Total Quality Management Processes: An Assessment on the Performance of Construction Firms in Pampanga, Philippines

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Abstract: - The demand for effective and efficient performance in construction industry had gone skyrocketing for the past few years. This is due to the rapid escalation of modernization that affects mainly the market trend. Hence, a considerable number of studies, mostly from the developing countries, suggest that adopting and implementing Total Quality Management is likely to improve an organization and become competitive in the global market. In the Philippines, TQM has not been fully implemented for its effectivity is still being questioned and challenged. Having to think that the Philippines is a developing country, it is a must to invest more in its construction sector to stimulate growth and development. Moreover, this study attempts to explore the impact of possible TQM implementation to a small population, Pampanga; and to end the long-gone endeavour in the improvement of quality of construction companies in the country. The researchers used both quantitative and qualitative research techniques in collecting data by conducting semi-structured interviews and distributing survey-form questionnaire. The data was analysed then using descriptive and inferential statistics and thematic analysis facilitated by software to come up with answers to the research objectives which are determining the extent of TQM knowledge and awareness among construction firms and establishing the effect of TQM to the construction processes by correlating TQM Key Factors and Project Performance Indicators. Lastly, a framework was developed in the hope of contributing to the improvement of construction processes. The findings on the study can be an empirical evidence for future endeavours of how TQM can be a competitive advantage.

Key Words: —*Total Quality Management, Quality, Construction, Framework, Correlation.*

I. INTRODUCTION

There are different business strategies adopted by construction companies in the Philippines in working out the improvement of not just the overall management but also the construction processes. One of which is the renowned Total Quality Management (TQM). Implementing total quality management requires broad and sweeping changes throughout a company. It also affects all other decisions within operations management. Its implementation is strategic in nature and it sets the direction of the firm and elevates its level of commitment. Conversely, when planning and implementing a total quality management system or quality management strategy, there is no one solution for every situation or workplace.

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Quality management strategies vary from organization to organization because each institution is unique in terms of its culture, management practices, and the processes used to create and deliver its products and services.

According to Oakland (2003), TQM is an approach in which quality is emphasized in every aspect of the business and organization; its goals are aimed at long term development of quality products and services. Total quality management embraces behavior, service issues, quality assurance, quality control, performance management, and continuous improvement. He also stated that TQM model has four hard components – four P's – processes, people, planning and performance, which are the keys to delivering quality products and services to customers and continuously improving overall performance. The three C's-culture, communication and commitment provide the glue or soft outcomes. Oakland (2003) noted that these 'four Ps' form the basis of a simple model for TQM and provide the 'hard management necessities' to take organizations successfully into the twenty-first century.

The existing literature of TQM clearly shows that a number of construction industry across the globe are utilizing the approach of TQM, such as Libya, Kuwait and countries situated at the Asia and the pacific region, which have built their competitiveness based on its principles, resulting to enhanced products, services and the overall operational processes. These worldwide literatures are useful in drawing up a synthesis of key points of success by a thorough examination to them and can be accumulated as part of this research.

However, the analyzed literatures indicate that there are only limited studies about TQM implementation for construction industry in the Philippines and there is no solid evidence of the development of a framework for its improvement. Moreover, there are no literatures available locally concerning the assessment of construction organizations in improving their processes, particularly in the province of Pampanga. Furthermore, quality products and services must be aimed to cater the current infrastructure plans of the Philippine government for the said province. Sustainable quality management has not been endeavored by many researchers but it is one of the aspects that must be highlighted by the province. Hence, this study will be conducted to identify probable solutions in transforming construction processes to integrate performance and satisfy client's needs without compromising the overall planning and resources. It can also contribute to the whole construction industry of the Philippines in measuring quality and assessing project performance using a business type of approach. The provided results of this study can be used as guide for practitioners in formulating methods that will enhance construction management in the construction industry. The level of awareness about the extent of TQM implementation of construction organizations will increase by having a broaden knowledge about TQM and the benefits they can acquire from it regarding quality management.

II. Objective Of The Study

A. General Objective

The study aims to asses and evaluate the effectiveness of TQM to the construction processes of construction firms in Pampanga, Philippines.

B. Specific Objectives

The project specifically aims to achieve the following

- To determine the extent of knowledge and awareness of construction companies towards TQM.
- To establish the relationship between TQM key factors and project performance indicators.
- To develop a framework of recommendation for the improvement of construction processes.

III. Research Methodology

The researchers utilized both quantitative and qualitative research approach in collecting data to satisfy the research objectives. An interview was conducted, which falls under qualitative research while the use of questionnaires falls under quantitative research method.

A. Data Collection

The collection of primary data was through the use of research instruments such as questionnaires and conducting an interview to the selected companies within Pampanga. The data gathered from both methods will be brought together by triangulation process to avoid researchers and respondents bias and also for the data validity and reliability.

Questionnaire:

For this study, a questionnaire-survey was structured to obtain quantitative data that was only administered to those specific managers and employees who are inclined with construction management such as managers, project managers, and quality managers of the studied construction firms. This is due to the fact that they are involved in the strategic decision-making in the overall management and process management of the organization and also because the questionnaire contains specific issues or questions that was not relevant to all the staff in the company.

The questionnaire consists of closed-ended statements that use a five-point Likert scale, an ordered, one-dimensional scale from which respondents will be required to choose one option that best aligns with their view. In this study, a five point scale is considered to be adequate in measuring the strength of agreement or disagreement with statements or the satisfactory scale designed to determine the relative importance as to what extent the total quality management aspects were being implemented. The middle neutral position is counted as valid answer as it may genuinely reflect a respondent's position. The scale ranged from strongly disagree to strongly agree and was

applied to all statements except for the first and second part of the questionnaire.

For the validity and reliability of the questionnaire's structure, the researchers had preliminary review of questionnaires used in the past studies to understand comprehensively more about the topic and its sensitivity. Furthermore, some parts of the questionnaire were patterned from a PhD thesis entitled A Framework to Facilitate Total Quality Management Implementation In The Upstream Oil Industry: An Iraqi Case Study authored by Abbas Aletaiby and some revisions were made in drawing up the final version of the questionnaire.

In summary, the questionnaire was divided into four parts. The first part was all about the profile of the respondents that includes three questions. The second part was about TQM awareness and knowledge in five different questions. While, the third part was relevant to the questions asked about the key factors of TQM. The researchers selected key factors to how frequent they appear from the past related studies. These are Top Management Commitment, Continuous Improvement, Process Management, Customer Focus, Training and Development, Quality Culture, Policy and Strategy, Employee Empowerment, and Communication. The last part asked about project performance indicators of the company which includes client satisfaction, cost predictability, time predictability, safety, waste and defect reduction, and environmental impact.

Semi-Structured Interview:

Since the study aims to develop a framework to improve the project performance, a semi- structured interview was used as an appropriate technique to understand themes related to the topic. As stated by Bryman, (2016) in situations when a researcher is familiar with the idea being researched, semi-structured interviews is a suggested data collection technique. It will allow the researchers to ask further questions and let the interviewee expound a specific topic for clarifications of some variables which needed further in-depth investigation.

It consists of open-ended questions to freely explore the subject. The researchers chose to have an informal mode of interview so that interviewees will give their opinions and interpretations without bias and to avoid false presentation of information from respondents who might want to put their companies in better light just to earn some credibility.

B. Sample and Population

The population of study was drawn out of the various construction firms in Pampanga. Respondents from different levels of management from a company were asked to rate the extent of implementation of TQM strategies such as Production, Marketing, Human Resource Department, Quality, Materials Management, and others were then asked about their perception on their firm's business, quality and organizational performance from past years up to the present. The questionnaires were distributed in each of the 15 companies under survey. The choice for employees with managerial role is borne out of the fact that they are believed to know the process since they have daily planning with different projects and are supposed to know what the problems that arises throughout the whole run of a certain project. Thus, the construction companies' understudy is equally represented in the study.

As it was not possible to interview all the members of the population, a sample was necessary. For sampling, the convenience sampling method was used in consideration of the accessibility of some companies. Nevertheless, the sample can represent the whole population. The questionnaires were randomly distributed to the individuals with managerial position. Furthermore, the sample of this study belongs to of AAA (Large-scale) and Small Medium Enterprise (SMEs) construction firms in Pampanga. Likewise, the respondents of this research were managers in different management levels, areas, and specialists from projects of construction firms. For enhancing the number of the participants, the delivery and collection of the questionnaires will be carried out by the researchers.

The sample for this investigation was selected on the basis that the scores obtained will accurately reflect whether TQM implementation on that firms is effective. Managers/employees of top management were interviewed to establish whether they are aware that it was their duty to institute quality and what they believed were the prospects for the introduction of Total Quality Management at their company.

C. Quantitative Data Analysis

The data obtained was analyzed through the use of IBM SPSS Statistics, a software that provides variety of statistics tool and analytics capabilities such as advanced data preparation, descriptive and inferential analysis, linear regression and visual graphing

Descriptive Statistics Analysis:

With the help of the SPSS software, statistical tools such as measure of central tendency was calculated particularly the means, but itself alone cannot weigh enough to describe the data. Measures of variability and dispersion such as standard deviations were also computed as a most appropriate measure

to show the variation in the samples. The structure of the descriptive statistical analysis closely follows the structure of the questionnaire survey which includes four parts.

Inferential Statistics Analysis:

To make inferences about the population as a whole, inferential statistics was applied to the data results. This was performed still with the use of SPSS software by examining relationships, trends and differences within the numerical data. There are different techniques used under inferential statistics Chi-Square Statistic, Anova, Correlation, and Regression. Chi-Square tests. To reach research objectives, the relationship between the main variables or factors was analyzed using Spearman's Correlation. It is a non-parametric, bivariate analysis that measures the relationship or strength between two or more variables or datasets. It is appropriate in the study for measurements of the data were in ordinal scales (Likert Scale). Thus, the study will correlate the following: (1) the relationship between the key factors of TQM and (2) the project performance indicators.

D. Qualitative Data Analysis

The study conducted semi-structured interview which falls under qualitative statistics whereas the analysis of the data gathered, the researchers adopted both referential and conceptual content analysis. Such types of content analysis provide an opportunity to examine the interviewees' responses in multiple methods so as to determine which data are most important to this research. Thus, the study followed the six steps suggested by Braun and Clarke (2006) and presented as follows:

Familiarization with the Data:

The researchers transcribed the data then read the transcripts repeatedly making notes to for better recognition.

Initial Codes:

Significant features in the date were coded to ensure that a particular participant is noted in code form. It must be kept as wide as possible to avoid the omission of important details.

Establishing Themes:

In this stage, codes were classified into themes collectively so that codes are organized under a theme.

Reviewing the Themes:

Ensuring and checking if the themes work appropriately and match the coded data.

Refining the themes:

In this step, themes were named as broad categories covering the data and arranged to see the overall trend.

Writing Up the Report:

This stage aimed to unleash the key ideas that are extracted from the analysis. The main picture emerges and supported by some selected materials from the analyzed data.

To perform the analysis, the NVivo version 12, a software program designed to assist and facilitate the analysis and management of qualitative data, was applied to the collected data from the semi-structured interviews.

E. Triangulation

Since two research instruments were used, sequential exploratory research design suites this research. The purpose of sequential exploratory research design is to explore a phenomenon in depth and therefore was a basis in the triangulation approach of this study to combine quantitative and qualitative methods. Hence, it involved the collection and analysis of qualitative data followed by the collection and analysis of quantitative data. Figure 1 explains the triangulation for qualitative and quantitative methods.

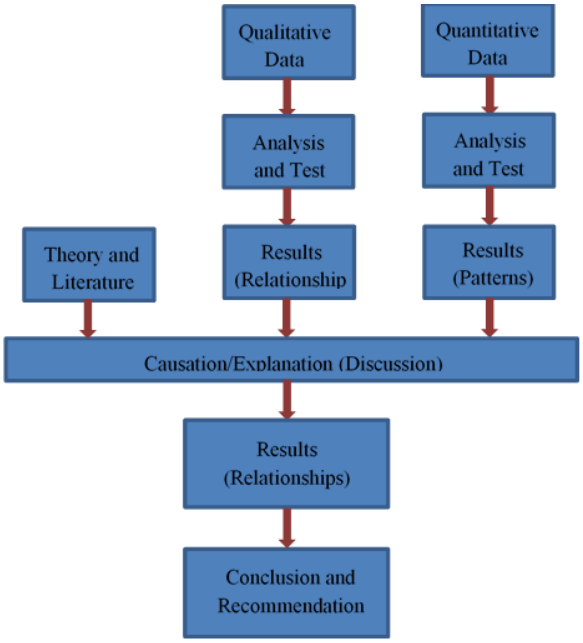

Fig.1. Triangulation for Qualitative and Quantitative Methods

IV. Results And Discussions

A. Quantitative Data Analysis

In this study, the quantitative data analysis which is inferential and descriptive statistics- based is composed of four parts. Part one illustrates the characteristics of the respondents. The second part is about the extent of company's knowledge and awareness of TQM. Part three describes the key factors of TQM and project performance indicators and finally, the fourth part discusses the correlation of TQM Key Factors and Project Performance Indicators.

Characteristics of the respondents were presented by means of charts which shows the computed frequencies of each variable using SPSS software.

More than half of the respondents (55.6%) were Junior Managers while 22.2% were in middle management and 4.4% of the sample were in Top Management. Quality management staff represented the 6.7% of the sample, and 4.4% for the other position.

Based on the results, managers at both the middle and junior levels have a significant role to TQM Implementation. Whereas, there is a lack of authorities under quality management and this could be crucial for the visibility of possible benefits of successful TQM implementation in the company.

Data collected shows that almost all of the respondents (93.3%) were Bachelor Degree holder and 6.7% of the sample have masters' degree.

The data suggests that employees of an organization who try to give quality products and services are required to be educated, well-trained in order to assess and solve problems that arise in the company. Moreover, the level of education is one of the most important indicators as to whether TQM is or can be employed successfully. This can also be considered as an indication of peoples' response to TQM awareness. Therefore, based on the presented results, companies in Pampanga are qualified in this aspect.

The data also indicates that, more than half of the respondents have a short period of work experience in their company (51.1%). These statistics doesn't mean that they are inexperienced because the statement did not consider their past job history and only conformed to the number of years in their current company. It rather means that improved performance at many companies is influenced by the work experience of not just the tenured employees but also the newbies as long as they are knowledgeable; as it can help in putting effort for TQM success.

TQM Awareness and Knowledge:

This section of the survey identifies the respondents' extent of knowledge and level of awareness of quality management systems particularly the TQM in terms of its concept and importance.

The data shows the percentage of respondents' understanding about the meaning of quality. More than half of the respondents (51.1%) stand for level of fitness as quality's definition; 22.8% conceived quality equals the customer satisfaction while 13.3% of the respondents perceived quality as conformism to certain requirements and 8.9% saw it as doing the right thing at the right time. There was an option for defining quality themselves but none chose to do so.

The data clearly shows that the majority of respondents (58.5%) knew about 'IS0 9001-2008' and 6.2% knew about 'ISO 29001'. Management Integrated System (MIS) ranked second to be most familiar, garnering 26.4% of the respondents' answer. Meanwhile, Six Sigma, Lean Quality Management and Statistical Process Control are also known by 6.2%, 3.9% and 1.4% of the respondents, respectively.

Besides meaning of quality, respondents were also asked about their concept of TQM. Since there it has no specific parameters, conceptualization is important as it will serve as a basic idea for TQM.

The respondents' perceptions of the importance of TQM for the company is presented. 48.9% of the participants agreed with the statement that,

"The importance of TQM implementation is an improvement of the company's entire performance". This can be attributed to the expected positive impact of TQM on the company's process and service. Meanwhile, 24.4% of the respondents see that TQM importance comprises time, cost and waste reduction in their operation. 15.6% also believed that TQM would help in enhancing the company's reputation towards its environment as an important aspect. Lastly, 4.4% answered that TQM could provide a competitive advantage in the market.

Noteworthy, these percentages could be related to the respondents' viewpoint, in terms of the positive impact of TQM implementation in Pampanga's construction industry.

This section discusses the familiarity of key factors required for TQM implementation in the company; Top Management Commitment, Customer Focus, Continuous Improvement,

Process Management, Training and Development, Quality Culture, Policy and Strategy, Employee Empowerment, and Communication, which is item no. 5 in the 2nd part of the questionnaire. It identifies to what extent the respondents were familiar with them.

All the key factors recorded a combined percentage of more than 80% of familiarity and strong familiarity among the participants and only a frequency of 2.2, which is a low percentage was unfamiliar of the Employee Empowerment key factor. Also, the results show that the highest percentage of low familiarity was recorded for quality culture at 6.7%, while the lowest percentage of low familiarity were Customer Focus, Process Management, Employee Empowerment and Communication at an almost negligible percent. Overall, the response of the participants with the most occurrence was

"Familiarity" followed by "Strong Familiarity" and "Not sure". On the other hand, a few respondents fell into the "low familiarity" and "not familiar" category. Therefore, based on the above results it can be assumed that the participants have extensive familiarity and knowledge regarding the suggested key factors of TQM.

Key Factors of TQM:

This section discusses the TQM critical success factors or key factors that has been measured by a group of questions in the Part 3 of the questionnaire using 5-point likert scale (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree and 5= strongly agree). These nine key factors were highlighted and associated with specific questions to reach research objectives and also to assess the nature of each.

The data shows that both choices, "strongly agree" and "agree", for the statements, ranged between 86% and 90% of the whole participants to the survey. On the other hand, none had selected the "strongly disagree" option and only 2.2% of the respondents answered "disagree" to the statements. Whereas, the percentages of the "neutral" option ranged from slightly higher than 8% for the second statement to slightly less than 14% for the first statement of the whole respondents. Furthermore, the results obtained which are presented in Table 2 can be explained based on the average level of the respondents' agreement for the related to "Top management commitment."

Statement 1: "Top management reflects its commitment to quality." The statement has a mean value of agreement of 4.2%, and a standard deviation of 0.66%. Whereas, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 86.6% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "Top management provides time and resources for quality management." The statement has a mean value of agreement of 4.2%, and a standard deviation of 0.67%. Whereas, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 88.9% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "Top management assure good performance through the use of performance indicators." The statement has a mean value of agreement of 4.1%, and a standard deviation of 0.68%. Whereas, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 86.7% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

The data shows that both choices of "strongly agree" and "agree" for the statements of this section, ranged from between 77.8% and slightly less than 87%, for the statement: "The company aims the best implementation of continuous improvement processes for all tasks", for all respondents to the survey. On the other hand, none had selected "disagree" and "strongly disagree" choices, for the three statements. Whereas, the percentages obtained of the "neutral" option were high, at an average rate of 15.6% of the whole respondents to the survey. Moreover, the results from Table 3 below, refer to the statement of "continuous improvement", which can be explained based on the average level of the respondents' agreement.

Statement 1: "Employees in the company sees quality improvement as an individual responsibility." The statement has a mean value of agreement of 4%, and a standard deviation of 0.63%. Whereas, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 84.4% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "The Company highlights improvement rather than maintenance." The statement has a mean value of agreement similar to the previous statement of 4%, with a standard deviation relatively high at 0.71%.

The percentage of participants, who rated this statement as "strongly agree" and "agree" is 77.8% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "The Company aims the best implementation of continuous improvement processes for all tasks." The statement has a mean value relatively higher than the previous statements of 4.2%, and a standard deviation of 0.7%.

Whereas, the percentage of participants, who rated this statement as "strongly agree" and "agree" is slightly less than 87% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

The data obtained demonstrates that both choices of "strongly agree" and "agree" for the statements below, ranged from between 86.6% and slightly higher than 88%, with an average of 86.7% of the whole respondents to the survey. On the other hand, none had selected "disagree" and "strongly disagree" from the choices. Whereas the percentages of the "neutral" choice ranged from between 11.1% and 13.3%, of the whole respondents to the survey. Moreover, the results from Table 4 below, can be explained, referring to the statement "process management."

Statement 1: "The Company has firm management parameters in controlling and improving production or delivery process." The statement has a mean value of agreement of 4.2%, and a standard deviation of 0.8%. Whereas, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 88.9% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "The management provides relevant measurements to cover the key processes in the company". The statement has a mean value of agreement and a standard deviation similar to the previous statement of 4.2% and 0.8%, respectively. Whereas, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 86.7% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "The company uses and follows clear working procedures and instructions." The statement has a mean value of agreement similar to the previous two statements of 4.2%, but has a standard deviation of 0.66%.

Whereas, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 88.6% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

The data displays that both choices "strongly agree" and "agree" for the statements below, ranged from between 80% and slightly higher than 88%, with an average of 86.6% of the whole respondents to the survey. Notably, none had selected the "disagree" and "strongly disagree" choices. Meanwhile, the percentages of the "neutral" option ranged from between 11.1% and 20%, with an average of 13.3% of the whole participants to the survey. In addition, the result previously stated refers to the statement of "customer focus", can be explained based on the average level of the respondents' agreement.

Statement 1: "The company determines current and future customer requirements and expectations" The statement has a mean value of agreement of 4.2%, and a standard deviation of 0.66%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 88.9% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "The Company is sensitive to its customers and markets' needs". The statement has a mean value relatively similar to the succeeding statement at 4.2%, and a higher standard deviation of 0.77%. The percentage of participants, who rated this statement as "strongly agree" and "agree" is 80% of the whole respondents. According to the Likert scale interpretation, the mean value ranges from 3.4 to less than 4.2, that makes the level of agreement for this statement high.

Statement 3: "The Company is updated of the market trends." The statement has a mean value relatively lower to the succeeding statement at 4.1%, and a standard deviation of 0.73%. The percentage of respondents, who rated this statement as "strongly agree" and "agree" was 86.6% According to the Likert scale interpretation, the mean value that ranges from 3.4 to less than 4.2, are at high level of agreement for the statement.

In relation with "training and development", the data demonstrated in the Table 10, shows a different analysis

compared to the previous sections. It has the percentage for the "neutral" option sometimes larger or equal to the percentage of "strongly agree" choice, ranging from 16.9% to 28.9% and 13.6% to 26.7% respectively. Whereas, the "agree" option was selected by an average of 46.7% of the respondents to the survey.

Statement 1: "Quality-related training is given to managers, supervisors and employees" The statement has a mean value of agreement of 4%, and a high standard deviation of 0.74%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 73.4% of the whole respondents and relatively low compared to past sections. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "There are resources allotted to employees training needs and development" The statement has a mean value of agreement of 3.9%, and a standard deviation of 0.70%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 71.1% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "The Company conducts regular training evaluation". The statement has a mean value of agreement similar with the succeeding statement of 3.9%, and a high standard deviation of 0.89%. However, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 57.8%, the lowest percentage recorded for the said options. Meanwhile, 2.2% answered "disagree". According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement and therefore, the statement is qualified.

The data analyzed refers to quality culture explains that both the choices of "strongly agree" and "agree" for the statements below, were the lowest, when compared to the others with an average of 49%. On the other hand, both the "disagree" and "strongly disagree" choices, had the highest percentages in this section with 2.2% which is for the statement 3. Meanwhile, the "neutral" option percentages ranged relatively high from 31.1% to 33.3%. Furthermore, the results will be discussed based on the average level of agreement of respondents.

Statement 1: "Changing traditional culture is an important sign of successful TQM implementation in the company." The statement has a mean value of agreement of 3.7%, and a standard deviation of 0.69%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 64.4% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "Adopting TQM culture makes the company fit to the changes in business environment." The statement has a mean value of agreement of 3.8%, and a standard deviation of 0.84%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 60% of the whole respondents to the survey which is a low percentage compared to the other statements. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "There is quality culture in the environment of employees." The statement has a mean value of agreement of 3.7%, and a standard deviation of 0.82%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is only 64.4% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

For the statements of policy and strategy, the data shows that option "agree" had the lowest percentage in this section, ranging from 46.7% up to 48.9% while 28.9% to 33.3% selected "strongly agree". However, it also had a high percentage for option "disagree" and "strongly disagree". In addition, the percentages of the "neutral" choice ranged from slightly higher than 11%, to about 23% respondents to the survey.

Statement 1: "The concept of quality management is reflected in the company's values, vision and mission." The statement has a mean value of agreement of 4%, and a standard deviation of 0.78%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 75.6% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "Managers in the company have a sound knowledge about strategies relating quality management." The statement has a mean value of agreement of 4.1%, and a standard deviation of 0.73%. On the other hand, the percentage of respondents, who rated this statement as "strongly agree" and

"agree" is 80% of the whole respondents to the survey. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "Policies and Strategies related to quality management are being reviewed regularly." The statement has a mean value of agreement of 4%, and a standard deviation of 0.98%. Meanwhile, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 82.2% of the whole respondents to the survey. However, this statement records the highest percentage of respondents who rated "disagree" and "strongly disagree" at 6.6%. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

In relation to employee empowerment, the results display that percentage for options "strongly agree" and "agree" ranges from 71.1% to 77.7%. On the other hand, there is 2.2% of the whole respondents who selected the "strongly disagree" and "disagree" option for statements 1 and 2. In addition, the percentages for "neutral" option ranged from 20% to 28.9%. Furthermore, the figures can be discussed based on the level of respondents' agreement.

Project Performance Indication:

This section describes the data obtained from the response of the participants regarding the Project Performance Indicators. The value of each variable was also measured by set of questions that uses 5-point Likert scale. It was done to determine the effects or possible effects of TQM implementation in the project performance of the studied construction firms. Moreover, the researchers used descriptive analysis for the findings such as mean values, standard deviation and frequencies that were facilitated using the SPSS software these were combined for better presentation.

The findings show that responses on both choices "strongly agree" and "agree" ranges slightly higher than 71% to 77.7% of the whole respondents to the survey. Meanwhile, options "disagree" and "strongly disagree" got an average of 3.3%. On the other hand, the percentages of the "neutral" option ranged from 20% to 28.9%, with an average of 22.2% of the whole participants to the survey.

Statement 1: "Enhance the relationship between the company and its clients." The statement has a mean value of agreement of 4%, and a high standard deviation of 0.82%. In addition, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 73.4% of the whole respondents. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "Reduce client's complaints" The statement has a mean value of agreement similar with the first statement of the section of 4%, and a slightly lower standard deviation of 0.8%. Also, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 71.1% of the whole respondents and relatively low compared again to the first statement. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "Meeting clients' needs and requirements." The statement has a mean value of agreement and standard deviation higher than the first two statements which are 4.2% and 0.91%, respectively. Meanwhile, 77.7% of the whole respondents, rated this statement as "strongly agree" and "agree", making it the highest agreement average for this section. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Regarding the results related to the statements of time predictability, the choices of "strongly agree" and "agree" ranged between 11% and slightly less than 25%, relatively the lowest among all the statements. Consequently, both the "disagree" and "strongly disagree" options, had high percentages that ranged from 53.4% to 62.2% of the whole participants to the survey. The highest percentage for "disagree" option is 44.4% for statement "Meeting client's time requirement for each phase of construction." Whereas, the percentages of the "neutral" choice ranged from 20% to 26.7%.

The data shows that both choices of "strongly agree" and "agree" for the statements of this section, ranges between 64% and 65% for all respondents to the survey. While there is only 2.2% on the "disagree" option for the statement one and none had selected "strongly disagree". On the other hand, this section accumulated the highest response percentages for the choice "neutral" at a range of slightly higher than 24% up to 35.6%. Both "disagree" and "strongly disagree" choices, ranged from 4.1% to slightly higher than 9% for the statement: "The company emphasizes improvement, rather than maintenance".

Whereas, the percentages of the "neutral" choice were relatively high compared to the disagreement statements, with

an average rate of 14.1% of the whole respondents to the survey.

Statement 1: "Employees are motivated to work and assured of their safety" The statement has a mean value of agreement of 4%, and a standard deviation of 0.88%. Meanwhile, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 64.4% of the whole respondents and relatively low compared to the previous sections. Also, the "agree" option had 2.2% of the responses. On the other hand, the percentage for "neutral" equals the percentage for "strongly agree" option. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 2: "Risk is considered in the planning phase and prior to work execution and therefore reduced" The statement has a mean value of agreement of 3.8%, and a standard deviation of 0.72%. Moreover, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is similar to the first statement at 64.4% of the whole respondents. However, 35.6% of the participants rated the "neutral" option, which is relatively higher than the "strongly agree" option. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

Statement 3: "Improved safe workplace environment" The statement has a mean value of agreement of 4.1%, and a standard deviation of 0.76%. In addition, the percentage of respondents, who rated this statement as "strongly agree" and "agree" is 75.5% of the whole respondents and relatively higher than the other two statements in this section. According to the Likert scale interpretation, the mean value that ranges from between 3.4 and less than 4.2, are at high level of agreement for the statement.

This section aims to identify the relationship between TQM Key Factors and Project Performance Indicators using inferential statistics analysis that has been facilitated by the SPSS Software. As being said, each of the nine TQM Key Factors which are: top management commitment, continuous improvement, process management, customer focus, training and education, quality culture, policy and strategy, employee empowerment and communication has been correlated with six Project Performance Indicators. These are: Client satisfaction, Cost predictability, Time predictability, Safety, Waste and defect reduction, and environmental impact. The correlation analysis is consisting of two levels; the first level illustrates the degree of the strength of correlation between TQM key factors and project performance indicators, while the second level summaries the determined relationships and listed down depending on the degree of the strength correlation with the said aspects. The Spearman's Rank Coefficient Correlation interpretation was used to explain the results comprehensively. To interpret the correlation, the following measures was used:

For "*s*" (absolute value) ranging 0.00 to 1.9, is considered to have a very weak correlation

For "*s*" (absolute value) ranging 0.20 to 3.9, is considered to have a weak correlation

For "*s*" (absolute value) ranging 0.40 to 0.59, is considered to have a moderate correlation

For "*s*" (absolute value) ranging 0.60 to 0.79, is considered to have a strong correlation

For "*s*" (absolute value) ranging 0.80 to 1.0, is considered to have a very strong correlation

Where *s* = correlation coefficient

B. Qualitative Data Analysis

Semi-structured interviews were conducted to source for information and for better understanding of the topic being studied. There are 15 interviewees, one from each company, who shared their insights about the topic. These interviewees are in different level of occupied position that are still inclined with management for data reliability and also in work experience. Furthermore, they were expected by the researchers to enhance the data and be able to provide an in-depth explanation of the topics. Thus, the gathered qualitative data was analyzed using NVivo 12 software and presented in this section.

Prior inputting the data to the software, the data are classified into themes to match the research objectives. There were three themes formed which has been followed in the data presentation and discussion. These themes include the extent of TQM awareness (objective one), identification of TQM Key factors and its effect to the Project Performance Indicators (objective two), and the possible recommendations or suggestions to improve the construction management (objective three). The results on the analysis are discussed as follows:

C. Impact of TQM in the Construction Processes

This section aims to establish the relationship between TQM Key Factors and Project Performance indicators based on the responses of the interviewees. Whereas, the answers of the

respondents are mainly based on their observations and had not performed any quantitative computations.

TQM Key Factors or Critical Success Factors:

Based on the interviewees' answers, most of those who have a background of TQM were familiar with its Key Factors. According to them, these are the basic aspects for successful TQM practice. Their responses only differ on how they look at it as a factor of improvement.

Use of Project Performance Indicators:

Noteworthy, all of the interviewees were familiar with the project performance indicators and most of them make use of these. In summary, all of the companies have protocols to measure performance of construction. Project performance indicators are usually the aspects being considered.

Effect of TQM Key Factors in Project Performance:

One mentioned that Project Performance Indicators were largely dependent on the TQM Key Factors. Basically the Key Factors triggers success in the company. As an approval, one also stated that without these key factors, definitely, there won't be successful projects. Based on the responses above, it shows that Key Factors have significant impact on the project performance.

D. TQM Awareness

This section deals with TQM awareness among the interviewees. Under this main theme, there were three sub-themes. The sub-themes of TQM awareness will be discussed in the following sections. This will also determine whether the company has a background of quality management systems and if they are implementing such to be able to bring up Total Quality Management on the topic.

Meaning of Quality:

The interviewee's responses on the question mostly emphasized three points of interest, which were: satisfying customers, conformity with the existing standards, and quality control. Moreover, these three points represented the meaning of the word 'quality' to the interviewees. Noteworthy, seven interviewees mention that quality meant satisfying customers.

Based on the responses, it can be concluded that there were similarities and also different perspectives regarding the meaning of quality among the interviewees. However, most of the opinions of the interviewees were focused on the effect or results of achieving quality, not with the process it requires.

Implementation of Quality Management Systems:

Most of the interviewees' responses consist of familiarity with QMS particularly the ISO and their participation in different seminars and symposium in improving their product and services. Some even mentioned that they had attended training courses about quality management system. However, some of the respondents showed disinterest in adopting QMS. Further, 9 out 15 companies adopt QMS techniques. From the interviewees' responses, it is clear that training is a part of QMS technique to where majority have participated. However, not all companies are very open for adopting QMS since it requires standards.

TQM Familiarity:

This section determines the extent of TQM knowledge and conception of the interviewees. Notably, three out of 15 respondents admitted that they do not have a picture or idea of TQM. Nevertheless, most of the interviewees are very much familiar with TQM.

Summarizing the responses, it can be concluded that most of the interviewees has an idea about TQM brought by studying and work experience. It is also perceived and understood in different level. Nonetheless, most of the answers revolve around to its idea of improvement in the overall performance of the company.

E. Recommendations for Improvement

Most Vital TQM Key Factors In Construction Management:

The interviewees shared varied opinions about what do they think is the most essential TQM Key factors in construction management. The key factors that have been mentioned several times were, customer focus, training and development and continuous improvement. To sum up, 10 out of the 15 interviewees have mentioned customer focus, 8 for continuous improvement and 7 for leadership and training.

Aspect of Project Performance to Improve:

In the case of Project performance indicators, interviewees had almost similar answers and they believed that Time Predictability is something they really need to improve. Summarizing the responses, it can be concluded that the companies want to improve client satisfaction and time predictability which were mentioned 11 and 14 times, respectively.

TQM Recommendation:

For this case, there's a uniform answer from the interviewees; TQM is recommended. Moreover, all the respondents recommend TQM implementation because of the good impact it could bring in the company, in terms of finance, performance and most especially processes.

Extent of TQM Knowledge and Awareness:

The first specific aim of the study is to determine the extent of TQM knowledge and awareness among construction companies in Pampanga. The findings indicate that quality management systems are well-known in the most of the respondents, and so for Pampanga's construction industry. 58.5% of respondents are familiar with International Standards for Organizations, a body that set standards for every type of organizations. This body requires a competent quality management system to meet its parameters and to be able to be certified. This explains why majority of respondent defined quality as the level of fitness (to certain standards, specifications and parameters) at 51.1%. Meanwhile, TQM was perceived as a management philosophy that focuses on the continuous improvement, customer satisfaction, and employee involvement and supplier partnership. In addition, the findings show that TQM was being studied to some curricular measures and also being practiced in some organizations, which makes it significantly familiar. Therefore, the construction firms in Pampanga have adequate knowledge and awareness about TQM in terms of its concepts, benefits and impact on the performance.

F. Relationship between TQM Key Factors and Project Performance Indicators

The research's second aim is to establish the relationship between TQM Key Factors and Project Performance Indicators by means of Spearman's Rank Correlation Coefficient. This was performed to establish the impact of TQM implementation in the construction process represented by the said variables. Results that were presented identify that Continuous Improvement, Customer Focus, and Training and Development are the most salient and critical factors contributing to the project performance of construction companies in Pampanga. Moreover, findings proved that the construction processes is largely impacted by TQM implementation. Therefore, there is a significant relationship between TQM Key Factors and Project Performance Indicators.

V. CONCLUSIONS

The first specific aim of the study was to determine the extent of TQM knowledge and awareness among construction companies in Pampanga. The findings indicate that quality management systems are well-known in the most of the respondents, and so for Pampanga's construction industry. 58.5% of respondents are familiar with International Standards for Organizations, a body that set standards for every type of organizations. This body requires a competent quality management system to meet its parameters and to be able to be certified. This explains why majority of respondent's defined quality as the level of fitness (to certain standards, specifications and parameters) at 51.1%. Meanwhile, TQM was perceived as a management philosophy that focuses on the continuous improvement, customer satisfaction, and employee involvement and supplier partnership. Based from the work experience section of the results, it showed that TQM was being studied to some curricular measures and also being practiced in some organizations which makes it significantly familiar. Therefore, the construction firms in Pampanga have adequate knowledge and awareness about TQM in terms of its concepts, benefits and impact on the performance.

The research's second aim was to establish the relationship between TQM Key Factors and Project Performance Indicators by means of Spearman's Rank Correlation Coefficient. This was performed to establish the impact of TQM implementation in the construction process represented by the said variables. Results in identified that Continuous Improvement, Customer Focus, and Training and Development are the most salient and critical factors contributing to the project performance of construction companies in Pampanga. Moreover, findings proved that the construction processes is largely impacted by TQM implementation. Therefore, there is a significant relationship between TQM Key Factors and Project Performance Indicators.

Given that this study was conducted with limiting factors, the researchers would highly recommend, first is the validation of framework. Every proposed framework must undergo some measures to ensure its validity and reliability prior usage. Nonetheless, the researchers suggest the framework to improve the quality of construction processes of the construction firms in Pampanga.

Since the study only covers a small population, the findings could not be fully applicable to a larger one. The researchers therefore recommend a more comprehensive and wide-range

study that will best fit a large population in choosing factors and variables. It might give a different result with respect to improvement considering that organizations vary in culture and processes.

Lastly, the implementation of TQM to construction companies is highly recommended as it was proven to be effective in improving the quality of products and services and integrate the overall performance.

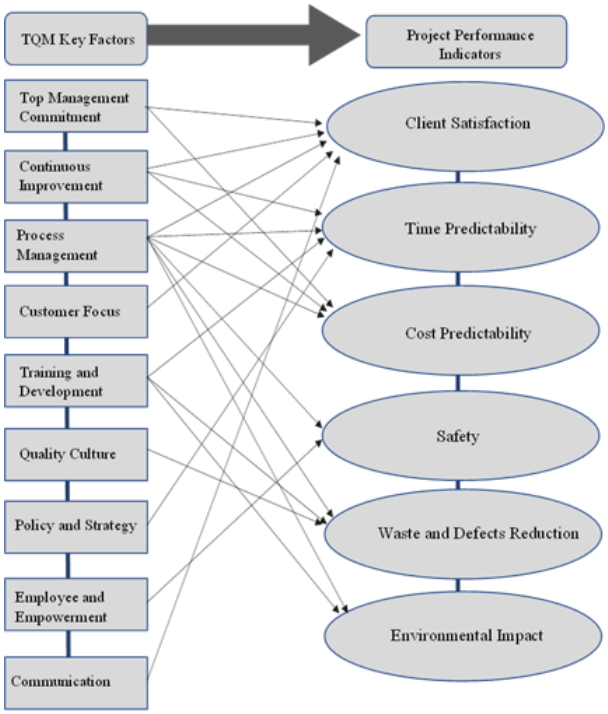

Fig.2. Final Framework.

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