100 %		27 %
	3. 3. 25%		6		3. 3. 25 %		18 %

2. 4. 0%	1	2. 4. Others	16 %
54. 5. Others	6	55. 5. 0 %	3 %

No. Question	Freq.	Ranking	Response Rate
26. What type of quality improvement program do you have ?			
56. 1. TQM	0	57. 1. QC/QA	94 %
2. 2. ISO 9000	2	2. 2. ISO 9000	6 %
3. 3. QC/QA	32	3. 3. TQM	0 %
58. 4. Others	0	59. 4. Others	0 %

Table 1.4.2: Significance of Dimensions of Data Acquisition of TQM by using chi-square Value

Q.No. in Questionnaires'	Question Statement Dimension / Variable	Arithmetic Mean	Chi-square Values	Level of Significances	Rank
26.	What type of quality improvement program do you have	8.5	5.07	Significance	6
23.	How would you rate user satisfaction	6.8	23.34	Significance	3
24.	Are employees empowered to make significance changes in operations	6.8	12.27	Significance	4
21.	Do you collect data to measure the performance of RHD	11.30	86.94	Significance	1
25.	Percentage of employees who are aware of importance of quality	6.8	9.82	Significance	5
22.	How does your organisation solves quality related problem	8.5	38.35	Significance	2
	General Arithmetic Mean	8.12			

Table 1.5.1: Improvement strategy regarding quality

No. Question	Freq.	Ranking	ResponseRate
27. Are RHD rated supplier ?			
1. Yes	13	1. No	45 %
2. No	15	2. Yes	39 %
3. Can't say	4	3. Can't say	12 %
4. Others	2	4. Others	4 %

No. Question	Freq.	Ranking	Response Rate
27. It defects in works are identified then contractor are contractually liable to correct this ?			
60. 1. Yes	32	61. 1. Yes	94 %
2. 2. No	1	2. 2. No	3 %
3. 3. Can't say	0	3. 3. Others	3 %
62. 4. Others	1	63. 4. Can't say	0 %

No. Question	Freq.	Ranking	Response Rate
29. Is formal training in TQM or other quality improvement philosophies give to employees ?			
64. 1. No. training is given	7	65. 1. Some training is given	68 %
2. 2. Some training is given	23	2. 2. No. training is given	20 %
3. 3. A formal training program is given	4	3. A formal training program is given	12 %
66. 4. Others	0	67.	

No. Question	Freq.	Ranking	Response Rate
30. Employee involvement is critical to successful TQM implementation ?			
68. 1. Yes	19	69. 1. Yes	56 %
2. 2. No	9	2. 2. No	26 %
3. 3. Can't say	6	3. 3. Can't say	18 %

No. Question	Freq.	Ranking	Response Rate
31. Training and development of staff is integral to effective TQM implementation ?			
70. 1. Yes	31	71. 1. Yes	91 %
2. 2. No	1	2. 2. No	6 %
3. 3. Can't say	2	3. 3. Can't say	3 %

No. Question	Freq.	Ranking	Response Rate
32. Do you heard about quality audit ?			
72. 1. Yes	32	73. 1. Yes	94 %
2. 2. No	2	2. 2. No	6 %
3. 3. Can't say	0	3. 3. Can't say	0 %

No. Question	Freq.	Ranking	Response Rate
33. Do you believe that quality audit improve the performance of RHD ?			
74. 1. Yes	31	5. 1. Yes	91 %
2. 2. No	1	2. 2. Can't say	6 %
3. 3. Can't say	2	3. 3. No	3 %

Table 1.5.2: Significance of improvement strategy regarding quality by using chi-square Value

Q.No. in Questionaries	Question Statement Dimension / Variable	Arithmetic Mean	Chi-square Values	Level of Significances	Rank
28.	If detect in works are identified then contractor are contractually liable for correct this	8.50	86.71	Significance	1
32.	Do you heard about quality audit	11.30	56.87	Significance	2
33.	Do you believe that quality audit improve the performance of RHD?	11.30	51.38	Significance	3.5
31.	Training and development of staff is integral to effective TQM implementation	11.30	51.38	Significance	3.5
29.	Is formal training in TQM given to employees	11.30	18.47	Significance	5
27.	Are RHD rated supplier	8.50	14.70	Significance	6
30.	Employee involved is critical to successful TQM implementations?	11.30	8.21	Significance	7
	General Arithmetic Mean				

Table 1.6.1: Others

No. Question	Freq.	Ranking	Response Rate
34. Which of the following approach RHD is taken during construction works ?			
1. Quality Control	10	1. Quality assurance	47 %
2. Quality assurance	21	2. Quality Control	44 %
3. Others	3	4. Others	9 %

No. Question	Freq.	Ranking	Response Rate
35. What approach RHD follows in decision making ?			
1. Top-down	27	1. Top-down	79 %
2. Bottom-up	5	2. Bottom-up	15 %
3. Employee himself	0	3. Others	6 %
4. Others	2	4. Employee himself	0 %

No. Question	Freq.	Ranking	ResponseRate
36. Is there any contractor's quality approach ?			
1. Yes	9	1. No	53 %
2. No	18	2. Yes	26 %
3. Can't say	6	3. Can't say	18 %
4. Others	1	4. Others	3 %

No. Question	Freq.	Ranking	ResponseRate
37. Is there any time based management system in RHD ?			
1. Yes	17	1. Yes	50 %
2. No	10	2. No	29 %
3. Can't say	6	3. Can't say	18 %
4. Others	1	4. Others	3 %

No. Question	Freq.	Ranking	Response Rate
38. Obstacles in the implementation of TQM program ?			

1. Rigid attitude of RHD engineers	2	1. Lack of education and training	35 %
2. Lack of education and training	12	2. Lack of expertise	26 %
3. Too much document / commitment	2	3. Lack of employee Commitment	18 %
4. 4. Lack of employee Commitment	6	4. Others	9 %
5. Lack of expertise	9	Rigid attitude of RHD engineers	6 %
5. Others	3	6. Too much document / commitment	6 %

Table 1.6.2: Significance of others dimension's by using chi-square Value

Q.No. in Questionaries	Question Statement Dimension / Variable	Arithmetic Mean	Chi-square Values	Level of Significances	Rank
35.	What approach RHD following in decision making?	8.50	55.17	Significance	1
36.	Is there any contractor's quality approach	8.50	18.01	Significance	2
37.	Is there any time bound management systems	8.50	16.06	Significance	3
38.	Obstacles in the implementation of TQM program	5.67	15.07	Significance	4
34.	Which approach RHD is taken during constructions works	11.30	6.58	Significance	5
	General Arithmetic Mean	8.50			

1.6(iii) PART-3: QUALITY PERSPECTIVE ORGANIZATION IMPROVEMENT

The Quality Perspective Organization Improvement is important to proper TQM practice as such, it was a measure to identify the visions of the respondents on quality. From Table 1.3.1 it is observed that when engineers asked about organization "perception of quality 47% believe that it elimination defects". When engineers were asked about how you rate the importance of service quality 82% felt that they rate it very important. While 47% of engineers considered that they measure user satisfaction through questionnaires survey. Sixteen respondents (47%) indicated that they have no system for gathering user suggestions however 41% believe that they have a system for gathering user suggestions. sixteen engineers (21%) considered that the potential for improving processes is on-site supervision. When respondents asked about quality improvement program ten engineers (29%) replied that such a plan is under consideration. Finally, they were asked to rank in order of importance, 30% engineers rank the importance as quality, 24% engineer prefer safety 21% prefer time, 15% prefer the cost and 10% prefer scope as importance.

Table 1.3.2 below shows that: question fifteen "How would you rate the importance of service quality" obtained rank one as its chi-square value reached 83.94 and the most frequent variable was "very important". Whereas the second rank was occupied by question seventeen "Do you have a system for gathering user suggestions?" as its chi-square value reached 20.36. When engineers were asked about RHD perception of quality, 47% believe that it eliminates of defects. When they were asked "How do you measure user satisfaction sixteen engineers (47%) replied that they came to know through questionnaires survey while eleven engineers (32%) argue that they know it by the number of complaints. Questions 18, 20, and 19 obtained the lowest rank as its chi-square value reached 3.41, 3.36, and 1.06 respectively showing that the questions are not significant.

1.6(iv) PART 4: DATA ACQUISITION OF TQM

Data acquisition is an important part of quality measurement and management; as such it was important to measure the effectiveness of data acquisition methods adopted. With reference to Table 1.4.1 below. As eighteen engineers (53%) believe that don't collect data to measure the performance of the organization. Whereas fourteen engineers (41%) said that they collect data to measure its organizational performance. When asked question, "How does organization solve quality-related problem" fourteen (41%) engineers of the respondents set-up multidisciplinary team for each problem eight (23%) of them answered that a permanent team is available to solve the quality-related problem and only six (18%) believe that organization solves the problem by assigning an individual to the solve problems. The majority (56%) of engineers replied that the user satisfaction rate is very important whereas only (9%) of them mentioned that it is not important for the organization.

When engineers were asked 'Are employees empowered to make a significant change to operations?' Fourteen (41%) of the respondent said only key personnel is empowered. Twelve engineers (36%) believe that 50% of employees aware of the importance of quality. Whereas the majority (94%) answered that organizations have a QC/QA type quality improvement program.

Table 1.4.1: Data Acquisition of TQM: The significances of data acquisition of TQM used by the engineers were analyzed in this part. Table 1.4.2 below shows that question twenty-six 'what type of quality improvement program do you have?' Thirty-two engineers (94%) answered that RHD has the 'Quality Control / Quality Assurance' Program and this obtained rank one as its chi-square value reached 86.94 with a resultant higher repetition. Whereas the second rank was occupied by question twenty-three 'How would you rate user satisfaction?' as its chi-square value reached 38.35. For question twenty-four. Are employees empowered to make a significant change in operation; as such rank is occupied by the question twenty one?

Do you collect data to measure the performance of RHD, as its chi-square value reacted 12.27 while question twenty-five; percentage of employees who are aware of importance of quality? obtained the fifth rank as it is chi-square value reached 9.82. Question twenty-two obtained the lowest significance. The significance of the data acquisition method

used by the engineers was analyzed in this part. Table 1.3.2 below shows that question fifteen “How would you rate the importance of service quality obtained rank one as its chi-square value reached 83.94 and the most frequent variable was “very important”. Whereas the second rank was occupied by question seventeen ‘Do you have a system for gathering user suggestions?’ as its chi-square value reached 20.36. When engineers were asked about RHD perception of quality, 47% believe that it eliminates defects. When they were asked, ‘How do you measure user satisfaction?’ sixteen engineers (47%) replied that they came to know through questionnaires survey while eleven engineers (32%) argue that they know it by the number of complaints. Questions 18, 20, and 19 obtained the lowest rank as its chi-square value reached 3.41, 3.36, and 1.06 respectively showing that the questions are not significant.

1.6(v) PART-5: IMPROVEMENT STRATEGY REGARDING QUALITY

As depicted in Table 1.5.1, fifteen respondents (45%) indicated that RHD does not rate suppliers, whereas thirteen respondents (39%) said that RHD rated suppliers. The majority (94%) of engineers agreed that defects in works are identified and then contractors are contractually liable to correct this. Twenty-three respondents (68%) answered that some training regarding TQM has been given to employees while seven (20%) of them said that they got no training regarding TQM. When they were asked, “employee involvement is critical to successful TQM implementation?” 56% of the respondent gives consent ‘Yes’. For the question ‘Training and development of staff are integral to effective TQM implementation’; the majority (91%) felt that ‘Yes’. Question regarding the quality audit, 94% of respondents told that they heard about the quality audit. When they were asked ‘Do you believe that quality audit improves the performance of RHD?’ Thirty one engineers (91%) replied that they believed that introducing quality audits is necessary to improve the performance of RHD.

According to Table 1.5.2, question twenty-eight “If defect in works are identified then the contractor is contractually liable for correct this” obtained rank one as it is chi-square value reached 86.71 with a resultant higher repetition. The second rank was occupied by question thirty-two ‘Do you hear about a quality audit?’ as its chi-square value reached 56.87, as a result of the most repetition, the answer by the respondents was ‘Yes’, whereas the third rank was occupied by question thirty-three ‘Do you believe that quality audit improves the performance of RHD?’ and question thirty-one. ‘Training and development of staff are integral to effective TQM implementation?’ as both of its chi-square value reached 51.38. For question twenty-nine ‘Is formal training in TQM given to employees?’ obtain rank five as its chi-square value is 18.47. The sixth rank is occupied by question twenty-seven, “Are RHD rated supplier?” as its chi-square value reached 14.7, while question thirty ‘Employee involvement is critical to successful TQM implementation?’ obtained the seventh rank as it is chi-square value reached 8.21.

1.6(vi) PART-6: OTHER

As depicted in Table 1.6.1 forty-seven respondents (47%) indicated that RHD follows quality assurance (QA) approach during construction works, on the other hand, forty-two (42%) believe that RHD follows Quality Control (QC) approach during construction work. When they were asked ‘What approach RHD follows in decision making?’ twenty-seven (79%) of respondents answered that RHD follows the ‘Top-down’ approach in decision making, whereas only 15% said that it follows the Bottom-up approach. When engineers were asked ‘Is there any contractor’s quality approach?’ 53% believe that there is no contractor’s quality approach, however, 26% answered that there is a contractor’s quality approach. When asked ‘Is there any time-based management system in RHD?’

seventeen engineers (50%) felt that RHD has time-based management, whereas ten respondents (29%) believe that it is no time-based management in RHD. Finally when they were asked ‘Obstacles in the implementation of TQM program’ twelve engineers (35%) agreed that it is lack of education and training, nine respondents (26%) believe that it is lack of expertise, only six engineers (18%) answered that it is lack of employee commitments.

Table-1.6.1 Others: This part analyses the significances of other dimensions in the organizations. Table 1.6.2 below shows that question thirty-five ‘What approach RHD follows in decision making?’ obtained rank one as its chi-square value reached 55.17; as a result of the higher repetition, the answer by the respondents was “Top-down”. The second rank was occupied by question thirty-six. “Is there any contractor’s quality approach?” as its chi-square value reached 18.01 with the most frequent variable replied by engineers as ‘No’. For question thirty-seven ‘Is there any time-bound management system?’ 50% of respondents replied yes as such it obtained the third rank as its chi-square value reached 16.06. The fourth rank is occupied by question thirty-eight ‘obstacles in the implementation of the TQM program?’ as its chi-square value reached 15.07. The fifth rank was questioned thirty-four, ‘Which approach RHD is taken during construction work?’ obtained the lowest significance as its chi-square value reached 6.58.

Result And Discussion

From the findings of this research, the following abstraction is drawn :

1.6.1 CONCERN ABOUT TQM

The perception of Quality was centered on conformance to standards as the majority of the engineer defined quality as a measure of conformance to standards. This affirmation the consequence of conformance to standards to the reaching of TQM in RHD. However, it is distress to observe that 33% of engineers believe that RHD has no formal quality management tools, and whereas 67% said that RHD has quality management tools. The reason for this might arise from the fact that there is a little misunderstanding of their belief that TQM will work in RHD; as a fifty percent (50%) respondent replied that it works to some extent. It is, therefore, necessary for the authorities of RHD to emphasize the practice and improvement of TQM in its policies and regulations to ensure that all employees should be involved

in it. Most of them (94%) argued the benefits of TQM to their organization.

1.6.2 QUALITY PERSPECTIVE ORGANISATION IMPROVEMENT

The engineers perceive product/service quality as important to the success of RHD. The perception of quality is such that they believe quality means the elimination of defects. Moreover, the majority (82%) of them replied that service quality is very important to their organization. From this survey, it is shown that engineer emphasis on-site supervision (21%), whereas only 9% importance on personal management of employee, for quality improvement, it is also noted that respondent ranked quality, safety and time as more important than cost and scope in project success.

1.6.3 DATA ACQUISITION OF TQM

Majority (53%) engineers replied that they don't collect data to measure the performance of RHD. For quality-related problems, 41% of engineers answered that they set-up a multidisciplinary team. Regarding user satisfaction, most of them (56%) said that it is very important for organizational improvement. It is observed that employees are not usually empowered to make significant changes to operations as only key personnel is (41%) and some feel that they are fully empowered (38%). This is to say rest employees have no say in decision making. They are just to carry out the duties assigned to them by their superiors. It is encouraging to note that 36% of respondents are aware of the importance of quality and the majority of engineers (94%) replied that RHD has QC/QA type quality improvement program. This means that a lot of engineers of RHD are not aware of TQM in quality improvement programs in operational processes.

1.6.4 IMPROVEMENT STRATEGY REGARDING QUALITY

It was observed that no formal training is given to employees regarding TQM. It is only 12% whereas the majority (56%) engineers believed that employee involvement is critical to successful TQM implementation. Regarding quality audit, most of the respondents (94%) answered that they heard about quality audit and they firmly believed that (91%) quality audit improve the performance of RHD.

1.6.5 OTHERS

Most engineers (47%) answered that RHD is taking the QA approach during construction works, whereas (44%) replied that RHD is taken a QC approach. However, 79% of engineers believed that RHD follows the 'Top-down' approach in decision making. From this study, it is observed that RHD is a bureaucratic organization whereas maximum decisions come from top-level management. Regarding the contractor's quality approach the majority of respondents said that there is no contractor's quality approach. When asked about obstacles in the implementation of the TQM program, it is seen that the respondent's emphasis on lack of

education lack of expertise and lack of employee commitment are more important than the rigid attitude of engineers and too much documentation in the implementation of TQM program.

Conclusion

In conclusion, it can be said that RHD engineers are very much aware of TQM philosophy and the dimensions of TQM in their organization to some extent. However, they are well convergence with the benefit of TQM implementation and long-term outcome of TQM in RHD. It is clear from the results achieved that most of the engineers understand quality, quality improvement tools, and conformance specifications. But due to lack of proper training regarding TQM, they are not fully competent to implement TQM technique in their organization's operational processes. It is also seen that many public service organizations like RHD are pressurized by the government to try to implement the principles and rules of TQM to some extent. It is observed that most of the respondent engineers have a good knowledge and perception of Total Quality Management. Generally, it can be said that the TQM program can work in RHD, hence they consider conformance to specification as the best means of achieving quality. It has also been observed that there is a shortcoming in training programs and a shortage in the data acquisition method. This is because in RHD there are no formulated systems for gathering user and employee's suggestions. Most of the engineers rely on empowered key personal to make a significant change in RHD operation, employees are not given the opportunity to impute their suggestions to the organization's service quality and progress. Finally, it is suggested that chaining the culture and policy of training plan, data acquisition method, and involving the third party for quality audit as key factors to the success of TQM implementation in RHD. It is hoped that this study has added extensive contributions to highlight the shortage and weakness in the management practice in RHD.

References

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Journal 15 (2): 285-296, 2011, ISSN 1818-
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