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CHALLENGES IN THE IMPLEMENTATION OF QUALITY CONTROL TECHNIQUES DURING SITE INSPECTION

NUR NABIHAH ABD RAZAK[1], INTAN ROHANI ENDUT[1], SITI AKMAR ABU SAMAH[2], AHMAD RUSLAN MOHD RIDZUAN[1], and SABIHAH SAAIDIN[1]

[1]*Faculty of Civil Engineering, Universiti Teknologi MARA, Shah Alam, Selangor*
[2]*Akademi of Language Studies, Universiti Teknologi MARA, Shah Alam, Selangor*

Quality has been the main issue in construction projects. In handling it, the quality control techniques during construction process are required to thoroughly carry out in order to avoid any mistakes which lead to bigger problem such as poor quality of project outcomes. The implementation of quality control techniques during site inspection is able to discard all possible negative effects towards construction projects. There are three quality control techniques that have been used during site inspection known as Project Quality Plan (PQP), Inspection Test Plan (ITP) and Checklist. In order to implement these techniques, there are some matters that need to be identified and overcome. Therefore, this study has been carried out to identify the challenges in implementation of quality control techniques during site inspection. To achieve the objective, the survey questionnaire was distributed among G5, G6 and G7 contractors' in Malaysia. A total of 82 useable questionnaires were received and analyzed using factor analysis. The challenges were clumped and categorized into respective groups. The seven groups were renamed, namely: (1) attitude, (2) documents, (3) operations, (4) management, (5) workers, (6) information and (7) methods. This study helps to improve the quality control techniques especially during site inspection among Malaysian contractors.

Keywords: Challenges, Implementation, Quality control, Site inspection, Techniques.

1 INTRODUCTION

Construction Industry Development Board Malaysia (CIDB) has established the Construction Industry Standard known as CIS 7:2006 for Malaysia's construction projects. The standard focus on quality of structural works comprises the site inspection for formwork and the laboratory test on concrete and materials required for construction (CIDB 2006). Inspection is the process of observation at construction site that outlines divergence of components based on the material specifications, tests and techniques implemented (Building Inspection Guideline 2012). Tamaki (2014) points out that activity of assuring construction works complies with standard is by doing physical scrutiny called inspection. Hence, the identified quality control techniques are needed to be implemented during site inspection. In order to do so, the challenges in its implementation need to be clarified and overcome.

2 QUALITY CONTROL TECHNIQUES

In this study, the techniques of quality control used during site inspection are Project Quality Plan (PQP), Inspection Test Plan (ITP) and Checklist. PQP is a planned set of construction activities that helps in controlling the project quality. Prior to the commencement of construction works, PQP must be developed and required an approval from the Engineer (Noel 2015). There is emphasis on the necessity of clear statements in the PQP to assure the information is deliverable for everyone as well as smooth progression of the project. PQP is one of major documents for construction projects to evaluate the project quality.

Meanwhile, Wauchope (2014) indicates that Inspection Test Plan (ITP) highlights the critical control points for each construction phase such as scheduled inspection or verification activity by securing the progression of works. According to Mande (2013), ITP must consist of detailed document for each construction phase that has been verified, details on required equipment for the test and finally concluded the results from each conducted test.

The purpose of the checklist is for identification, revision and correction found during inspection which does not follow the standards and requirement. The essential matters in the checklist are all information of project which details are compiled and upgraded via the checklist followed by construction processes (Ruin 2009).

3 CHALLENGES

The quality control techniques namely PQP, ITP and Checklist are identified and the challenges implementing these quality control techniques in Malaysian construction projects are investigated.

Documents are records required at construction site since it contains various construction activities. The main purpose of developing the documents is an act of communication between project team. These documents require contractors obligation so as to fulfill all the standards stated in the contracts. Thus, all crucial documents must be presented during inspection at construction site. However, if the documents are not properly managed and organized it could lead to other problems. As been clarified by Low and Ling-Pan (2004), the restriction and inefficiency in updating these documents can inflect the effectiveness of quality control techniques. The exact information must be conveyed and reported so as to assure that there will be no same mistake made as well as to avoid carry out jobs redundancy. As been agreed, there was a case involved in Indonesian construction project which the main causes lead to that problem, that is, absence in quality information. In line with Chin-Keng and Abdul-Rahman (2011), the stumbling block in implementation of this system is synchronized with the involved documents for construction projects.

An approach from top management can be seen from its support, commitment, and suitable quality policy that need to be accepted by employee (Sambasivan and Yun 2007). Most of barriers to implement the new quality control techniques or system come from lack of support from top management (Shehu and Akintoye 2010). Insufficient support from top management has been a known issue since it has been agreed and declared by most researchers such as Escanciano *et al.* (2001), Wiele *et al.* (2005), Hesham and Magd (2007), as well as Al-Najjar and Jawad (2011). The commitment and dedication from top management can influence the continuous improvement if it has been shown on the quality aspects.

According to Low and Ling-Pan (2004); as well as Chin-Keng and Abdul-Rahman (2011), the support from top management is crucial factor in execution quality control system. Furthermore, top management has an obligation in establishing a rigid quality policy as well as continuous assessment on the effectiveness of quality control system.

The scope involved with workers such as the accessibility of training, relationship between team members, the awareness of quality control systems, the willingness of receiving new system among team members and the human resources given (Wiele *et al.* 2005). Poor accessibility of training was a hindrance in ensuring better implementation of quality control techniques (Ibrahim 2005). Team member is a group of people connected in finishing the construction projects and all the decisions made consist of consents in each team member. As been declared by Balzarova *et al.* (2002), one huge barrier or hindrance towards a successful quality control technique is lack of team work. Meanwhile, awareness is something that required companies to ensure its employees to feel that each team member is part of quality organization (Crosby 1996). This indicates that without team members' consciousness towards the importance of quality control system, it can cause negligence and unwillingness to follow the provided quality policy.

To establish, introduce and implement these quality control techniques do consume time and cost. It is supported by the companies that require time and cost to productively implement these techniques thoroughly, since the processes vary and are large to cover and at the same time to assure there is a specified improvement to achieve (Dory and Schier 2002). Meanwhile, it has been found that the most difficult elements to comply in better implementation of quality control techniques are cost and time (Stevenson and Barnes 2001, Dickenson *et al.* 2004).

4 METHODOLOGY

The survey questionnaire was distributed by hand or email and a total of 82 useable questionnaires were collected. The targeted respondents were Project Manager, QA and QC Manager, Site Engineer, Site Supervisor and Construction Manager from G5, G6 and G7 contractors within the area in Selangor, Malaysia. They were registered under Construction Industry Development Board Malaysia (CIDB). Meanwhile, the questionnaire forms were produced by using the Likert Scale range from one until five developed by Rensis Likert in 1932. Factor analysis was used for data analysis using SPSS to identify, manage and reduce wide items to the smallest item from the questionnaire (Chua 2009).

5 RESULT AND DISCUSSION

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) test was carried out to check the data suitability for Factor Analysis. According to Field (2009), the value of KMO varies according to a range such as value above 0.9 being excellent, values between 0.9 and 0.8 are great, values between 0.8 and 0.7 are good and values between 0.7 and 0.5 are mediocre. Meanwhile, for Bartlett's Test of Sphericity the value must be less than 0.05. Table 1 indicates that the values of both KMO and Barlett's Test of Sphericity are satisfactory for factor analysis.

Table 1. KMO and Barlett's Test of Sphericity.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.768
Bartlett's Test of Sphericity	Approx. Chi Square	1012.032
	df.	.276
	Sig.	.000

The result from factor analysis has been separated according to the respective groups and there were seven groups. Table 2 presents the rotated component matrix which contained seven components.

Table 2. Loading for rotated factor matrix.

Barriers	Component	Loading
Lack of trust-based relationship between project team.	1	0.808
Lack of supervision.	Attitude	0.753
Unwillingness of project team to accept and adapt the quality control system.		0.680
Lack of training and motivation.		0.569
Allocation of financial and human resources by top management is taken lightly.		0.547
Lack of awareness in benefits of implementing quality control techniques consistently.		0.503
Negligence on Technical Report in order to pursue construction works.	2	0.751
An unorganized Resources Plan.	Documents	0.713
The provided Quality Manual is difficult to comply and understand.		0.548
Top management rarely conducts management reviews on project quality.		0.534
Time consuming.	3	0.841
High operating cost.	Operations	0.780
Lack of knowledge in managing certain job.		0.520
Inadequate attention on setting quality policy by top management.	4	0.752
Inadequate top management support.	Management	0.606
Unclear description for each worker's roles and responsibilities as has been stated in Manpower Record.	5 Workers	0.709
Do not implement on a full scale.		0.658
The Progress Report is not up-to-date	6	0.858
Lack of information regarding defects and corrective action taken in Progress Report	Informative	0.654
Contractors do not comply with Method Statement	7	0.759
The unclear and unspecified information of Method Statement	Methods	0.748

- **Component 1: Attitude –** This principal consists of seven components. The first component consists of six variables that contribute to difficulty in implementing the quality control system that lacks trust-based relationship between project team, lack of supervision, unwillingness of project team to accept and adapt the quality control system, lack of training and motivation, allocation of financial and human resources by top management is taken lightly and lack of awareness in benefits of implementing quality control techniques consistently. The main point is lacking in human behavior itself to comprehend and understand the whole purpose of quality control techniques. It reflects the nature and culture of working in construction projects which must not be taken lightly.
- **Component 2: Documents** – The second factor consists of four components that need to be filed for construction projects. These four variables are negligence on Technical Report in order to pursue construction works, an unorganized Resources Plan, the provided Quality Manual is difficult to comply and understand, and top management rarely conducts management reviews on project quality. Although some may conclude that these files are not as important towards effective quality control system, due to its small purpose in construction projects may contribute to huge unseen problem if neglected.
- **Component 3: Operations –** The third factor consists of three components, namely time consuming, high operating cost, and lack of knowledge in managing certain job. It is due to the focal point that operates these quality control system that many have agreed on the

overshadowing in terms of time and cost which is unbearable if not followed. In addition, because of less knowledge in handling a specific job, this may be a hindrance towards effective implementation of these quality control systems.

- **Component 4: Management –** The fourth factor consists of two components, namely inadequate attention on setting quality policy by top management and inadequate top management support. These two components reflect the sole purpose of top management establishing in construction projects so as to assure that quality methods or procedures are followed. At the same time, developed or created a department helps in enhancing the quality control for construction projects.
- **Component 5: Workers –** This fifth factor consists of two components, namely unclear description for each worker's roles and responsibilities, as has been stated in Manpower Record and have not been implemented on a full scale. Those two factors briefly said that the responsibilities of workers involved in construction projects and due to vague picture of tasks, the workers may be in non-systematical orders. Moreover, the quality control technique is lack of encouragement since it has been taken lightly and lack of thorough implementation in large scale that emphasizes on the quality control.
- **Component 6: Informative –** The sixth factor consists of two components, namely Progress Report that is not up-to-date and lacks of information regarding defects and corrective action taken in the Progress Report. The Progress Report has been agreed by many experienced personnel in construction projects that give most impact in conducting the quality control because it is a consistent and frequent updated file for construction process. Furthermore, it contains the identified defects or any error that could bring mishap during construction. Briefly said, it gives important information and it is so informative for construction projects. If the information in the report is disorganized, it becomes the problem for better implementation of quality control techniques.
- **Component 7: Methods –** The seventh factor consists of two components, namely do not comply with Method Statement and the unclear and unspecified information of Method Statement. Method Statement comprises all procedures for construction projects and it gives a clear definition for each procedure. Due to lack in explanation in Method Statement, this can lead to misunderstanding of construction projects objective. Moreover, the descriptions in Method Statement give a lot of similarities in method for construction projects.

6 CONCLUSION

Most of the results have shown that the challenges comes from human factors, such as lack of supervision, lack of strong relationship among team members, unwillingness to accept new quality policy and lack of awareness in benefits to implement these techniques. Lack of financial supports from top management and lack of training are also part of the challenges to implement the quality control techniques. The result indicates that in order for these techniques to be implemented, there has to be commitment and dedication from all personnel to assure its implementation. In addition, disorganized and outdated information in documents implicated better implementation of these techniques. Even though the techniques used are advanced techniques, without an experience personnel to supervise it and proper documents, the system will not give any help in controlling the quality of construction projects.

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