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An Examination of Factors Influencing Effective and Continuous Improvement of Indonesian Contractors' Quality Management Systems

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Abstract: This paper presents the results of a pilot study examining the factors that impact most on the effective implementation of, and improvement to, Quality Management Systems (QMSs) amongst Indonesian construction companies. Nine critical factors were identified from an extensive literature review, and a survey was conducted of 23 respondents from three specific groups (Quality Managers, Project Managers, and Site Engineers) undertaking work in the Indonesian infrastructure construction sector. The data has been analyzed initially using simple descriptive techniques.

This study reveals that different groups within the sector have different opinions of the factors regardless of the degree of importance of each factor. However, the *evaluation of construction project success* and the *incentive schemes for high performance staff*, are the two factors that were considered very important by most of the respondents in all three groups. In terms of their assessment of *tools for measuring contractor's performance*, *additional QMS guidelines*, *techniques related to QMS practice provided by the Government*, and *benchmarking*, a clear majority in each group regarded their usefulness as 'of some importance'.

Key words: Continuous improvement, effectiveness factors, Indonesian contractors, QMS.

1. INTRODUCTION

Quality management system (QMS) implementation has been spreading more widely in the Indonesian construction industry, ever since the quality of civil engineering project work became an issue of high concern to the government, contractors, consultants, project customers and end-users. A QMS in construction, as stated by Thorpe (2004), is "a formal statement of an organisation's business policy, management responsibilities, processes and their controls, that reflect the most effective and efficient ways to meet (or exceed) the expectations of those it serves, whilst achieving its own prime business objectives". It is, therefore, the effectiveness of the system that is one of the most important factors usually considered by internal stakeholders within an organisation.

In Indonesia, QMSs applied by constructors and builders developed and implemented based on ISO 9000, are also now becoming very important to customers who have for some time been seeking qualified and professional construction firms capable of meeting their requirements and providing satisfactory and successful outcomes in the area of project delivery. Holding a valid ISO 9000 certification is a compulsory for construction companies that wish to be registered as the G-7 (the highest grade of Indonesian contractor qualification), as well as for allowing them to tender for government projects above USD 100,000 up to mega

projects. For most companies, the major motivation for developing and implementing a QMS appear to be mostly determined by a desire to be included on clients' tendering lists and not for improving the overall company management system, or for effectively and efficiently controlling project activities. However, according to the extant literature, by fully understanding the holistic concepts of quality management practices and by a full commitment to implementing the concepts and practices, contractors should be able to successfully retain their ISO 9000 certification and more importantly improve the standard of their QMS in order to achieve highly effective company performance, satisfy customers better and enhance their business competitiveness. One of the ways to achieve a better understanding of a QMS is by being able to identify the main factors that drive effective QMS implementation and continuous improvement, and such factors should be taken seriously and considered by all levels of management.

The primary aims of this study, therefore, are to investigate the factors that can influence the effective implementation, operation and continuous improvement of QMSs in Indonesian construction companies, and to identify which of the identified factors can be considered as the most influential in contributing to the success of QMSs in such companies. The factors identified in this research study based on the literature review are presented in the second part of this paper. A pilot questionnaire was developed and distributed to several construction companies in Indonesia in order to ascertain and measure their opinions of the degree of importance of the factors. The methodology used for conducting this pilot survey is also described in the following part of this paper. The third part of the paper presents the initial results and some discussions of the pilot survey. This study is a part of a wider current investigation being undertaken by the authors on how construction companies in Indonesia can improve the implementation, effectiveness, efficiency and outcomes of their QMSs.

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2. METHODOLOGY

2.1 Literature Review on the Factors

A successful implementation of a QMS as espoused in the relevant ISO standards, requires effective planning, operation, review and continuous improvement of the system at all levels of an organisation. Effectiveness as related to implementing the ISO 9000 series standard can be defined as “meeting prescribed quality objectives of the company and specified requirements of ISO 9001:2000” (Oztas et al. 2007). By this means, management and staff must ensure that an effective QMS is established, implemented and maintained to achieve their quality objectives (Turk 2006). Based on the improvements that can arise from effectively operating a robust QMS, a company will rapidly observe successful and continuous quality process improvements and these can further lead the company to the achievement of a more holistic and systematic approach to quality management, ultimately allowing the adoption of a Total Quality Management (TQM) philosophy.

However, research on the barriers to implementing QMS effectively reveals that besides the huge amount of written documentation required to be prepared by companies intending to pursue ISO 9000 certification, Turk (2006) admits there is a problem in understanding the ISO 9000 terminology, in that study specifically within Turkish construction companies, as the requirements of the standard are too general because the standard is a generic one (i.e. not specifically designed for any particular industry) and can be used in any company and any size and in any industry. Furthermore, he recommends that the ISO global organisation should prepare a guide both for the firms and for the certification bodies and auditors in order to apply ISO 9000 in the construction industry more effectively (ibid 2006). Such a guideline is expected to assist construction companies to develop and design their quality manuals, procedures and work instructions to reflect the characteristics of company operations and goals that need to be demonstrated to comply with an ISO 9000 certified QMS.

Therefore, according to ISO 9000 Council (2009), it is crucial for a successful ISO-driven QMS implementation, that management allocates financial resources for several rounds of quality training. For example, the prospective quality manager needs training to become a lead auditor (if he/she does not already have such training), members of the quality management and operational teams require training on developing quality documentation, and process control skills are required by operational staff and supervisors. Top management needs to be convinced of the underlying concepts of ISO 9000 and its benefits if properly implemented and operated. The quality management team should have the skills to assist the quality manager in ensuring that the operation of a company's QMS complies with all of the ISO 9000 requirements. In addition, technical employees and site operatives also need concentrated training on how to properly carry out specified works on construction projects to a high standard. In researching construction worker training programmes in Iran, Tabassi and Bakar (2009) discovered that short term training courses at fixed centers (off-the-job training), trainers being sent out to the construction sites (on-the-job training), and self-learning together with taking part in standard exams, are some useful methods that can be used to educate construction workers, which may in turn lead them to applying better controls and procedures and thus helping to prevent the delivery of low quality construction works (ibid 2009). Another author refers to the occurrence of unsuccessful human resources training with regards to becoming ‘an agent of change’ as being one of the root-causes

of ineffective ISO-certified QMSs implemented by Indonesian contractors Novessro (2009). These studies all indicate that the quality of construction projects has a strong correlation with the degree and frequency of training of labor (Tabassi and Bakar 2009).

When examining the Indonesian government regulations pertaining to the implementation of QMSs on construction projects, it is found that all the regulations state that the Government refers to the ISO 9000 standard as a benchmark for the development of QMSs by contractors engaged in Public Works construction projects. In 2005, the National Board of Construction Services Development, in cooperation with the Department of Public Work released the Guidelines of Quality Management Implementation (ISO 9001:2000) for Construction and Consultant Services. The guideline consists of key sections explaining the basis requirements for planning and implementation of QMSs, it also advises on preparation of quality documentation and provides samples of work instructions. However, these regulations only contain general descriptions of what construction firms should do, and the guidelines appear just to be restating ISO 9001:2000 requirements. As a result, the lack of detailed instructions and guidelines for defining and designing QMS documentation and other omissions causes some construction firms to encounter difficulty in properly implementing their quality systems (Novessro 2009). Therefore, despite the existence of both the existing regulations and the guidelines, there is still a burning need in Indonesia for additional comprehensive explanations of procedures, tools and techniques, in order to make the required systems more understandable and practical for contractors and builders.

Conducting comprehensive measurements of company performance enables an organisation's management to acquire a clearer picture of the actual level of their achievements against their defined goals. Hence, they can initiate strategies for corrective and preventive actions to target gap areas or identify where non-conformances are occurring that affect performance and can then set up improvements for raising performance levels. Coffey (2010), in his research, details the Hong Kong Housing Department (HKHD)'s Performance Assessment Scoring System (PASS). PASS (2000 version) consists of two types of measures, namely, an Input (Management) score and an Output (Deliverable) score. These scores are accumulated over a three-month period to constitute a Quarterly Project Score League and a Quarterly Contractors' Score League. The Quarterly Project Score League reflects contractors' performance on individual projects, which triggers discussion of, or action on, poor performance of a contractor for a particular project; whereas the Quarterly Contractors' Score League considers overall performance of contractors across all projects being undertaken (ibid 2010). By using the PASS, HKHD are able to decide which contractor can be invited for all contracts to be tendered out in any quarterly period and those who have no tendering eligibility due to poor performance. PASS is therefore an effective tool used to measure Hong Kong's construction companies' effectiveness and performance (in terms of the quality of their management and delivery of quality outputs) and it uses a successful and highly effective reward and penalty approach. Use of some sort of measurement factor will be another element to be investigated in relation to its importance as a driver to a more effective and continuous improvement of Indonesian contractors' QMS practices.

Lastly, factors that are related to motivating employees are also reviewed. According to Tabassi and Bakar (2009), motivation can be defined as “the characteristic of an individual willing to expend efforts towards a particular set of behaviors”. Thus, in the context of this study, motivation can influence the way people in

the Indonesian construction industry feel, think and act towards implementation, operation, maintenance and improvement of their ISO 9000-certified QMSs. Studies show that the key to motivating employees is therefore to find proper ways to satisfy their needs (ibid 2009). Olomolaiye et al. (1998) provide an example of the most powerful motivational factor to improve company's quality performance, which is by providing a well-designed reward system, such as a financial bonus.

Not only do some authors consider motivational factors as one of the QMS effectiveness determinants, there is some indication that these factors also somewhat reflect the cultural values held by an organisation. In their research, Cameron and Quinn (2006) identify the applicability of one culture type in human resource management roles. This research reveals that companies that possess a 'clan' culture type, respond to employees' needs, including their employees' grievances. Strong motivation driven from all levels of management is, in fact, very important to encourage employees to be fully involved in the company's quality system (Mahmood et al. 2006, Müller and Turner 2010).

Effective QMSs also require judicious use of benchmarking against leading competitors in the same industry (Ahire et al. 1996). These authors further explain that benchmarking should be undertaken with a clear focus on the goals of improving product quality and processes. Indonesian construction companies that operate in the capital city, Jakarta, are considered appropriate to be benchmarked by local companies, as they are G-7 companies, the highest level of contractors qualification, that can be exemplars for their previous good performance in constructing large projects, either on national level or abroad, as well as for their best practices of implementing ISO 9000-certified QMSs.

It is important for a company to recognize that its QMS is always constantly evolving (ISO 9000 Council 2009). Clause 8.5 ISO 9001:2008 urges a company to plan for corrective and preventive action, and continuous improvement (Tricker 2008). An effective QMS can be a 'booster' to continuous improvement of overall business outcomes and thus competitiveness. In other words, a company that has been effectively implementing its QMS will make continuous improvement a potential target to escalate the company's quality standards and procedures, hence improving the holistic quality performance of the organisation.

Table 1: Factors which Impact on Effective QMS Practices in a Construction Company

Measurement Factors	Assessment tools to measure contractor's performance (A) Assessment evaluation of construction project success (B)
Training and QMS Information	Quality training for all staff (C) QMS guidelines covering ISO 9000 requirements specifically for the construction industry (D) Information and tools and techniques regarding QMS practice provided by the Government (E)
Motivational Factors	Incentive schemes for high performing staff (F) Effective management response to settle staff's grievances (G) Strong motivation from all level of management (H) Benchmarking with other certified companies (I)

2.2 Research Methodology

This paper is based on the results from a pilot survey, which was carried out in January 2010. The purpose of the pilot study is to obtain a measure of the perceived importance of each of the nine factors that can influence and impact on an effective and continuous improvement of quality management practices in Indonesian construction companies.

The questionnaire was sent out to nine leading construction companies in two cities in Indonesia; seven out of nine companies were from Manado (North Sulawesi) and two companies were from Jakarta. All had QMSs that were ISO 9000-certified and all held a Grade 7 level government listing qualification. Three sets of questionnaire were distributed - to Quality Manager, Project Manager and Site Engineer in each company. These groups of respondents represent the high level (QM), middle level (PM), and low level (SE) in the organisational structure, and were considered appropriate to provide balanced data in terms of quality management system implementation within their construction companies. Numbers of survey responses returned was 23, which came from eight Quality Managers, six Project Managers, and nine Site Engineers, and all were eventually useable for further analysis under the pilot study. After the data was collected and tabulated, descriptive statistical methodologies were used to analyze and raise discussion of the survey results.

3. RESULTS AND DISCUSSION

In the previous part of this paper, a review of the literature covering the factors to be investigated was presented. The respondents were provided with a list of these factors, which are considered to have a positive impact on QMS practices in their companies. They were asked to express their opinion as to how important each factor is in influencing effective and continuous improvement of their company's QMS. The measure of degree of importance ranges from 'of great importance', to 'of no importance'.

The investigation is aimed at answering the following research questions:

1. How important are measurement factors in supporting the effectiveness and continuous improvement of QMS implementation?
2. How important to contractors are training and information about QMS?
3. How important are motivational factors to successful QMS implementation in construction companies?

The following tables depict the results derived from the three groups of respondents relating to the above questions.

Table 2: Questionnaire Results From Quality Managers

Respondents: Quality Managers $n=8$	Of great importance $M=3.89$ $SD=2.09$	Of some importance $M=4.00$ $SD=1.94$
Factors		
Assessment tools (A)	3	5
Assessment evaluation (B)	5	3
Quality training (C)	3	5
QMS guidelines (D)	4	4
QMS Information (E)	1	6
Incentive schemes (F)	5	3
Management response (G)	6	2
Management motivation (H)	7	1
Benchmarking (I)	1	7

1 respondent rated 'of no importance' for E

Table 3: Questionnaire Results From Project Managers

Respondents:	Of great importance	Of some importance
Project Managers <i>n</i> =6	<i>M</i> =3.44	<i>M</i> =2.44
	<i>SD</i> =1.01	<i>SD</i> =1.01
Factors		
Assessment tools (A)	3	3
Assessment evaluation (B)	5	1
Quality training (C)	5	1
QMS guidelines (D)	3	2
QMS Information (E)	3	3
Incentive schemes (F)	4	2
Management response (G)	3	3
Management motivation (H)	3	3
Benchmarking (I)	2	4

1 respondent rated 'of no importance' for D

Table 4: Questionnaire Results From Site Engineers

Respondents:	Of great importance	Of some importance
Site Engineers <i>n</i> =9	<i>M</i> =4.44	<i>M</i> =4.56
	<i>SD</i> =1.33	<i>SD</i> =1.33
Factors		
Assessment tools (A)	3	6
Assessment evaluation (B)	5	4
Quality training (C)	6	3
QMS guidelines (D)	4	5
QMS Information (E)	4	5
Incentive schemes (F)	7	2
Management response (G)	3	6
Management motivation (H)	4	5
Benchmarking (I)	4	5

As can be seen from the tables above, every group has different opinions regarding the factors considered to be 'of great importance', but this rating was achieved from the highest number of respondents in every group. Most Quality Managers (QMs) believe that strong motivation from all management levels (H) is very important. QMs represent those that are responsible to ensure that QMSs are effectively implemented by top and middle management and staff. Their views are based on front-line experience based on what has actually been implemented by the management within their companies to support the operation of QMS. This finding supports the research described by Novessro (2009), where the author cites a lack of management commitment at the top of the list of the common failures during QMS implementation in construction companies of Indonesia.

However, this result is not replicated in the groups of Project Managers and Site Engineers. The most important factors chosen by most respondents from the group of Project Managers were assessment evaluation of construction project success (B), and quality training for all staff (C). The high rating of the need for quality training may be due to the lack of quality training programs at the level of these respondents. This bears out the finding from the literature that insufficient employee training is one of the typical problems related to successful QMS implementation (Tabassi and Bakar 2009). In the case of the Site Engineers group, seven agreed that increased financial rewards (F) could motivate them to fully implement the QMS. Incentive schemes may be financial or non financial, for example, staff training, development, and promotion, all of which can stimulate employees from the lower to the middle levels of the company to be more productive and better qualified.

The above tables also show that other motivational factors were chosen by more than 50% of the respondents in every group as being 'of great importance'. Besides benchmarking (I), two

other motivational factors, namely effective management response to settle staff's grievances (G) and incentive schemes for high performing staff (F), are identified as being very important factors by the Quality Manager group of respondents. Factor F is also considered to be of high importance by the group of Project Managers, as well as additional ISO 9000 QMS guidelines specifically designed for the construction industry (D). Site Engineers also emphasize that they need training facilities provided by their companies (C), and view assessment evaluation of project success (B) as very important for overall QMS success.

Despite 91% of all respondents that opine all factors are essential in driving management and staff behavior and perception to effectively implement their companies QMS, among these, there are also more than 50% of the respondents in every group who rated 'some importance' against these factors. The group of Project Managers only deemed the benchmarking factor (I) as being 'of some importance', whereas the literature deems it is very necessary for an incentive program; other motivational factors were considered 'of not great importance' by the group of Site Engineers. All factors regarding the need of training and QMS information were not considered to be significant by most of Quality Managers. Since the QMs had received some quality training when they were assigned to be quality management representatives, this may explain why they may think that training programs and QMS information are not of great importance to them currently. In relation to their view on a set of guidelines characterizing the way the government driven QMS requirement can be properly implemented in construction companies, this group appears to think it may be beneficial. However, they seem not to place too much importance on this guideline as a major factor contributing to project success as they understand that there is already an ISO 9000-certified QMS that enables them to interpret each requirement of the standard to be incorporated into a company's quality procedures.

The figure below highlights those factors that were specifically judged by most of the respondents from every group to be of high importance for their QMS implementation.

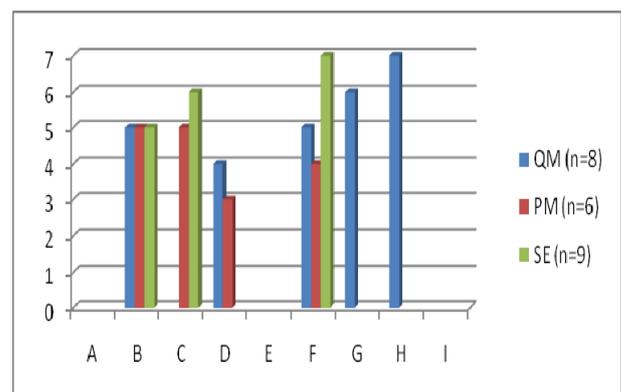


Figure 1: Factors considered as of being of great importance by the majority of respondents in every group

From the above figure, it can be noted that most of the participants who were construction practitioners in their companies assume that an evaluation instrument to measure their project success (B) and incentive scheme (F) as company's rewards, can be very influential in them, hence improve company and their performances. Also, assessment tools to measure contractor's performance (A), information and tools and techniques regarding QMS practice provided by the Government (E), and benchmarking

program are important factors, but not as much as the B and F factors.

Figure 2 shows the factors for improving worker and company quality performances, based on applying effective and continuous improvement of the QMS.

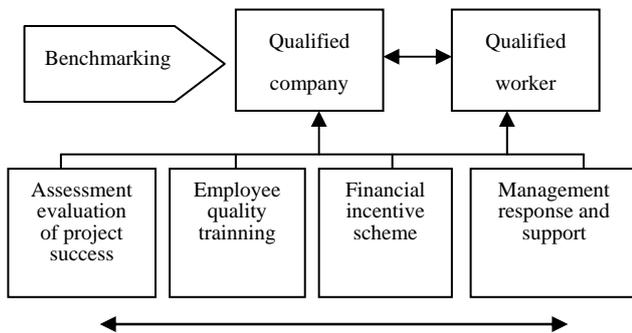


Figure 2: Factors for effective and continuous improvement of QMS implementation and motivate employees and the company towards quality performance

4. CONCLUSION

Taking into account the above results and discussion, several conclusions can be derived as follows:

Although the factors listed are considered important by the majority of the respondents, the differences of the degrees of importance made for each factor indicate that there are specific reasons underlying their range of opinions.

Some of the reasons for this may be due to the lack of management commitment and resources made available to support each factor.

The overall assessment made by the respondents (or rather their contractors), out of nine factors is that two factors are agreed by the majority of all groups as providing a great contribution to the success of QMS implementation and therefore of high importance, they are:

- Assessment evaluation of project success
- Incentive schemes for high performing staff

However, three factors considered as being of some importance are:

- Measuring contractor's performance
- Technical QMS information provided by the Government
- Benchmarking with other certified companies

Being able to effectively implement a quality management system, such as one developed under ISO 9000 standard; means that as a consequence, the company will have the best opportunity to continuously improve its quality system, and hence its overall quality performance leading to customer satisfaction.

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