Full paper

International Journal of Real Estate Studies

INTREST

The Roles of Contractors in Implementing Quality Assessment System in Construction (QLASSIC) in Construction Projects

Mohd Shazreen Seman*, Mohd Reza Esa, Mohd Reeza Yusof

Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia

*Corresponding author's email: shazreenshamsaiman@gmail.com

Article history: Received: *13 July 2021* Received in revised form: *8 September 2021*
Accepted: *21 October 2021* Published online: *30 November 2021*

Abstract

In recent decades, the construction industry has been widely criticized for its lack of efficiency and productivity, and it has been shown that the Malaysian construction industry records poor quality on its projects. To overcome this issue, the Technical Committee on Quality Assessment in Construction with the support of the Construction Industry Development Board (CIDB) has introduced Quality Assessment System in Construction (QLASSIC). QLASSIC is a scoring system that is used to assess and evaluate the performance of construction buildings. It is based on the Construction Industry Standard (CIS 7:2006). Unfortunately, this assessment system had poor implementation since its introduction in November 2006. QLASSIC was not extensively implemented and was taken lightly by the contractors and developers in Malaysia. There are still a huge number of contractors that are not aware of QLASSIC even the big construction companies. Thus, this research is aimed at investigating the contractor's perspective towards the implementation of QLASSIC in the construction industry in Malaysia. Three objectives are developed to achieve the aim: (1) identification of the needs to implement QLASSIC; (2) investigation of issues and challenges to implement QLASSIC and (3) recommendation of strategies to implement QLASSIC. Structured questionnaire surveys were distributed to the G7 and G6 contractors in the Klang Valley area; which may have or may not have experience in implementing QLASSIC in their projects. The result revealed that majority of the respondents were aware and understand the needs of QLASSIC implementation, but there were still few who were unfamiliar with the QLASSIC. The current level of implementation of QLASSIC in Malaysia is still not satisfactory due to several issues and challenges acting as barriers to its implementation. Therefore, the initiatives from the government are important to promote QLASSIC implementation in the construction industry. By doing this, the contractors would be aware of the implementation of QLASSIC in the construction industry. The significance of this research is that it will assist contractors and other construction players in comprehending the implications and importance of QLASSIC implementation.

Keywords: Quality assessment, QLASSIC, contractors, benefits, issues and challenges

1.0 INTRODUCTION

The construction industry is one of the most important industries for a country's growth. As one of the most important industries, it plays a crucial role in the other industry's development as an enabler for the growth of other industries (Ibrahim et al., 2010). Quality is one of the most important factors in determining the performance of construction projects. The quality of construction projects is linked to good quality control at all stages of the project life cycle (Ashokkumar, 2014). Quality, time, and cost are three main components in a construction project which is to attain a balance construction project success (Building and Construction Authority, 2008). According to Oyebamiji (2019), the construction industry is unforgiving nature towards poor product quality as both contractors and clients can be impacted by these problems. In the initial stages, British Standard (BS) 5750 was implemented as a quality assurance system by the BSI association and this standard has since brought quality concerns to the construction industry. ISO 9000 is one of the principles that provide a collection of criteria for establishing a quality system to manage the processes that affect its product and services (Tan & Kamil, 2016). The adoption of the ISO 9000 system in the construction industry is not as wide as in other industries such as the manufacturing industry. To cope with this problem, Construction Industry Development Board (CIDB) had introduced Quality Assessment System in Construction (QLASSIC) using the Construction Industry Standard (CIS) 7:2006, adapted from the Construction Quality Assessment System (CONQUAS) in Singapore to meet the requirements of the construction industry in Malaysia (Kam & Hamid, 2012b). It is a quality assessment system for building construction work standards through a scoring system (CIDB, 2020). According to Manap et al. (2017), QLASSIC became a special guideline for determining the quality of construction work as well as the standards for the project's quality level. The challenge now is to achieve widespread adoption of this quality assessment system, because there are a few numbers of contractors practicing QLASSIC in their projects. Thus, this paper aims to report on the perception of contractors towards implementation of QLASSIC assessment by identifying its possible benefits and challenges of its implementation. Therefore, the significance of this

research is to give exposure to the contractors about the application of QLASSIC which is expected to increase their awareness towards implementation of QLASSIC and to assist the authorities with some useful information.

■2.0 LITERATURE REVIEW

The definition of quality refers to the totality of the features and characteristics of a product or service which underpins its capacity to satisfy stated or implied needs (ISO, 1994). According to Salvi and Kerkar (2020), quality is referred to the degree to which a product is likely to meet the construction agency's required requirements and limitations. Quality control in the construction industry is critical to the industry's growth (Sandirasegaran & Manap, 2016). According to Rumane (2018), construction quality depends largely on construction control, which is the contractor's key responsibility. One of the most important aspects of any construction project is quality. The quality of construction as well as the project's success can be seen as the fulfilment of the expectation of the project participants (Ashokkumar, 2014). According to Sohimi et al. (2016), in building construction works, defects and failures are common. This problem can reduce the quality and value of buildings. Therefore, some approaches of the measurement method for housing must be made compulsory in the construction industry (Manap et al., 2017).

The purpose of the QLASSIC is to improve the quality of the construction industry in Malaysia. According to Ali (2010), the introduction of QLASSIC in the construction industry is expected to solve some of the predominant quality issues that have plagued the industry. The objectives established by the QLASSIC are:

- To benchmark the quality of workmanship of the construction industry in Malaysia;
- To have a standard quality assessment system for the quality of workmanship of building projects;
- To assess the quality of workmanship of a building project based on CIS 7 standard;
- To evaluate the performance of contractors based on the quality of workmanship; and
- To compile data for statistical analysis.

There are several categories of buildings projects that can be accessed using QLASSIC such as residential, public, commercial and industrial buildings. The total score of building quality is divided between the cost proportions of four components; which are the structural work, architectural works, mechanical and electrical works and external works. Table 1 summarises the building elements that will be evaluated.

Table 1 Summary of building components to be assessed

Component	Description
Structural Works	The structural integrity of the building is of paramount importance as the cost of failure and repairs are very significant. The assessment of structural works comprises: I. Site inspection of formwork, steel reinforcement, prefabricated or pre-cast elements, and so on during the construction. II. Laboratory testing of compressive strength of concrete and tensile strength of steel reinforcement. III. Non-destructive testing of the uniformity and the cover of hardened concrete.
Architectural Works	Architectural works deal mainly with finishes. This is the part where the quality and standards of workmanship are most visible. Architectural works are works such as floors, internal walls, ceiling, door and window, fixtures and fittings, external wall, roofs, driveway, porch and apron
Mechanical and Electrical (M&E) Works	The quality of M&E works is important in view of its increasingly high cost proportion and its impact on the performance of a building. The assessment covers electrical works, Air-Conditioning and Mechanical Ventilation works (ACMV), fire protection works, sanitary and plumbing works, lifts, escalator and other basic M&E fittings
External Works	External works cover the general external work elements in building construction such as the link wats or shelters, drains, road works, car parks, footpaths, turfings, playgrounds, gates and fences, swimming pools, hardscapes and electrical substation.

QLASSIC assessments are performed by site inspection, using the first-time inspection concept. Assessment is done by taking samples randomly from the project. The number of samples used in the assessment will be determined by the project's Gross Floor Area (GFA). According to Manap et al. (2017), QLASSIC Assessment will be carried out after the completion of a building construction works and before-hand over the completed project. The processes of the QLASSIC are shown in Figure 1 below. According to CIDB (2014), to commence implementation of QLASSIC towards the completed construction project, developers or project owners or contractors must apply to CIDB by submitting a request.

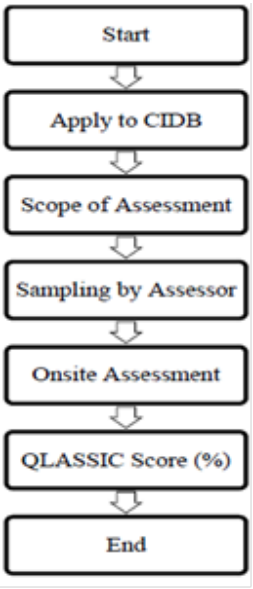


Figure 1 QLASSIC process flow
(Source: *CIDB, 2014*)

The QLASSIC assessment on building construction projects shall be conducted by a CIDB-appointed professional assessor (CIDB, 2014). According to Ali (2014), QLASSIC can be classified as a third-party assessment. Marks are given if the inspected building elements meet the quality acceptance requirement specified in CIS 7: 2006. According to Sohimi et al. (2017), it is very important to have competent assessors to access and measure the quality of a building because it can affect the QLASSIC evaluation process. To become a QLASSIC assessor, a construction practitioner has to attend the QLASSIC training course that is organized by CIDB (CIDB, 2006). Figure 2 illustrates CIDB's QLASSIC awareness process and assessor training course. According to Khalid and Tamjehi (2020), QLASSIC training has been implemented to increase assessors' performance in evaluating building quality.

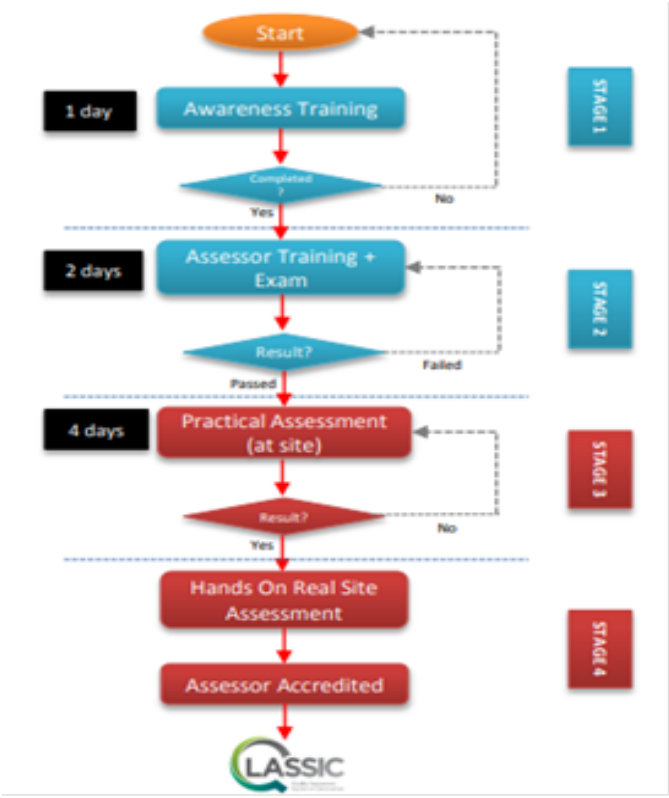


Figure 2 QLASSIC awareness and assessor training process
(Source: *CIDB, 2014*)

In general, the purpose of implementing QLASSIC in the construction industry is to efficiently incorporate resources to improve the quality of construction works. Referring to Master Builders Association Malaysia (MBAM), there are several benefits of QLASSIC implementation in the construction industry. QLASSIC is beneficial to contractors by the outcome of the QLASSIC assessment which is the QLASSIC Score. It can be set as a quality objective that needs to be achieved for the overall projects. The implementation of QLASSIC brings many impacts to the construction industry. The summary of the benefits of implementation QLASSIC is shown in Table 2.

Table 2 Summary of benefits of implementing QLASSIC

Benefits of implementing QLASSIC	Authors
Improving the functionality and ensuring customers are satisfied to a certain degree	Din et al. (2011)
The performance of the contractor can be evaluated	Kam and Hamid (2012a) Azir et al. (2018)
As a benchmark quality of the project	Ali (2014)
Build the reputation of the contracting firm	Sohimi et al. (2016)
Improve the productivity of the project and build the competitiveness of the company.	Zin et al. (2009)
Lower cost by reducing re-work, shorten the lead time	Ali (2014)
Improve workmanship and quality of building construction	Tang et al. (2005)
Assist contractor to accomplish zero defect	Kam and Hamid (2012a)
Enhance its overall quality control	Hwang et al. (2013)
Minimize the defects on the works	Ali (2014)

QLASSIC was not widely implemented and was often taken lightly by the contractors and developers in Malaysia (Norizam & Malek, 2013). According to Kam and Hamid (2015), the QLASSIC system brings benefit towards improving the construction industry standard of workmanship, but at the same time construction industry faced barriers in getting acknowledgment and implementation among the construction industry players and in implementing this system in their building construction projects. The summary of barriers to implementing QLASSIC is shown in Table 3.

Table 3 Summary of barriers of implementing QLASSIC

Barriers to implementing QLASSIC	Authors
An additional cost due to requirement fees	Ahmad et al. (2014)
Causes delays in construction projects	Manap et al. (2017); Bernama (2017); Norizam and Malek (2013)
More time spent in management, more paperwork, and increase bureaucracy	Sia et al. (2010)
Lack of knowledge about the QLASSIC	Kam and Hamid (2015)
Lack of experience and competency	Ali and Wen (2011)
Contractors not aware of the QLASSIC implementation	Ipsos Loyalty (2017)

QLASSIC had been adopted by CIDB since the end of the year 2006. There are a few concerns and problems that need to be resolved after more than five years of operation (Ali, 2014). To address the issues and problems associated with implementing QLASSIC in the Malaysian construction industry, a few strategies for improving the QLASSIC are suggested in this research. It is important to enhance the QLASSIC assessment regularly to achieve a higher quality to assure the implementation of QLASSIC is well received by the contractors or other construction players in the Malaysian construction industry. Table 4 shows the summary of strategies to improve the QLASSIC implementation in the construction industry.

Table 4 Summary of strategies to improve the QLASSIC implementation

Strategies to improve QLASSIC implementation	Authors
Provide training for employees at the construction site	Jraisat et al. (2016); Ling and Bui (2010); Sohimi et al. (2017)
Subcontractors, consultants and Superintending Officer (S.O) are recommended to engage in the QLASSIC training	Sohimi et al. (2016)
Reduce the time taken to create QLASSIC reports	Ali et al. (2014)
QLASSIC scoring system needs to be improved	Azir et al. (2018)
Promote QLASSIC by hosting road shows, workshops and training	Azir et al. (2018)
Government and CIDB can reduce QLASSIC registration fees	Ali et al. (2014)
Enhance CIDB oversight of the external assessors' assessments	Ali et al. (2014)
Enforce the use of QLASSIC as the primary criterion of project approval	Manap et al. (2017)
Government would make QLASSIC assessment a mandatory for all government projects	Katessan (2017)
The measuring tools should be included with reliable software	Ali and Wen (2011); Norizam and Malek (2013)

■3.0 METHODOLOGY

An intensive literature review was conducted to explore the information related to QLASSIC implementation in the Malaysian construction industry. This research aims to investigate the contractor's point of view towards the implementation of QLASSIC in Malaysia's construction industry. The paper began with a review of QLASSIC and its benefits and barriers in the construction industry. Subsequently, a structured questionnaire was used to obtain the data. The research focused on the construction industry was involved a building project in the Klang Valley area. Klang Valley is located in the centre of Kuala Lumpur; it encompasses the state of Selangor's bordering cities and towns. It comprises the Federal Territory of Kuala Lumpur, the Federal Territory of Putrajaya, Selangor District of Petaling, Klang, Hulu Langat and Gombak. The target respondents of this research are the G6 and G7 contractors registered under CIDB that may have or may not have experience in implementing QLASSIC in their project. The population of registered contractors under CIDB for G7 in Klang Valley's area is 2276 companies while population of registered contractor under CIDB for G6 was 527 companies. The total population for both contractors G7 and G6 that were registered under CIDB was therefore 2803 companies. According to a table by Krejcie and Morgan (1970), the sample size for populations G7 and G6 in Klang Valley is in the range of 338 respondents. Extra numbers of the questionnaire were then distributed to the respondents through email to obtain the data and information related to the research. The respondents of this survey consist of construction practitioners who are contractors, engineers, site supervisors, construction project managers and any person that in charge of a construction project. Due to the COVID-19 pandemic and Movement Control Order (MCO) implemented by the government that had restricted the collection of data. Although the questionnaires were distributed to various construction practitioners but only a few of them responded. The questionnaire was divided into three parts. Part A briefly exhibits the demographic information such as company grade, the position of respondent, year of experience, and construction quality assessment type that is being used by the firm. Part B comprised of the awareness toward the QLASSIC, needs and barriers of implementing QLASSIC. Lastly, Part C was designed to ascertain the strategies for improving QLASSIC. These parts were formatted in attitude scale as Likert Scale type. The data received were analysed using the descriptive analysis which showed the unvaried summary statistics such as mean for several variables in a single table and calculated the standardized value. This method was achieved using the Statistical Package for Social Science (SPSS) software. The results were used to get contractor's perspectives on QLASSIC implementation, including their understanding of QLASSIC's needs, challenges, and strategies for improving QLASSIC implementation.

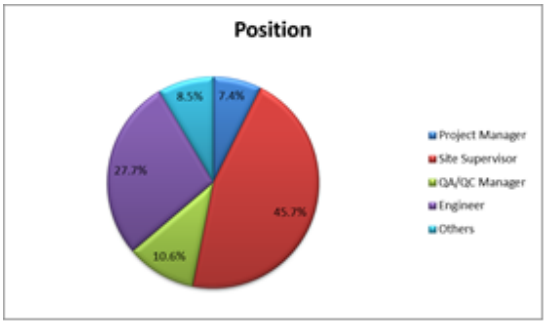
■4.0 RESULT AND ANALYSIS

The study aims to explain the main findings of the research based on the data obtained through the distribution of the questionnaires. In this research, more than 338 sets of questionnaires were distributed across Klang Valley. These sets were distributed via e-mails, WhatsApp links and also social media platforms by using the application of Google Docs form to the respondents. However, only 94 sets of questionnaires were answered within a stipulated period. The percentage of the response received over the number of questionnaires distributed is 27.8%. In construction management study, a response rate of 27.8% is sufficient, as the average response rate in postal questionnaire surveys of the construction industry is between 20% and 30% (Akintoye & Fitzgerald, 2000). Therefore, the feedbacks from the 94 respondents in this research were sufficient to make statistical analysis for the research.

Part A underscored the demography of the respondent's company. The result shows that 45.7% of 43 respondents out of 94 respondents are Site Supervisors, followed by Engineer 27.7% (26 respondents), QA/QC Manager 10.6% (10 respondents), and Project Manager 7.4 % (7 respondents) respectively. Other positions that were not mentioned were Quantity Surveyor, Licensing Assistant, and Project Engineer with 8.5% (8 respondents) as Figure 3(a). Figure 3(b) shows that 73.4% equal to 69 numbers of respondents have applied

Quality Assessment in their current or previous projects. Meanwhile, the remaining 26.6% of the respondents with 25 respondents did not experience or not applied any Quality Assessment in their current or previous projects. Furthermore, 62 numbers of respondents with 66.0% have implemented QLASSIC as their quality assessment for the construction projects. While, 24 respondents with 25.5% have never used or unfamiliar with quality assessment for construction and the rest of the results were using the other quality assessment methods such as CONQUAS, QAQC, and ISO as Figure 3(c).

a)



b)

c)

Figure 3 (a) Demographic distribution of respondent's position; (b) Demographic distribution of Quality Assessment implementation; (c) Demographic distribution of type of Quality Assessment that has been used

In Part B, the data were analysed by using descriptive analysis. The first data analysed is the awareness towards the QLASSIC. According to Table 5, a majority of the respondents were aware and have knowledge that CIDB provides application of QLASSIC assessment. This is because this statement has the highest mean score among the others which is 4.23 and a standard deviation of 1.051. As can be seen in the Table 6, the respondents have a higher level of consciousness about that statement. In the second-highest rank, the respondents were also conscious that QLASSIC assesses structural, architectural, mechanical & electrical and external works. This statement has a mean score of 4.18 and a standard deviation of 1.057. As shown in Table 6, we can see that the respondents have a lower level of consciousness about that statement. Next, respondents were also aware that QLASSIC implementation is to increase the construction quality performance. This statement has a 4.17 mean score and a 1.063 standard deviation. Respondents also respond on QLASSIC is to provide a standard for satisfactory on-site workmanship by defining the desired final product quality. This statement has a mean score of 4.16 and a standard deviation of 1.070. Lastly, in the fifth rank in the awareness towards the QLASSIC implementation was assessment will be carried out by an external assessor. This statement has a mean score of 4.13 and a standard deviation of 1.089.

Table 5 Distribution of mean and standard deviation for awareness towards QLASSIC

Awareness towards QLASSIC	Mean	Standard Deviation	Ranking
CIDB provides application of QLASSIC assessment.	4.23	1.05163	1
QLASSIC assess structural, architectural, mechanical and electrical, and external works.	4.18	1.05711	2
QLASSIC is to increase construction quality performance	4.17	1.06396	3
QLASSIC is to provide a standard for satisfactory on-site workmanship by defining the desired final product quality.	4.16	1.07066	4
Assessment will be carried out by the external assessor.	4.13	1.08988	5

\

Table 6 Mean value for scale of awareness level

Mean	Level of Awareness
1.00 - 1.80	No Awareness
1.81 - 2.60	Subconscious awareness
2.61 - 3.40	Altered state of consciousness
3.41 - 4.20	Lower-level of consciousness
4.21 – 5.00	Higher-level of consciousness

Based on Table 7, the element with the highest distribution of mean 4.52 was the performance of the contractor can be evaluated. This means that most of the respondents agree on the need to implement QLASSIC in a construction project. This was followed by the benefit to improve workmanship and quality of the building's construction with a mean of 4.50 and a standard deviation of 0.502. This means that the respondents believe that QLASSIC can enhance the workmanship building efficiency. The third highest mean score was to evaluate the standard of quality of building industry with the mean score at 4.49 and standard deviation of 0.523. As a benchmark of the quality level for several construction elements and enhance construction quality by a contractor are ranked on the fourth and fifth in this part with the mean distribution of 4.48 and 4.46 respectively.

Table 7 Distribution of mean and standard deviation for the needs of QLASSIC implementation

Benefits of QLASSIC Implementation	Mean	Standard Deviation	Ranking
The performance of the contractor can be evaluated	4.52	0.50223	1
Improve workmanship and quality of building construction	4.50	0.50268	2
To evaluate the standard of quality of the building industry.	4.49	0.52353	3
As a benchmark of the quality level for several construction elements	4.48	0.50223	4
Enhance construction quality by contractor	4.46	0.54210	5

Table 8 briefly indicates the result of barriers in the implementation of QLASSIC in a building project. Most of the respondents agreed that incompetence and lack of experience is one of the factors contractors are reluctant or have been a barrier for them to implement QLASSIC in their construction project. This statement was in the first rank due to the highest mean score of 4.54 and standard deviation of 0.682. Respondents believe that lack of experience and expertise is the main quality concern in the construction industry that leads to poor workmanship in construction projects. This was followed by contractors in the construction industry are lack knowledge about the QLASSIC system is the second highest mean with 4.51 and a standard deviation of 0.683. The next barrier to implementing QLASSIC in the construction industry is contractors failed to understand that implementing QLASSIC may minimize the defect with a 4.38 mean score and 0.704 standard deviations. On the contrary, most of the respondents disagreed that more time spent in management and QLASSIC caused delays in the construction project are the barrier of contractors implementing QLASSIC in the construction industry. These statements are in the last rank due to the lowest mean score with 3.15 and 2.78 respectively.

Table 8 Distribution of mean and standard deviation for the barriers of QLASSIC implementation

Barriers of QLASSIC Implementation	Mean	Standard Deviation	Ranking
Incompetence and lack of experience	4.54	0.68258	1
Contractors in the construction project are lack knowledge about the QLASSIC system	4.51	0.68383	2
Contractors failed to understand that implementing QLASSIC may minimize the defect.	4.38	0.70492	3
More time spent in managing, more paperwork and increase bureaucracy.	3.15	0.99415	4
QLASSIC cause delays in the construction project	2.78	1.05905	5

Based on Table 9, most of the respondents agreed that the promotion of QLASSIC needs to be enhanced by hosting road shows, workshops, and training as the strategies to improve the QLASSIC implementation in the construction industry. Because of the high degree agreement from the respondent, that statement was in the first rank with a mean score of 4.76 and a standard deviation of 0.456. This was followed by the government should make QLASSIC assessment a mandatory for all government projects is in the second-highest rank with the mean score of 4.73 and standard deviation 0.467. The respondent also has responded on providing training for employees at the construction site as the strategies for improving QLASSIC with the mean score of 4.73 and standard deviation of 0.511. The fourth highest mean score for strategies to improve QLASSIC implementation is enforcing the use of QLASSIC as the primary criteria of project approval for issuance of Certificate of Practical Completion (CPC) or Certificate of Compliances (CCC). The mean for this statement is

4.70 and the standard deviation is 0.525. Subcontractor, consultants and Superintending Officer (S.O) are recommended to engage in the QLASSIC training was in the fifth rank of the strategies for improving QLASSIC implementation in the construction industry with a mean score of 4.59 and a standard deviation of 0.629.

Table 9 Distribution of mean and standard deviation for strategies for improving QLASSIC

Strategies for Improving QLASSIC	Mean	Standard Deviation	Ranking
Promote QLASSIC by hosting road shows, workshops and training.	4.76	0.45640	1
The government should make QLASSIC assessment a mandatory for all government projects.	4.73	0.46779	2
Provide training for employees at the construction site.	4.73	0.51170	3
Enforce the implementation of QLASSIC as the primary criteria of project approval for issuance of Certificate of Practical Completion (CPC) or Certificate of Compliances (CCC).	4.70	0.52527	4
Subcontractors, consultants, and Superintending Officer (S.O) are recommended to engage in the QLASSIC training.	4.59	0.62921	5

■5.0 CONCLUSION

Generally, the purpose of this research was to investigate the contractor's perspective towards QLASSIC being implemented in the Malaysian construction industry. The findings of the research showed that the majority of the respondents understood the needs or benefits of implementing QLASSIC. However, there are few numbers of respondents who were still unfamiliar with QLASSIC. Through the analysis of the data collected, the research found that most of the respondents agreed that lack of experience and knowledge about the QLASSIC was a major issue and create challenges that made contractors reluctant to implement QLASSIC in their construction project. Lack of experience and knowledge of QLASSIC implementation also made the contractors unaware of QLASSIC and take it for granted. To make contractors familiar with QLASSIC and implement it in their project, proactive action should be taken to solve this problem. All the possible barriers or challenges towards the implementation of QLASSIC should be eliminated so that the contactors or other players in the construction industry may accept and apply QLASSIC in their project. Thus, a few strategies for improving the QLASSIC are suggested in this research to assure the implementation of QLASSIC in the Malaysian construction industry. From the data that has been collected, most of the respondents believe that government involvement is necessary to boost implementation of QLASSIC in Malaysia. Not only a government, but contractors also have their role to improve the implementation of QLASSIC in construction industry. In conclusion, the government and construction parties should work together to improve the strategies to implement the QLASSIC to meet the aims and objectives of the implementation of QLASSIC in the Malaysian construction industry.

Acknowledgement

The authors are very thankful to all the associated personnel in any reference that contributed in/for the purpose of this research.

References

Ahmad, N., Sabli, M. N., & Othman, A. A. (2014). Assessing the implementation of CONQUAS standard amongst contractors towards improving quality of workmanship. *JURUTERA [IEM Bulletin],* (April), 25-28.

Akintoye, A., & Fitzgerald, E. (2000). A survey of current cost estimating practices in the UK. *Construction Management and Economics, 18*(2), 161-172.

Ali, A. S., & Wen, K. H. (2011). Building defects: Possible solution for poor construction workmanship. *Journal of Building Performance, 2*(1), 59-69.

Ali, M. C. (2010). Understanding the underlying principles of QLASSIC assessment. *The Ingenieur, 45*(March-May), 51-54.

Ali, M. C. (2014). Exploring the potential of integration quality assessment system in construction (QLASSIC) with ISO 9001 quality management system (QMS). *International Journal for Quality Research, 8*(1), 73-86.

Ali, M. C., Ismail, R., Kam, K. J., & Dzulkalnine, N. (2014). Preliminary findings on potential areas of improvement in QLASSIC. *Elixir International Journal, 76,* 28341-28349.

Ashokkumar, D. (2014). Study of quality management in construction industry. *International Journal of Innovative Research in Science, Engineering and Technology*, *3*(Special Issue 1), 36-43.

Azir, K. M. A. K., Muhammad, W. M. N., Othman, M. N. F., & Daeng, D. H. (2018). The insight on quality assessment system in construction (QLASSIC) implementation in Sarawak. *IOP Conference Series: Materials Science and Engineering, 429*, 012103.

Bernama. (2017, August 22). Government construction projects must apply QLASSIC – Fadillah. *The Borneo Post*. Retrieved from https://www.theborneopost.com/2017/08/22/govt-construction-projects-must-apply-qlassic-fadillah/

Building and Construction Authority. (2008). *CONQUAS®: The BCA construction quality assessment system* (7th ed.). Singapore: Building and Construction Authority.

Construction Industry Development Board Malaysia (CIDB). (2006). *Construction industry standard (CIS 7:2006) – Quality assessment system for building construction works* (1st ed.). Kuala Lumpur: CIDB.

Construction Industry Development Board Malaysia (CIDB). (2014). *Construction industry standard (CIS 7:2014) – Quality assessment system for building construction works* (2nd ed.). Kuala Lumpur: CIDB.

Construction Industry Development Board Malaysia (CIDB). (2020). *Analysis defect CIS 7 & QLASSIC acceptable score (2015-2018)* (CIDB Technical Report Publication No. 206). Kuala Lumpur: CIDB.

Din, S., Abd-Hamid, Z., & Bryde, D. J. (2011). ISO 9000 certification and construction project performance: The Malaysian experience. *International Journal of Project Management*, *29*(8), 1044-1056.

Hwang, B.-G., Tan, H. F., & Sathish, S. (2013). Capital project performance measurement and benchmarking in Singapore. *Engineering, Construction and Architectural Management, 20*(2), 143-159.

Ibrahim, A. R. B., Roy, M. H., Ahmed, Z., & Imtiaz, G. (2010). An investigation of the status of the Malaysian construction industry. *Benchmarking: An International Journal, 17*(2), 294-308.

International Organization for Standardization (ISO). (1994). ISO 9000-1:1994. Quality management and quality assurance standards — Part 1: Guidelines for selection and use. Geneva: ISO.

Ipsos Loyalty. (2017, April 27). Presentation of research findings: Customer satisfaction. Retrieved from https://www.cidb.gov.my/sites/default/files/2020-12/16-042311-01_CIDB-C-Sat-Report_Apr17_v2_0.pdf

Jraisat, L., Jreisat, L., & Hattar, C. (2016). Quality in construction management: An exploratory study. *International Journal of Quality & Reliability Management, 33*(7), 920-941.

Kam, K. J., & Hamid, A. H. A. (2012a). Malaysia, Singapore and Hong Kong approach towards quality assurance initiative in the building construction industry; The three major countries which have the small land for fast development progress. *Elixir International Journal*, *46*, 8525-8529.

Kam, K. J., & Hamid, A. H. A. (2012b). The relationship between motives and benefits on adopting QLASSIC - CIS 7: 2006 in Malaysia construction industry. *International Journal for Quality Research*, *6*(4), 321-332.

Kam, K. J., & Hamid, A. H. A. (2015). The true motives behind the adoption of QLASSIC-CIS 7: 2006: As a quality assurance initiative in construction industry. *International Journal of Quality & Reliability Management, 32*(6), 603-616.

Katessan, S. (2017, August 23). QLASSIC awards 43 quality building projects. *StarProperty*. Retrieved from https://www.starproperty.my/news/events-and-seminars/qlassic-awards-43-quality-building-project/93418

Khalid, Z., & Tamjehi, S. D. (2020). Contractor's understanding towards the implementation of quality assessment system in construction (QLASSIC) in construction industry. *IOP Conference Series: Materials Science and Engineering, 849*, 012052.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607-610.

Ling, F. Y. Y., & Bui, T. T. D. (2010). Factors affecting construction project outcomes: Case study of Vietnam. *Journal of Professional Issues in Engineering Education and Practice, 136*(3), 148-155.

Manap, N., Goh, Y. K., & Syahrom, N. (2017). Compulsory of Malaysia's quality assessment system in construction (QLASSIC). *IOP Conference Series: Earth and Environmental Science, 109*, 012008.

Norizam, A., & Malek, M. A. (2013). Perception on quality assessment system in construction (QLASSIC) implementation in Malaysia. *Malaysian Construction Research Journal*, *13*(2), 69-77.

Oyebamiji, M. (2019). *An analysis of the quality management practices used in the construction industry and their effectiveness: Case study on Irish construction companies* (Master's thesis). Dublin Business School, Dublin, Ireland. Retrieved from https://esource.dbs.ie/handle/10788/3926

Rumane, A. R. (2018). *Quality management in construction projects* (2nd ed.). Boca Raton, FL: CRC Press.

Salvi, S. S., & Kerkar, S. S. (2020). Quality assurance and quality control for project effectiveness in construction and management. *International Journal of Engineering Research & Technology (IJERT), 9*(2), 26-29.

Sandirasegaran, K., & Manap, N. (2016). Impacts of dredging and reclamation projects. *Jurnal Teknologi, 78*(7-3), 139-143.

Sia, M. K., Gomez, C. P., & Hamid, Z. A. (2010). Structural equation modelling the causal effects of ISO 9001 registration efforts. *International Journal of Modelling in Operations Management, 1*(1), 29-66.

Sohimi, N. E., Affandi, H. M., Fadzil, H., & Sattar, R. M. (2016, September 15). Exploring the Malaysian QLASSIC practicality. In A. Arifin & Surono (Eds.), *Proceedings of the 4th International Conference on Vocational Educational and Training* (pp. 2-16–2-23). Yogyakarta: Yogyakarta State University.

Sohimi, N. E., Affandi, H. M., Hassan, F., Che-Ani, A. I., & Rasul, M. S. (2017). The problem of quality of electrical work in Malaysian construction projects. *Pertanika Journal of Social Sciences & Humanities, 25*(S), 105-110.

Tan, C. K., & Kamil, S. Z. (2016). Implementation of ISO quality management system in construction companies of Malaysia. *Journal of Technology Management and Business*, *3*(1), 1-23.

Tang, S. L., Ahmed, S. M., Aoieong, R. T., & Poon, S. W. (2005). *Construction quality management*. Hong Kong: Hong Kong University Press.

Zin, R. M., Chen, G. H., & Ali, M. C. (2009). An observation of impact in implementation of quality management system by contractors. *Malaysian Construction Research Journal*, *4*(1), 54-73.

APPENDIX A

Part A: Awareness towards QLASSIC
Please tick (√) to indicate your level of awareness towards QLASSIC:

1. No awareness
2. Subconscious awareness
3. Altered state of consciousness
4. Lower-level of consciousness
5. Higher-level of consciousness

		1	2	3	4	5
A)	**Awareness**					
I.	QLASSIC is an independent assessment of quality.					
II.	QLASSIC is to increase construction quality performance.					
III.	QLASSIC is a standardized acceptable quality of workmanship on site by clarifying the desired final quality of the product.					
IV.	QLASSIC assesses workmanship based on CIS 7 standards.					
V.	Assessment will be carried out by the external assessor					
VI.	CIDB provides the application of QLASSIC assessment.					
VII.	QLASSIC assesses structural, architectural, mechanical and electrical, and external works.					
VIII.	A score, namely QLASSIC Score, will be given to the project after assessment.					
IX.	CITP 2016-2020 sets out target initiate QLASSIC as prerequisites for Certificate of Partial Completion (CPC) and Certificate of Completion and Compliance (CCC).					

Please tick (√) to indicate your choice on the benefits of QLASSIC implementation:

1) Strongly Disagree
2) Disagree
3) Neither agrees nor disagrees
4) Agree
5) Strongly Agree

		1	2	3	4	5
B)	**Benefits of QLASSIC implementation**					
I.	Improving the functionality					
II.	Increase work efficiency.					
III.	As a benchmark of the quality level for several construction elements.					
IV.	A point of reference for quality in the construction work					
V.	To evaluate the standard of quality of the construction industry.					
VI.	Improve workmanship and quality of building construction					
VII.	Improve productivity of the project and build the competitiveness of the company					
VIII.	Build the reputation of the contractor's firm.					
IX.	Increase the quality of work and value of the product					
X.	Achieve a certain level of customer's satisfaction					
XI.	Enhance construction quality by the contractor					
XII.	Assist contractor to accomplish zero defect.					
XIII.	The performance of the contractor can be evaluated					
XIV.	Used as criteria to evaluate the performance of contractors					
XV.	Lower cost by reducing rework					

Please tick (√) to indicate your choice on the barriers of QLASSIC implementation:

1) Strongly Disagree
2) Disagree
3) Neither agrees nor disagrees
4) Agree
5) Strongly Agree

C)	Barriers of QLASSIC implementation	1	2	3	4	5
I.	Contractors are not aware of the QLASSIC implementation.					
II.	Additional cost of requirement fees for the quality assessor.					
III.	Contractors failed to understand that implementing QLASSIC may minimize the defect.					
IV.	QLASSIC causes delays in the construction project.					
V.	More time spent in management, more paperwork and increase bureaucracy.					
VI.	Contractors in the construction project are lack knowledge about the QLASSIC system.					
VII.	Incompetent and lack of experience.					

PART B: Strategies for improving QLASSIC system
Please tick (√) to indicate your choice.

1) Strongly disagree
2) Disagree
3) Neither agrees nor disagrees
4) Agree
5) Strongly agree

In your opinion, what do you think can be done to improve QLASSIC system in construction industry?

		1	2	3	4	5
I.	Provide training for employees at the construction site.					
II.	Subcontractors, consultants, and Superintending Officer (SO) are recommended to engage in the QLASSIC training.					
III.	Reduce the current time taken in producing QLASSIC reports.					
IV.	QLASSIC scoring system needs to be improved.					
V.	Promote QLASSIC by hosting roadshows, workshops, and training.					
VI.	The government and CIDB can reduce QLASSIC registration fees.					
VII.	Strengthen supervision by CIDB on the assessment by the appointed external assessors.					
VIII.	Enforce the implementation of QLASSIC as the main element of project approval for issuance of Certificate of Practical Completion (CPC) or Certificate of Compliances (CCC).					
IX.	The government would make QLASSIC assessment mandatory for all government projects					
X.	The measuring tools should be included with reliable software					

Others (please specify): …….....
……..

APPENDIX B

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
QLASSIC is an independence assessment of Quality.	94	1.00	5.00	4.1064	1.09218
QLASSIC is to increase construction quality performance.	94	1.00	5.00	4.1702	1.06396
QLASSIC is a standardized acceptable quality of workmanship on site by clarifying desired final quality of the product.	94	1.00	5.00	4.1596	1.07066
QLASSIC assesses workmanship based on CIS 7 standards.	94	1.00	5.00	4.0638	1.10530
Assessment will be carried out by the external assessor.	94	1.00	5.00	4.1277	1.08988
CIDB provides application of QLASSIC assessment.	94	1.00	5.00	4.2340	1.05163
QLASSIC assesses structural, architectural, mechanical and electrical, and external works.	94	1.00	5.00	4.1809	1.05711
A score, namely QLASSIC Score, will be given to the project after assessment.	94	1.00	5.00	4.1277	1.11908
CITP 2016-2020 sets out target initiate QLASSIC as prerequisites for Certificate of Partial Completion (CPC) and Certificate of Completion and Compliance (CCC).	94	1.00	5.00	4.0532	1.12992
Valid N (listwise)	94				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Improving the functionality	94	3.00	5.00	4.3404	.64846
Increase work efficiency.	94	3.00	5.00	4.3617	.61959
As a benchmark of the quality level for several construction elements	94	4.00	5.00	4.4787	.50223
A point of reference for quality in the construction work	94	3.00	5.00	4.4468	.54115
To evaluate the standard of quality of the construction industry.	94	3.00	5.00	4.4894	.52353
Improve workmanship and quality of building construction	94	4.00	5.00	4.5000	.50268
Improve productivity of the project and build the competitiveness of the company	94	3.00	5.00	4.4149	.51660
Build the reputation of the contractor's firm	94	3.00	5.00	4.3298	.59366
Increase the quality of work and value of the product	94	3.00	5.00	4.4362	.55954
Achieve a certain level of customer's satisfaction	94	3.00	5.00	4.3191	.60841
Enhance construction quality by contractor	94	3.00	5.00	4.4574	.54210
Assist contractor to accomplish zero defect.	94	3.00	5.00	4.4255	.55821
The performance of the contractor can be evaluated	94	4.00	5.00	4.5213	.50223
Lower cost by reducing rework	94	3.00	5.00	4.3191	.62584
Valid N (listwise)	94				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Contractors are not aware on the QLASSIC implementation	94	1.00	5.00	4.0851	.91181
Additional cost of requirement fees for the quality assessor	94	2.00	5.00	3.7872	.81481
Contractors failed to understand that implementing QLASSIC may minimize the defect.	94	2.00	5.00	4.3830	.70492
QLASSIC cause delays in the construction project	94	1.00	5.00	2.7766	1.05905
More time spent in management, more paperwork, and increase bureaucracy.	94	1.00	5.00	3.1489	.99415
Contractors in the construction project are lack knowledge about the QLASSIC system	94	2.00	5.00	4.5106	.68383
Incompetence and lack of experience	94	2.00	5.00	4.5426	.68258
Valid N (listwise)	94				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Provide training for employees at the construction site.	94	3.00	5.00	4.7340	.51170
Subcontractors, consultants, and Superintending Officer (S.O) are recommended to engage in the QLASSIC training.	94	2.00	5.00	4.5851	.62921
Reduce the current time taken in producing QLASSIC reports.	94	2.00	5.00	4.1809	.84195
QLASSIC scoring system needs to be improved.	94	2.00	5.00	4.0745	.84547
Promote QLASSIC by hosting roadshows, workshops, and training.	94	3.00	5.00	4.7553	.45640
The government and CIDB can reduce QLASSIC registration fees.	94	2.00	5.00	4.3191	.77893
Strengthen supervision by CIDB on the assessment by the appointed external assessors	94	3.00	5.00	4.5532	.68182
Enforce the implementation of QLASSIC as the main element of project approval for issuance of Certificate of Practical Completion (CPC) or Certificate of Compliances (CCC).	94	3.00	5.00	4.7021	.52527
The government would make QLASSIC assessment mandatory for all government projects	94	3.00	5.00	4.7340	.46779
The measuring tools should be included with reliable software	94	3.00	5.00	4.4681	.66724
Valid N (listwise)	94				