QUALITY MANAGEMENT ON WORKMANSHIP FOR HIGH RISE BUILDING

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Abstract
A high-rise building is a tall structure as opposed to a low-rise structure, and its height is defined variously depending on the jurisdiction. Quality is an essential element that needed to be taken care of in all aspects especially in construction of high-rise building. An adequately good quality product can be achieved by a principled quality control management ever since day one of preliminary stage until the final stage of construction process. There is a lot of research regarding quality control management in Malaysia's construction industry such as about the causes, weaknesses and benefits which can be as references to improve. However, research on the implementation of quality control management in construction of high-rise building remain unclear. Therefore, the objectives of this research are to identify the quality control management towards workmanship in constructing high-rise building. An online survey using questionnaires were done on 100 construction professionals in Johor Bahru. Only 50 of them are responded (response rate 50%). The data of respondents were analyzed using statistical which are the mean, standard deviations, and SPSS. The respondents were Project Manager with 8.2%, Quality Assurance and Quality Control and Site Engineer with 10.2%, Site Clerk with 24.4%, Inspector of Work with 19.4%, Site Supervisor 13.2%, Procurement Assistant with 6%, and Contractor with 2%. The most popular reasons for quality management towards workmanship still lacking and unclear defined are majority of contractors had trouble upholding quality standards throughout the construction process, important variables including unskilled labour, inappropriate tools and supplies, and a lack of project management might result in subpar quality control of the work. Therefore, the method in assuring quality control of workmanship based on construction drawings and authority compliance need to be addressed. This is to ensure that the construction of high-rise building can be sustained towards the entire life cycle of the building.

Keywords: (*quality control on workmanship, quality management performance, strategy planning, strategy implementation)*

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INTRODUCTION

A high-rise building is a tall structure as opposed to a low-rise structure, and its height is defined variously depending on the jurisdiction. It serves as a residence, office building, or other functions such as a hotel or retail store, or it serves numerous roles at once (Constro Facilitator, 2020). High-rise buildings are those that are more than six levels or floors tall. In addition, most high-rise buildings are over 100 meters tall. These should not be confused with "skyscrapers", which are often significantly taller, ranging from a few meters to over 200 meters. There are also "supertall" buildings, which can reach a height of up to 300 meters to around 1000 feet depending on the design (Diesel, 2020).

Quality is an essential element that needed to be taken care of in all aspects, especially in the construction industry. An adequately good quality product can be achieved by principled quality control management ever since day one of the preliminary stages until the final stage of the construction process. Quality control may generally be defined as a system that maintains a desired level of quality, through feedback on product/service characteristics from a specified area (Mitra, 2016). This aspect is a vital component, especially for high-rise construction projects for them to be ably sustained for a long period of time.

This quality control can get rid of any possible dangerous risks or additional costs which affect the specified budget projects. There is a high possibility that this system management can be a turning point, especially for high-rise building projects to be finished successfully. Quality Management System

will be able to help reduce the number of major flaws and concerns with building failure. This will also assist the developers in reducing their rectification costs no matter whether during or after the construction works have been fully completed. Other than that, it will improve investor perceptions of Malaysia's building industry (Subramaniam et al., 2019).

Customer satisfaction can be attained through quality management systems. Customers gain by acquiring goods and services that are durable, faithful, and dependable, available when needed, and consistent with standards (Poh, 2016). Additionally, it offers significant benefits grouped into three categories: workers, processes, and business. The team will benefit from greater shared objectives, transparent operating procedures, and fewer personnel turnover. It will aid operational operations by lowering material waste, increasing potency, and raising product quality. The company's operations will attract more native customers, lower complaints, and boost profitability (Mohammad, Viana & Raghib, 2019). However, research on quality control management towards workmanship is still lacking and unclearly defined. Therefore, this research will identify the current practice of quality control of workmanship in constructing high-rise buildings. Then, the major factors which lead to poor quality control of workmanship will be analyzed. As result, the method of assuring quality control of workmanship based on construction drawings and authority compliance will be developed.

LITERATURE REVIEW

Quality Control on Workmanship

Workmanship refers to a worker’s ability to perform a task or trade depending on their education or career (Adetayo, 1995 as cited in Burer, 2016). Workmen are the most significant factor of production, according to Ogunmakin (2005, as cited in Burer, 2016), because they are the only factor that creates value and determines the overall level of output. Quality craftsmanship necessitates meticulous attention to detail. It can be described as a desire to get it properly the first time, no matter how long it takes (Vulcan, 2017).

Quality workmanship is a complete strategy to improve the construction's longevity, serviceability, and safety. Workmanship with higher standards is a constructive and humanistic approach to product management that brings all levels of the workforce and experience in an organization together to set high standards and achieve better results (Thamilarasu, Rajpasad, and Pavan, 2017). Without proper guidance in workmanship, the quality of the final products will not be able to achieve the right standard of requirements and dissatisfied clients' demands. Everything needed to be controlled from the whole workmanship starting from the upper and bottom of the organization. Workmanship can be defined as cooperation to undertake the assigned tasks in a good and correct way with the same purpose which is to gain the best quality for the buildings.

Anthony Lee Tee, director of Architect Centre Sdn Bhd, and Chris Tan, founder and managing partner of Chur Associates, discussed how mistakes can be prevented through design, contract provision, excellent business practises, and regulatory compliance in an article published by The Edge Markets. In addition, the discussion is about the level of craftsmanship from the perspective of the architect. Lee demonstrated how architects handle compliance and certificates while dealing with the craftsmanship. Building materials are included in clause 53 of the architect's certified declaration to the UBBL. Any material used in the construction of a building, structural modification or extension, the execution of the work, the installation of fittings, and backfilling must be suitable and qualified for the purposes for and conditions in which they are employed.

In the construction sector, one such criterion is the "excellent craftsmanship standard". This criterion is generally included in contracts in which the contractor pledges to construct the structure or system in a skilled and professional manner. The contractor's quality of work is referred to as "good workmanship". The work that is to be supplied must fulfil a quality standard that is consistent across the industry, and it must be functional, safe, and usable in the usual sense (Sweeney Law, 2019). Besides, in today’s building sector, quality workmanship is crucial. The high level of quality produced in construction projects promotes future marketability and increases client confidence (LLC Properties, n. d).

The Current Practice Quality Control of Workmanship in Constructing High-Rise Building

Malaysian construction industry is essential to accelerating Malaysia's development. According to Abdul Rahman et al. (2006), the construction industry significantly contributes to the economies of developing nations like Malaysia. However, Nima et al. (2002) noted that there are numerous issues facing the construction sector today, including a decline in quality standards, an increase in costs, and project delays. According to Abdul Razak et al. (2010), the weak points in Malaysia's construction industry are a lack of effective training skills in the field and a lack of status recognition for construction technologists.

However, Zainal et. al. (2019) mentioned the actual practices that have been applied mostly at the construction of high-rise building in the aspects of workmanship are the utilized material monitoring procedures on construction sites, as well as project management practices in construction projects. The highest rank in that analysis is a comprehensive understanding of the work and process.

Figure 1: Project Management on High-Rise Buildings Analysis

Items	Mean	Rank
Important to emphasize good project planning	4.55	2
Manage the contractor's engineering sequence & construction method	4.43	4
Comprehensive understanding of the work and process	4.57	1
A different project will demand different priorities	4.48	8
Congruent and consistent with each other phase process	4.2	3
Good workmanship in the review system and feedback on the site problems hindering	4.15	9
Implementation of good design and planning	4.25	7
Implementation of a good management system and competent personal	4.42	5
Important in using the right material, especially for the external façade	4.3	6
Average Mean	4.378	

Source: Zainal et. al (2019)

Due to its successful application in numerous industries and proven efficacy and flexibility in achieving project goals and objectives, project management has become a critical issue in Malaysia. The construction sector requires greater implementation and exploitation of efficient and effective project management practices due to its high-risk nature and high resource consumption. Examining the commonly used project management standards, methods, methodologies, tools, and strategies serves as a wake-up call for contractors and other decision-makers to better plan their efforts toward the efficient application of project management practice (Zainal et al., 2019).

Furthermore, Quality Assessment System in Construction which is QLASSIC was still used as the current quality practice to control the quality of the workmanship. The CIDB-developed Quality Assessment System in Construction (QLASSIC) is an independent system for measuring and evaluating the quality of craftsmanship and finishes of construction works using a sampling and statistical approach (UK Essays, 2018). It enabled the quality of workmanship between construction projects to be objectively compared through a scoring system. This system was established in 2007. If the workmanship meets the standard, it is given a mark. The QLASSIC evaluation is based on a site inspection, visual examination, and the application of assessment instruments and equipment. The sampling guideline and statistical technique are used to pre-determine sample selection. Drawings and plans are used to choose samples. The evaluation is based on a random sampling of samples that sufficiently represent the complete construction project. The CIS 7:2014 standard includes a sample guideline (Sysnovate, n.d)

The Major Factors Which Lead to Poor Quality Control of Workmanship

Poor craftsmanship in building construction, particularly for high-rise buildings, can be caused by a variety of issues. For instance, the collapse of a 21-story high-rise on Gerrard Road in Ikoyi on November 1, 2021, was reported in the newspaper article. This subject is addressed in a report by the Nigerian Institution of Structural Engineers (NIStructE). According to one section of the report, the lack of adequate quality control and quality assurance systems and processes during the construction was evident, becoming visible as indicated by the poor quality of concrete materials and craftsmanship found during the analysis of the collapse debris (Ramon, 2021).

Table 1: The Major Factors Lead to Poor Quality Control of Workmanship

Factors	Explanation
Unskilled Workmen	Unskilled labour is one of the most inefficient labour groups in the construction sector, negatively impacting project outcomes. Long-term economic sustainability and project performance are hampered by manpower scarcity and a lack of competent workforce (Hussain et al., 2020).
Unsuitable Equipment and Materials	This can access critical problems which can undermine the building's quality for a period such as structural errors.
Lack of Project Management	Lack of project management is not producing any continuous improvement, especially in the workmanship. There will be no information or data which can be used to analyze to improve the progress of the work assessments that have been done every single day.

The Method in Assuring Quality Control of Workmanship Based on Construction Drawings and Authority Compliance

There are many ways and suggestions to control the quality of workmanship in the construction industry. But there are also quite several pieces of information and data for assure to control of the quality of workmanship just based on the construction drawings and authority compliance. Construction drawings are part of the total documentation used for the tender, the employer-contractor relationship, and the construction itself. The construction drawing shows how the structure will be constructed graphically. The designs mustn't cause any misunderstandings which could result in mistakes or delays. Construction drawings are visual designs illustrating a structure to be erected for residential, public, or commercial structures that are produced by hand or with digital programs. Construction drawings assist in the construction process by displaying a structure's dimensions, installation materials, and other variables, as well as ensuring that the essential permits are obtained from local agencies (Indeed Editorial Team, 2021).

Table 2: Method in Assuring Quality Control of Workmanship Based on Construction Drawings and Authority Compliance

Factors	Explanation
Understanding Project Specification	The work of the programming team can be substantially improved if they are clearly defined and documented throughout the time with their scope.
Discuss Quality Requirements with The Team	The strategies started by defining quality, committing to quality, sticking to the project requirements, managing quality, performing quality assurance, controlling the quality, focusing on requirements, following the project processes, lessons learned, and project de-brief (Hydra, n.d).
Hire The Right People	Hiring the proper person improves workplace culture and pays itself a thousand times over in terms of increased staff morale, positive forward-thinking planning, and achieving difficult targets (Heathfield, 2021).
Never Settle for Poor Quality Work	Substandard work is never acceptable, and it can cost the project more time and money, in the long run, owing to continuous repairs, not to mention a loss of current and new clients due to poor reputation.
Daily Project Progress Monitoring	It is also to ensure that your project is a success, accurate and effective monitoring helps to stick to the project's deadline and spot problems early in the problems (Frost, 2018).
Carry Out Testing	The testing that needed to be carried out must be based on the specification that has been set up for the project.
Check Raw Materials Before Starting the Project	The raw materials can be checked by using materials management. Materials management is a basic component of supply chain management, and it entails the planning and execution of supply chains to meet a company's or organization's material requirements.

RESEARCH METHODOLOGY

The quantitative approach is the best strategy to select for this research after conducting research and comprehending all of the functions of the research technique. This is due to the need to avoid any direct physical contact due to the present pandemic crisis. When employing questionnaires, the data will be considerably clearer and more detailed rather than using the qualitative method. The statements presented by the researcher in this study can be supported by the respondents' varied responses. Data gathering is a methodical process of locating and analysing particular information to respond to pertinent questions and evaluate results (Formplus Blog,2019). It is a technique for compiling and examining

data from several sources to get a full and accurate picture of a subject (McLaughin, 2007). After being completed using a Google form, the survey questionnaire was distributed over social media platforms including Facebook and WhatsApp. The experts that responded to the survey are those who are directly involved in building highrises. The sample size for the respondents in this study was determined using a random sampling procedure. 80 samples were taken from the population of 100 professionals working on the high-rise building in Johor Bahru. However, only 50 of them (or 50%) answered to this study. The questionnaire asked about the respondents' backgrounds and the reasons why clear-cut quality control management of craftsmanship is still inadequate. The mean, standard deviations, and SPSS were used in the analysis of the respondent data.

ANALYSIS AND DISCUSSIONS

Demographic Survey Results

The demographic information of the respondents was represented in Section A of the questionnaire, which included professions, years of experience in the construction industry, years of experience in quality management, years of experience in quality management for high-rise buildings, and project types. The profile and demographic details of the respondents are shown in the table below.

Table 3: Demographic Survey Results

Professions	**Frequencies**	**Percents**
Project Manager	4	8.2%
Quality Assurance and Quality Control	5	10.2%
Site Engineer	5	10.2%
Site Clerk	12	24.4%
Inspector of Work	13	19.4%
Site Supervisor	7	13.2%
Procurement Assistant	3.	6%
Contractor	1	2%
Total	50	93.6%
Years of Been Involved in the Construction Industry	**Frequencies**	**Percents**
Below 5 years	35	66%
Above 5 years	18	34%
Years of Been Involved in Quality Management	**Frequencies**	**Percents**
Below 5 years	38	70.4%
Above 5 years	16	29.6%
Years of Been Involved in Quality Management For High Rise	**Frequencies**	**Percents**
Below 5 years	41	80.4%
Above 5 years	10	19.6%
Type of Projects	**Frequencies**	**Percents**
Residential	28	52.8%
Infrastructure	7	13.2%
Commercial	18	34%

The professions of the respondents are listed in the table above. The total number of people that responded is 50. The project Manager has a frequency of 4 (8.2%), Quality Assurance and Quality Control have a frequency of 5 (10.2%), and Site Engineer has a frequency of 5 (10.2%). The frequency for Site Clerk is 12, which accounts for 24.4 percent of the total, while the frequency for Inspector of Work is 13, which accounts for 19.4 percent. Site Supervisor has a frequency of 7, which accounts for 13.2 percent, Procurement Assistant has a frequency of 3, which accounts for 6%, and Contractor has a frequency of 1, which accounts for only 2%. As a result of the table above, most respondents who responded to these questionnaires are Inspectors of Work. According to the table above, the respondents with experience and involvement in the construction industry for less than 5 years account for the highest frequency (35 respondents, or 66%), while those with experience and involvement in the construction industry for more than 5 years account for the lowest frequency (18 respondents, or 34%). The respondents with less than 5 years of experience in quality management had the highest frequency (38 out of 50, or 70.4%), while those with more than 5 years of experience in quality management have the lowest frequency 16 out of 50 (29.6 percent). Respondents with less than five years of experience in quality management had the highest frequency (38 respondents, or 80.4%), while respondents with expertise in quality management for high-rise buildings had the lowest frequency 10 respondents (19.6 percent). Residential projects are the most common sort of project that respondents are involved in,

with 28 respondents (52.8%). Commercial has the second largest frequency, with 18 respondents (34%), while commercial has the lowest frequency, with 7 respondents working on that sort of project, accounting for 13.2%.

Result and Discussion on Current Practice of Quality Control of Workmanship in Constructing High-Rise Building

The existing practices of quality control of workmanship in the construction of high-rise buildings were represented in Section B of the questionnaire.

Table 4: Current Practice of Quality Control of Workmanship in Constructing High-Rise Building

Current Practice of Quality Control of Workmanship in Constructing High-Rise Building	Mean	Std. Deviation	Ranking
Before beginning construction work, I practice a thorough understanding of the job and the process	3.32	0.471	1
I have proper planning before commencing the work with others	3.30	0.503	2
I am well-known about quality management of workmanship before being involved in the construction industry	3.19	0.521	3
Contractors have a difficult time adhering to quality requirements throughout construction	3.19	0.487	4
Quality practices such as QLASSIC can assist high-rise buildings to achieve greater long-term quality	3.09	0.354	5
According to my personal experience, most Malaysian construction companies are unconcerned with the quality of their work as long as the project is completed	3.02	0.500	6
During high-rise development, your construction company follows best practices that include the proper way of quality control	3.00	0.588	7
Malaysia's current quality control method for high-rise building construction is far superior to that of other Asian countries such as Singapore	1.49	0.892	8

Table 4 shows the data analysis on the current practice of quality control of workmanship in constructing high-rise buildings. Eight statements describe the respondents' knowledge about quality management of workmanship before being involved in the construction industry. The data analysis indicated that most respondents agreed that *'Before beginning construction work, I practice a thorough understanding of the job and the process* with a mean of 3.32. The second highest ranking was '*I have proper planning before commencing the works towards others'* with a mean of 3.30. The third and fourth ranks of the data analysis were *'Contractors have a difficult time adhering to quality requirements throughout construction'* and '*I well-known about quality management on workmanship before involved in the construction industry* with a mean of 3.19. The fifth ranking of the respondents' knowledge about quality management on workmanship before being involved in the construction industry was *'Quality practices such as QLASSIC can assist high-rise buildings to achieve greater long-term quality'* with a mean of 3.09. The sixth rank was '*According to my personal experience, most Malaysian construction companies are unconcerned with the quality of their work as long as the project is completed* with a mean of 3.02. The lowest two ranking for this questionnaire question was *'I well-known about quality management on workmanship before being involved in the construction industry* with the options which were *'During high-rise development, your construction company follows best practices that include the proper way of quality control'* and *'Malaysia's current quality control method for high-rise building construction is far superior to that of other Asian countries such as Singapore'* with a mean 3.00 and 1.49.

Result and Discussion on Major Factors Which Lead to Poor Quality Control of Workmanship

The primary reasons that lead to poor quality control of workmanship were represented in Section C of the questionnaires. Unskilled labour, inappropriate equipment and materials, and a lack of project management are among the key factors.

Table 5: Major Factors Which Lead to Poor Quality Control of Workmanship

Major Factor: Unskilled Workmen	**Mean**	**Std. Deviation**	**Ranking**
The building projects suffer because of the inexperienced workers' mistakes	3.28	0.533	1
Hiring untrained labor is less expensive than hiring skilled workers	3.13	0.482	2
Rather than skilled workers, my company hires more unskilled workers	2.32	0.803	3
Major Factor: Unsuitable Equipment and Materials	**Mean**	**Std. Deviation**	**Ranking**
I have been involved in an instance when incorrect material handling and storage resulted in any on-site hazards	3.09	0.491	1
There is an equipment failure that prevents the task from progressing, such as a stop-control device failure or an engine failure	3.06	0.456	2
I have never got any products from a manufacturer that weren't made in line with the manufacturer's claimed safety	2.60	0.631	3
Major Factor: Lack of Project Management	**Mean**	**Std. Deviation**	**Ranking**
Time, money, and quality all suffer when there is a lack of project management	3.38	0.489	1
It is true that a lack of project management, everything does not adhere to the standard need for guidance created for the project	3.36	0.484	2
Due to a lack of project management, everything does not adhere to the standard need for guidance created for the project	3.34	0.478	3
Workers will be inexperienced and unclear on how to carry out the tasks allocated to them, whether by the contractor or the project manager, because of this.	3.32	0.547	4
Continuous improvement is difficult to attain	3.26	0.486	5

According to the table above, with a mean of 3.09, most respondents agreed that the state with the highest rating is 'I have been involved in an instance where inappropriate material handling and storage resulted in any on-site hazards.' With a mean score of 3.06, most respondents agree that 'There is an equipment failure that prohibits the task from advancing, such as a stop-control device failure or an engine failure.' With a mean of 2.60, the lowest score is 'I have never received any products from a manufacturer that were not made following the firm's declared safety requirements,' indicating that most of them have had these events. Table 11 shows that the respondents agree with the statement 'Time, money, and quality all suffer when there is a lack of project management,' with a mean of 3.38. With a mean of 3.36, the second highest group concluded that the respondents agreed with the statement It is true that a lack of project management might jeopardize a construction project.' The respondents agreed with the statement that 'due to a lack of project management, everything does not correspond to the standard need for guidance developed for the project' with a mean of 3.34. Despite this, with a mean of 3.32, the second lowest rating is: 'Workers will be inexperienced and unsure on how to carry out the responsibilities assigned to them, whether by the contractor or the project manager.' 'Continuous improvement is difficult to achieve had the lowest score, with a mean of 3.26.

Results And Discussions on Method in Assuring Quality Control of Workmanship Based on Construction Drawings And Authority Compliance

The way of providing quality control of workmanship based on construction designs and authority compliance was represented in Section D of the questionnaire.

Table 6: Method in Assuring Quality Control of Workmanship Based on Construction Drawings and Authority Compliance

The method in Assuring Quality Control of Workmanship Based on Construction Drawings and Authority Compliance	**Mean**	**Std. Deviation**	**Ranking**
Construction designs and authority compliance can move further in ensuring workmanship quality control	3.25	0.434	1
By using the construction drawings, they can help the construction progress to run smoothly	3.23	0.423	2
There will be a warranty that the quality of workmanship may be easily regulated and enhanced by adhering to all authority compliance	3.21	0.532	3
Understanding Project Specification	**Mean**	**Std. Deviation**	**Ranking**
The project specifications might aid in better communication between the client and the customer	3.32	0.471	1
The jobs can be distributed equally and according to their abilities and responsibilities	3.30	0.463	2
Workers will have a clear misunderstanding of how to do their responsibilities and meet the project's requirements	3.30	0.463	3
The project activities will be appropriately organized and run successfully if you grasp this	3.26	0.445	4
Discuss Quality Requirements with The Team	**Mean**	**Std. Deviation**	**Ranking**
This conversation can provide a clear picture of the type of quality standards that must be met	3.34	0.478	1
The jobs can be distributed equally and according to their abilities and responsibilities	3.34	0.478	2
This method can assist the project team in reducing rework as well as negative impacts on project deadlines and budgets	3.32	0.471	3
Hire The Right People	**Mean**	**Std. Deviation**	**Ranking**
Recruiting the proper person can help improve my workplace culture	3.19	0.395	1
For those interested in working for my company, a standard qualification will be developed	3.13	0.342	2
I hire people with excellent academic qualifications but poor attitudinal qualifications	1.55	0.471	3
Never Settle For Poor Quality	**Mean**	**Std. Deviation**	**Ranking**
Work that is not up to par might cost the project a lot of money and effort	3.25	0.515	1
At work, an occurrence occurred in which my co-workers failed to remedy the criticized error	3.11	0.543	2
My project management team has a habit of finishing tasks on time while ignoring the quality of the work	2.49	0.891	3
Daily Project Progress Monitoring	**Mean**	**Std. Deviation**	**Ranking**
Producing daily reports allows me to keep track of progress on the job site	3.36	0.484	1
Supervision, evaluation appraisal, and feedback are all used in project	3.36	0.484	2

monitoring and evaluation systems to verify that a project meets its objectives			
During the construction process, my project management practiced daily project progress monitoring	3.28	0.455	3
True, the contractor is usually the one that prepares the daily construction reports.	3.19	0.561	4
Carry Out Testing	**Mean**	**Std. Deviation**	**Ranking**
The testing that needs to be done must be following the project's specifications	3.42	0.497	1
Other tests performed by my project include the compaction test or in-situ density test, mechanical and electrical test, CMU (Concrete Masonry Unit) compression test, and non-destructive testing	3.40	0.494	2
Before beginning construction, my company conducted soil testing	3.36	0.552	3
Check Raw Materials Before Starting The Project	**Mean**	**Std. Deviation**	**Ranking**
The raw materials are handled via a material management system in my project	3.38	0.489	1
This method can help to prevent future faults that could compromise the building's quality	3.38	0.489	2
The raw materials that have been received will be inspected and properly kept	3.38	0.489	3

The table above shows the data ranking for the method in assuring quality control of workmanship based on drawings and authority compliance based on perspectives of people who work on-site or have experiences with the construction industry. The highest ranking with a mean of 3.25 most of them agreed with this recommendation statement, *'Construction designs and authority compliance can move further in ensuring workmanship quality control'.* The lowest ranking would be for this statement which is *'There will be a warranty that the quality of workmanship may be easily regulated and enhanced by adhering to all authority compliance'* with a mean of 3.21. There also most respondents agree that *'By using the construction drawings, they can help the construction progress to run smoothly* with a mean of 3.21.

The table above shows the percentage of respondents who agreed that knowing project specifications can help ensure quality control of workmanship. With a mean of 3.32, this statement, 'The project specs may aid in better communication between the client and the customer,' receives the highest rating. Furthermore, with a mean of 3.30, the second and third rankings show that most respondents agreed with the statements 'The jobs can be distributed equally and according to their abilities and responsibilities' and 'Workers will have a clear understanding of how to do their responsibilities and meet the project's requirements.' The lowest grade, 3.26, indicates that not all respondents agree with the statement, "The project activities will be correctly organized and run successfully if you grasp this."

The data in the table above ranks respondents' agreement that discussing quality requirements with the team can ensure quality control of workmanship. The first and second data rankings, with a mean of 3.34, are *'This conversation can provide a clear image of the type of quality level that must be met* and *'The positions can be allocated evenly and according to their talents and responsibilities.'* With a mean score of 3.32, the lowest rating is *'This strategy can aid the project team in decreasing rework as well as negative implications on project deadlines and budgets.'*

The data in the table above ranks the respondents' agreement that discussing quality requirements with the team can ensure quality control of workmanship. The first and second data rankings, with a mean of 3.34, are *'This conversation can provide a clear image of the type of quality level that must be met* and *'The jobs can be allocated evenly and according to their talents and responsibilities.'* With a mean of 3.32, the lowest ranking *is 'This strategy can aid the project team in decreasing rework as well as negative implications on project deadlines and budgets.'*

The table above displays the most popular data collection, which is *'Work that is not up to par may cost the project a lot of money and effort,'* which has a mean of 3.25, indicating that most of them agreed with this statement. Furthermore, the second ranking, with a mean of 3.11, is *'At work, an incident happened in which my co-workers failed to rectify the criticized error'*. The lowest score is *'My project management team has a history of accomplishing assignments on time while ignoring the quality of the work,'* implying that all their project management teams can manage their time effectively.

The data collection for ranking statements regarding daily project progress monitoring is shown in the table above. The first and second places, with a mean of 3.36, indicate that most of the participants agreed with the following statements: 'Producing daily reports allows me to keep track of progress on the job site' and *'Supervision, evaluation, appraisal, and feedback are all used in project monitoring and evaluation systems to verify that a project meets its objectives and aims.* The third statement, *'During the construction process, my project management practiced daily project status monitoring,'* received just a 3.28 on a scale of one to ten. The statement *'True, the contractor is usually the one who writes the daily construction reports'* received the lowest rating, with a mean of 3.19, indicating that not all respondents agreed with it. The data rating for carrying out testing advice is shown in the table above. With a mean of 3.42, most respondents agreed with this statement: *'The testing that needs to be done must be following the project's specifications,'* resulting in the highest ranking. With a mean of 3.40, the second highest ranking is *'Other tests undertaken by my project include the compaction test or in-situ density test, concrete compression test, durability test, mechanical and electrical test, CMU (Concrete Masonry Unit) compression test, and non-destructive testing.'* Furthermore, the lowest rating, with a mean of 3.36, is *'Before beginning construction, my business undertook soil testing,'* implying that not all companies carried out this type of testing.

The table above provides the data rating for checking raw materials before beginning a project. With an average score of 3.38, most respondents agreed with all the statements: 'In my project, raw materials are handled via a material management system,' 'This method can help to prevent future faults that could compromise the building's quality,' and 'The raw materials that have been received will be inspected and properly kept.'

CONCLUSIONS AND RECOMMENDATIONS

It would be fascinating to talk about high-rise building workmanship quality management. The parties concerned are generally aware of the current industry norm for quality control of workmanship in the construction of high-rise buildings. Each of them is also aware that Malaysia's existing system is not considerably superior to the quality control procedures used in Singapore and other Asian countries like Malaysia when erecting high-rise buildings. It is also true that QLASSIC, developed by the CIDB, can assist high-rise structures in the interim in achieving higher long-term quality. Most contractors, however, had difficulty maintaining quality standards throughout the construction process, according to studies. Additionally, crucial factors including untrained labour, the use of the wrong equipment and materials, and a lack of project management may lead to poor quality control of work.

To create high-rise buildings, quality control of the labour is currently practiced, and this research's primary goal is to identify this technique. Based on the data, it can be concluded that goal 1 of this research has been accomplished since most respondents are using the proper techniques to improve the quality control of workmanship when developing high-rise structures. For instance, before beginning their work with others, most of them do thorough planning. This could be because the majority of them began their careers at the bottom and subsequently gained more expertise, particularly from those who had worked in the construction business for much longer than they had. In conclusion, this research's primary goal has been accomplished.

The study's second goal is to identify the key elements, particularly as building projects move along, that contribute to subpar quality control of workmanship. According to the Literature Review, factors that contribute to the poor performance of low-skilled workers have been identified. These factors include a lack of skilled workers, poor site management, a lack of safety and health services, inefficient plants and equipment, and excessive overcrowding of skilled workers, all of which are consistent with the respondents' covenant. To put it succinctly, the research's second goal has been accomplished. The development of a technique for ensuring quality control of workmanship based on construction plans and authority compliance is the third goal of this research, and it is intended to address the ongoing issues that are persistent in the construction sector. The results of the data

analysis revealed that the respondents had come to the same conclusion on how building designs and government compliance may help provide more precise control of the quality of the work. The buildings can be constructed safely and without a doubt, as described in the literature review, with these as well. Finally, it may be said that the third and last research goal has been accomplished.

The following recommendations were given considering the study's findings and conclusions, including the need for all construction professionals including those who work on-site and in corporate offices to take future studies into consideration. Further study on high-rise project employees in the construction industry who are based outside of Malaysia is also welcomed. An actual survey will be conducted after the pandemic has passed. Encouragement of more persons to carry out a follow-up investigation into this matter is advisable.

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