

THE MALAYSIAN STAKEHOLDERS COGNIZANCE ON CONSTRUCTIONS IN IMPLEMENTING A SUSTAINABLE INDUSTRIAL BUILDING SYSTEM (IBS) IN MALAYSIA

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ABSTRACT

The construction industry and government of Malaysia have coined the term Industrialised Building System (IBS) to describe the enhancement of industrialization and the development of prefabricated components for building constructions. The purpose of this study is to create an awareness regarding the sustainable implementation of the Industrialised Building System (IBS) among private stakeholders in the Malaysian construction sector, notably in the Klang Valley region. The study aims to better identify stakeholders' existing level of IBS knowledge, with a focus on cost, time, and available programmes. Certain units of a building that comprises more time usage and workload are efficiently reduced by implementing manufactured components in the off-site and delivered later to the site. IBS is however a need that is persisting subconsciously and consciously as Malaysia has been relying on the dependency of other countries for their unskilled laborer. Thus, this study is intended to create cognizance among private stakeholders in Malaysia Construction in implementing sustainable Industrial Building System (IBS) in Klang Valley. A survey of the quantitative method of 126 construction workers from 400 private enterprises in Klang Valley was carried out. The study focuses on evaluating the effectiveness of time management in construction projects, evaluating project quality compliance, comparing construction quality and cost between conventional methods and IBS, and assessing private stakeholders' awareness and cognizance of the sustainability of IBS in the construction industry. The findings of the research are gearing towards investigating the potential of IBS in addressing building difficulties in Malaysia and focusing on its sustainable practices and the need to improve awareness among private stakeholders in the Klang Valley.

Keywords:

Industrialised Building System, Private Stakeholders, IBS Cognizance, Klang Valley, Malaysia

INTRODUCTION

The construction industries envision the circumstances that could occur with the implementation of the sustainable development in their building processes and functions that relatively sustain the ecology with the new discovery of business models, materials, and their processes. To aid in this development, humans need to revolve, work, and do continuous learning and enhancement to achieve a sustainable living standard (Yeang, 2011).

The concept of a sustainable Industrialised Building System (IBS) is defined as the modern method engaged with “green” elements, considerably advanced rather than the conventional system. The conventional IBS is not technically relevant due to its work performance being completely conducted on site. Dangers and risks of foreign and local workers gave effects to a poor quality of production when older IBS implementation occurs. The current IBS implements construction process to take place in factories and then transported to the site for components to be assembled. Additionally, Modular System correlates measurements between spaces, installation, and components to ensure that the constituent elements are fit with one another. The need for extension or cutting is excluded even though the components and fittings are readily served by different manufacturing companies and suppliers (W.A. Thanoon, 2003). Prefabricated construction or better known as the IBS is convenient for developers and stakeholders as it minimises the time for completion of construction process simultaneously and reducing

the cost needed. Components built in the factories are usually faster and an easier method for their high-quality performance (Rahim, 2009 & Ismail, 2009).

In Malaysia, IBS was introduced in 1960 when the Ministry of Housing and Local Government of Malaysia participated in the housing development program among other countries in the European region. Contrary to Malaysia's minimum number of existing residential buildings', the outcome of the program supervised the initiation of IBS implementation in the country (Thanoon, 2003). Since then many projects were launched with the use of IBS in Malaysia. For instance, Kuala Lumpur's Pekeliling Street Flats comprising of 17 stories with 3000 residential and 40 commercial units respectively. The project was built with the use of large IBS wall system and plank slabs. However, the usage of IBS had decreased in the 70s due to poor architectural design which affected the prefabricated buildings that disappointed consumers of precast concrete usage. The need for wet spaces such as toilets was required and the lack of providence of this utility lead to problems arising for IBS buildings.

In the 20th century, the government had promoted IBS usage in projects such as IBS Roadmap 2003-2010 to educate practitioners and policy makers on IBS problems to ensure the Malaysian construction competence level tops in the international standards. However, this goal was unsuccessful because only one out of five KPI goals were reached (CIDB, 2011). The five KPIs consist of Manpower, Monetary, Materials and Bumiputera Development that has subdivisions of IBS manufacturers and Bumiputera IBS Manufacturers. CIDB launched the IBS project called Roadmap 2011-2015. The implementation enforces on project quality, competency level, efficiency, and sustainability in the development. The construction business environment is becoming more complex these days, with more issues that must be addressed by teamwork (Yusuf, H. Y, 2021).

The government and the most important party, CIDB are in the ongoing process of achieving the use of IBS 70% in construction projects. (CIDB, 2016). Therefore, the keen interest in improvisation of sustainable IBS adaptation in Malaysia has developed. The use of more than 70% of IBS in the construction industry could produce more successes for the country and outstanding the standard internationally as mandated by the government. The construction industry has been experiencing persistent problems such as poor health and safety conditions, inferior working conditions, and non-achievement of quality, which have harmed construction productivity, overall performance, and image (Fateh,2020).

The Industrialized Building System (IBS) is a term used to refer to various pre-fabricated construction methods. The scale and size of components vary, from wall-sections to full-scale building floors, which are constructed separately in a controlled environment, and later assembled to form a full-fledged building or facility (CIDB, 2015). The objective of implementing the sustainable IBS in Malaysia is to improve the productivity rate, efficiency, and quality of construction projects. It also aims to promote sustainable and climate-friendly construction practices (CIDB, 2015). In terms of sustainability, the implementation of IBS is evaluated based on Political, Economic, Social, and Technological factors (PEST) (Taherkhani, 2014). The results show the need and the importance of considering social factors to improve the development of IBS for sustainable construction. This is the main reason why this study is aimed to provide cognizance for the construction industry in implementing IBS mainly targeting the private stakeholders. The need to it have been exposed to the aspects of IBS is essential. The construction industry has been battered by chronic problems such as poor health and safety conditions, poor working (Fateh,2020).

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Barriers in Adaptation to IBS System

The hindrances to embracing IBS are the extreme need labeling with the validated changes produced using traditional technique towards the incorporation of off-site advancement. It was expressed in this investigation that IBS technique requires diverse administration abilities and new processes (Hamid et al, 2009). In contrast to the conventional method of building structures, IBS conducts a reasonable segment by appropriate arranging of its cycles, plan, fabricating arranging and quality control to limit the deformities in the construction (Gibb, 2001 and Warszawski, 1999). Another obstruction is a significant restriction in the information controlled by industry players. A large portion of the methodology towards more current ventures is conventional technique than IBS (Blissmas, 2006). IBS is additionally implanted with an exceptionally focused association that includes incorporation, coordination, and legitimate obsession of components as it includes numerous parties to complete one project (Pan et al, 2008). Furthermore, in terms of business approach it becomes another barrier to adopting IBS since the investment plans and selection of suitable project proposals needs to justify (Malik, 2006).

Subsequently, the primary obstructions to improve IBS in the business are simply on the outlook of the players generally in specialized terms. The IBS variation is expecting for changes in their underlying get together and their structure measures. The IBS positive results must be seen when the comprehension on IBS standards on the assembling terms along appropriate gather to the assembling measures. The government and CIDB is on the ongoing process of achieving the use of IBS 70% in construction projects. (CIDB, 2016). Therefore, the keen interest in improvisation of sustainable IBS adaptation in Malaysia has developed.

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Perception of Contractors in Malaysia Towards Industrialised Building System (IBS)

The wavering towards accepting IBS strategy in developments by the private workers for hiring purposes is the requirement to burn-through IBS in project improvements. Expansion in unfamiliar works in Malaysia for modest compensation and expanded time limitations in giving schooling and preparing to the laborers to agree with IBS technique helps in the choice of project workers picking ordinary strategy over present day framework (Kadir, Lee, Sapuan, Jaafar & Ali, 2006).

On-site of prefabrication is done in the surrounding of the site and later transported to the actual location and it includes advantages that satisfies budget of construction, time minimization and an improved performance quality (CIDB, 2003). The off-site construction is also understood to be built in factory and later transported to the site location. Even though, it is a way older finding, the argument above is strongly supported till present time.

Perception of IBS among Construction Project Managers in Malaysia

Underline on the view of IBS and the competency level of IBS in Malaysian development industry among Construction Management Project Manager, it is believed to come about that the development projects being included of IBS requires more competency than the conventional strategy's need. (Janipha, Jabar, Ismail & Aziz, 2013).

The primary factor for the competency level of development director in the result of a task and in territories explicitly expected to have the best conveyance of a venture (Crawford, 2005). It is clarified that solely after ten years; a construction management certified graduate would accomplish the situation as a project manager. In this manner, the normal numbers of undertakings directed in the time frame are

16 projects. In the middle of those sums, it is expressed that an average of 3 or lesser number of activities are directed with IBS (Jabar, 2013).

A different method is used in managing IBS and conventional development pays a big effect on construction project. This study shows a contrast in opinion that time is shortened and project completion within time duration is ensured because the plants and machineries are available to receive the components.

Public Perception Towards Implementation of IBS

As addressed by Zawawi (2009), numerous advantages advanced, the various insights among the partners have prompted the low utilization of IBS segments in the development business. Nevertheless, Onyeizu (2011) stated that since the beginning of the IBS introduction to the Malaysian construction industry and its promises to solve and improve the current construction method and scenario in the country, poor perception amongst the construction stakeholders towards it, is an issue which greatly contributes to the low usage of IBS components.

Thus, it led to the term “IBS” being misinterpreted with negative conception. As explained by Rahman & Omar (2006), the explanation that add to the negative origination of IBS term is past disappointments and ugly design. Development experts are questionable with IBS innovation and IBS’ relation with potential post-development issues. Researchers concurred the negative insight towards IBS depends on the chronicled disappointment of off-site practices to convey improved execution, specialized challenges (e.g. Site specifics, delivery issues, interfacing problems and cost), lack of opportunities for benefiting from economies of scale, structural requirements associated with social, security, privacy and noise problems and the fragmented structure of the construction supply chain (Blismas & Wakefield, 2009; Idrus et al., 2008; Pan at al., 2004).

Cost and Quality between IBS and Conventional Method from Industrial Key Players’ Perspective

A prior finding has announced that the IBS has continuously diminished the use and increment the future benefits for the partners, for example, project supervisors, specialists and designer through the execution of IBS which all the while lessens the expense of work and materials (Yunus, 2011). Another research in the following year stated that IBS and conventional method does not make a huge difference in construction material but does contrast in the labour cost reduction and the improvement of quality of production by IBS (Ahmad, 2005).

It is concurred that IBS saves cost and improves quality; and they should be cognizant in instilling the strategy as it is a perspective to consider among supervisors and central participants. Along these lines, level of insight on technique usage of IBS is required.

Contractors Perception on Time Effectiveness in Construction Project with IBS

According to CREAM (2010), one of the fundamental criteria for estimating the accomplishment of a task. Thus, the investigation accentuates on time improvement between IBS model and ordinary technique. For example, nail fixing and cutting of logs and wood contains a great deal of time (Bannet and Grice, 1985). Furthermore, another paper guaranteed that IBS abbreviates development time with better quality control as a result of its distinctive methodology in development (Warszarski, 1999). As per Gibb (2001), building development utilizing pre- assembled segments with fabricated under explicit conditions and determinations implies breaking an entire house unit into various parts and building them independently. Later embracing fixation to develop the whole house

It is concluded that the work scheduling time becomes very effective when IBS is used in the project. Therefore, IBS cognizance among stakeholders is needed as very little private companies are instilling it even though that have the basic knowledge of this method.

Levy Exemption for IBS Users

The Malaysian Construction Levy exemption on CIDB taxes of 0.125 % of the absolute expense of the IBS project towards the workers for hire that apply the arrangement of 50 % in their underlying parts in lodging structures (Hamid, 2008). Different discoveries contended that the exclusion of duty when a project has 50 % association of IBS is excessively less and not sensible (Shaari, 2006). The offer is not actually acknowledged by partners as the current levy that is being instigated is low when contrasted with the past demand forced of 0.25 %.

The IBS Score and the levy exemption value must comply with the consideration of contractors' budget constraints as well. The levy offered will be accepted and felt encouraged to adopt IBS when the percentage of levy increase and the IBS Score is set considerably (Shaari, 2006).

IBS Training

It is just rational to have skilled workers and supervisory group who are prepared sufficiently to support the development progress as the requirement for reconciliation between higher management and lower management, legitimate coordination and details of materials and coordination during assembly of parts are fundamental. The writing has featured the requirement for preparing to be given to the partners (Thanoon, 2003).

Another finding has stated that the higher the level of advancement in a project and the implementation of IBS will require different and more skilled worker as well compared to a simpler IBS project (Gibb, 2007). The author also stated that the already skilled labourers must be given training from time to time to be reskilled according.

METHODOLOGY

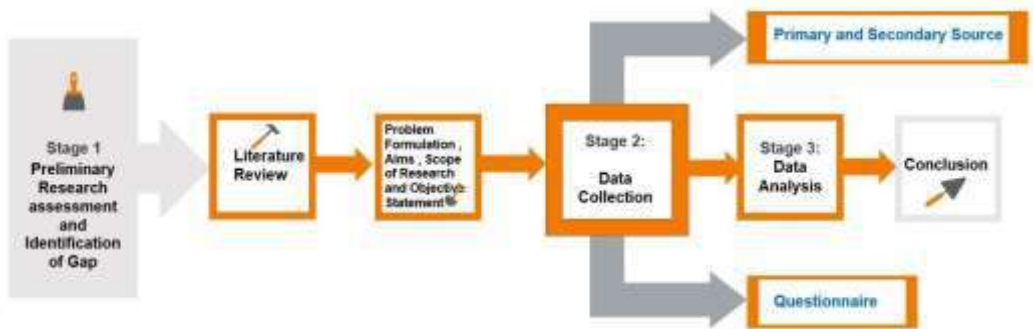


Figure 1: Flowchart of Research Methodology

Based on the figure above, this study method involves some literature review, and the dissemination of questionnaires to attain the emphasised aim of the research and objectives as stated. From August 2020 to January 2021 (when this study started) a total of 100 private stakeholders were identified as sample for the study. The strategic scheme is used to create an appropriate framework for the research, which contributes to a high-quality data collection and production of results. This research uses a quantitative method. The first section of the research study has a series of questionnaires. A systematic questionnaire is used in the research to gather data. One hundred private stakeholders make up the research sample, and in the context this research, this sample size is suitable for a quantitative study because it permits statistical analysis and generalisation of findings to a larger population of private stakeholders. The robustness and reproducibility of the investigation are enhanced by the deliberate selection of this sample size. In order

to accomplish the research objectives, a structured questionnaire for data collection is used, along with a sample size of 100 private stakeholders chosen through a strategic plan and a quantitative approach with statistical analysis tools.

IBS Professional Training Programme by CIDB

IBS Professional Training Program by CIDB is attended under 50 % of the respondents. The preparation is gone to by 33.9 % just of which are 42/124 members of the study. Then, the remainder of 66.1% of 82 respondents has not gone to the program as demonstrated in Figure 2, separately. The need to go to the program has not brought consideration up in many of the respondents when the information gathered was noticed. This is the main motivation behind the reason of more openness to IBS broadly is required in the nation to urge partners to accumulate data in the framework application. IBS is anything but a go for program since partners are not quick to go to nor get ready trainings teamed up with separate CIDB organizations of IBS programs that could use them into acquiring information on IBS that prompts an attainable status of its execution in current and future projects.

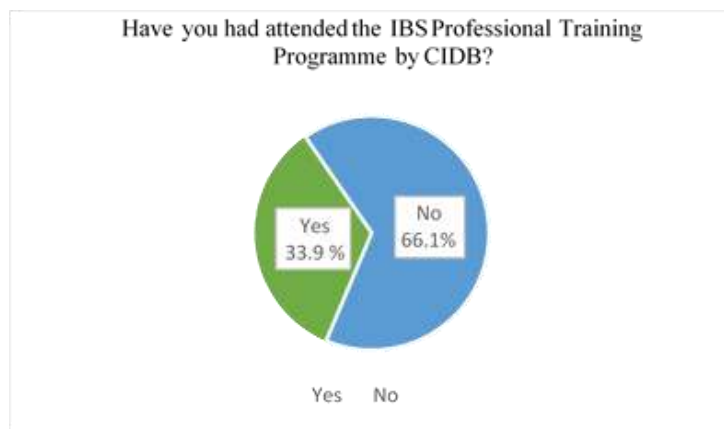


Figure 2: Percentage on attendees of IBS Training Programme by CIDB

The analysis results of attendance rate is approximately 50% of the respondents attended and out of 124 participants in the study, 42 individuals (33.9%) attended the program, while the remaining 66.1% (82 respondents) did not participate. The data indicates that the need to attend the programme did not receive much consideration from the respondents, and a noteworthy finding is that there is a lack of awareness or interest among respondents in the significance of attending the IBS Professional Training Programme. These factors account for the non-attendance. Moreover, Further, owing of the participants' lack of preparation for or limited knowledge base, there are implications for IBS implementation and a need for greater awareness as part of the data analysis. Instead of facilitating information gathering and promoting the application of IBS, the necessity of awareness focuses more on the critical need for enhanced awareness and promotion of IBS in the nation. There is a clear need for greater transparency and encouragement among stakeholders. The study's goals were to evaluate private industry stakeholders' awareness of and involvement in the IBS Professional Training Programme in Malaysia's construction sector.

Awareness on IBS Benefits in Construction

IBS provide many benefits and its applications as indicated are not all around publicized among half of the respondents. This is on the grounds that lone 49% of respondents can decipher the advantages as they

are associated with the IBS project itself and have known the essentials of its framework and planning. The other 51% have been utilized to the comfort of managing the conventional method for quite a long time who are the workers for hire and task administrators who may not probably acknowledge the more up to date technique which is IBS. The figure beneath deciphers that acknowledgement on benefits are available, yet the adaptation rate is less. The outcome shows that the degree of insight on advantages of IBS is on the edge of half of the scale. The cognizance to embrace the execution and improve where necessary.

Are you aware of the IBS benefits in construction projects?

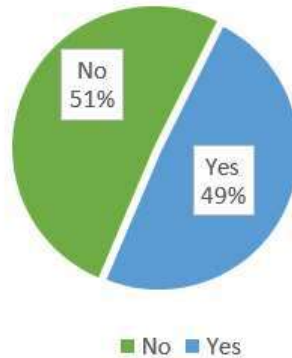


Figure 3: Awareness of IBS among private stakeholders

Concurrent IBS Production Shortens the Overall Construction Period

Respondents who are accustomed to practicing conventional method technique are not vulnerable against fresher innovative methodology as IBS, yet the graph underneath shows majority of the respondents have picked the third bar with 28.2%. The Neutral Bar is higher with 20.2%. A large portion of the separate respondents who disagree or strongly disagree are contractors and project manager who have been teaming up with conventional technique for a really long time with their number of working a very long time as demonstrated in figure 4 underneath. This shows an openness adequately long to detail out their unshakable assurance towards not wandering into IBS. The absence of comprehension on a simultaneous interaction which means work of IBS is delivered all the more effectively while other work is running nearby like preliminary activities in the interim, complex IBS structures are worked off-site.

Q2) Constructions of prefabricated components are concurrent constructions which can proceed even when other preliminary activities are being held shortening the whole construction period.

124 responses

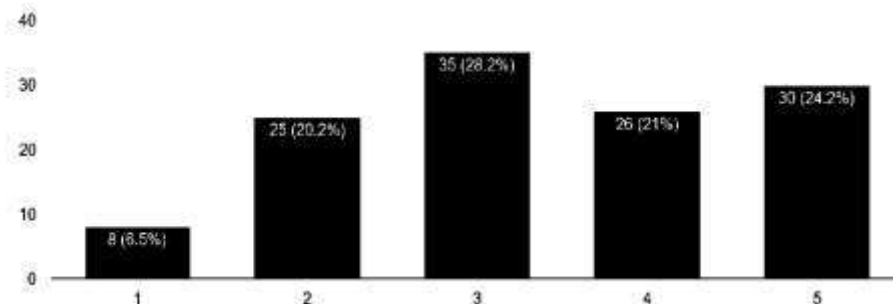


Figure 4: Concurrent IBS Production Shortens the Overall Construction Period

IBS Operations are Cheaper than Conventional Method

It is agreeable that the IBS development tasks are less expensive than traditional method. The add on charges are applicable to conventional method from time to time when necessary. The IBS is supposed to be a lot less expensive as their segments are developed on assembling off-site and that limits the on-site work. This is by one way or another comprehends by the respondents. In this way, 14.5% of the respondents strongly agreed in Figure 5. The other 10.5 % strongly disagreed regarding their rates as underneath. This shows that the respondents absolutely have an alternate opinion to the use of IBS. This is an immense motivation to why adaptation of IBS is resistant and slow.

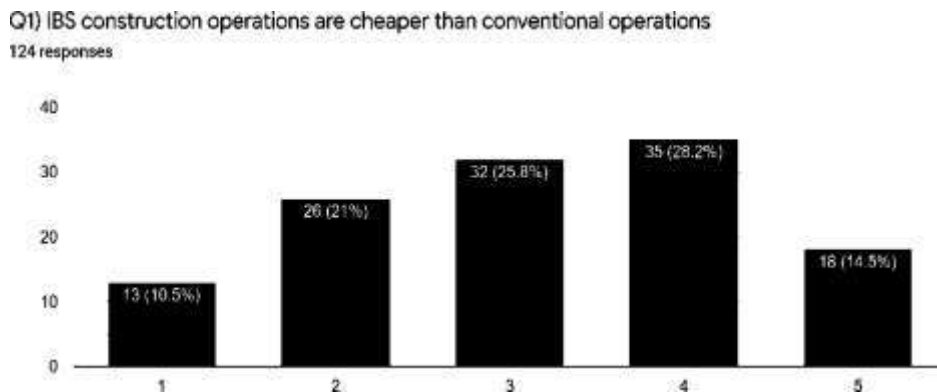


Figure 5: IBS operations are cheaper than conventional method

Lesser Labour Cost with IBS

An enormous level of respondents with 30.6 % of 38 individuals disagreed and 15.3 % of the respondents agreed. It is clear in the Figure 6 underneath that the vast majority of the partners have a recognize assessment on IBS and work cost. They do not want to adopt to the change as they still have perception that IBS does not aid in reducing the cost. This is because, the contractors who have responded to this are worried of the initial capital cost to endure in IBS projects. As these are small group of contractors who are incapable to afford the investment. This means IBS is adoptable with a little bit more revelations on a more depth IBS cost benefits to the stakeholders. Hence, the risks show very low, and the long-term production quality and cost saving factor is higher.

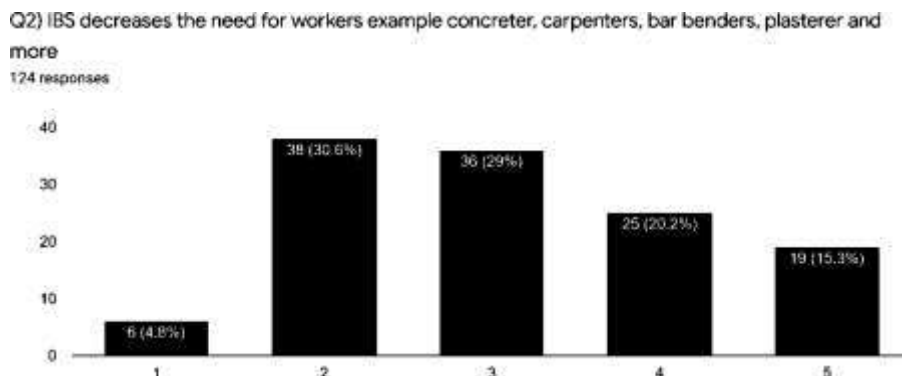


Figure 6: Lesser Labour Cost with IBS

Simplified Installation Process Improves Quality Control

In the information gathered as beneath, it is strongly shown that the vast majority of the respondents disagree to the factor that cost is reduced when IBS parts are planned and made of-site, that at the same time improves the quality as the climate is cleaner and more coordinated when based nearby. As deciphered in Figure 4.7 the degree of understanding this factor is low as 8.9 % of them have strongly disagreed and opposed this idea. This is because that a large portion of the respondents have encountered working with traditional method yet when uncovered of IBS and a portion of its advantages are still agreeable to them.

Plus, 12.1 % of the respondents have expressed strongly agreed to the statement. These are the respondents who are keen on IBS, for example, new alumni and post advanced education holders working in the construction industry as they opted the risk on capital expense which will later profit in overall cost decrease and quality improvement when IBS is in projects. Overall, with a decent implementation of IBS among private key partners is fundamental to take cognizance of the topic researched as the quality of components are easily managed.

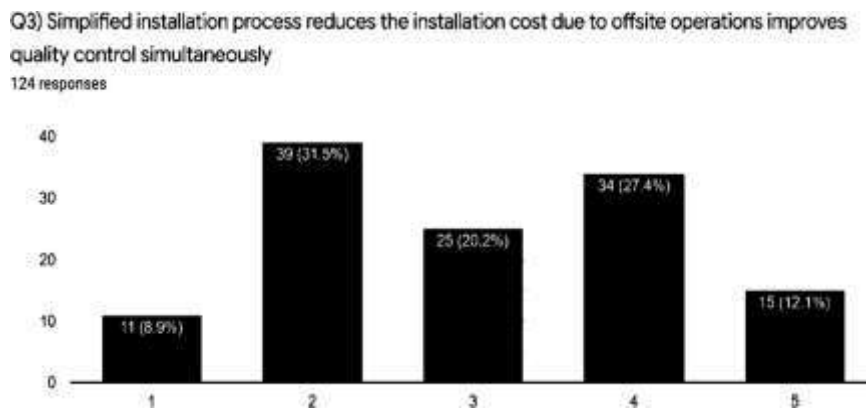


Figure 7: IBS Professional Training Programme

IBS Professional Training Programme

This program provides training to all work force of development group to expand the use of IBS and acquaint. The strategies of development measure were shown, yet it is strongly disagreed by 33.9 %. This shows that practically 50% of the respondents are not presented to this program with less acknowledgment to IBS Professional Training Program is investigated. Just 12.1 % of respondents know the program with scale selected as emphatically concurred. The plans are taken to the cognitive actions for it could help in more IBS for future undertakings. An action taken by higher supervisory group in implementing the program by higher management team will be useful to accomplish the objective in practicing IBS without any problem. The training has a high potential in impacting laborers without IBS foundation to acquire the down to earth information and execute in the working environment. Partners may discover ease in project coordination as the workers have been instigated of IBS information and execution abilities.

Investors also acquire trust in setting up the IBS project as the group have the comparing prerequisite of abilities and information. The cognizance to IBS is fundamental as evolved through this program. The program would build the degree of usage in IBS when key stakeholders also go to the CIDB workshop as a large portion of the accomplished partners are still promptly accessible to change their approach towards the construction industry. The requirement to initial construction cost and its benefits will be attained making dear of monetary loss is prevented as the long run profit is seen with understanding

of the IBS Professional Training Programme. Time effectiveness and the production of quality materials increasing the work efficiency is understood in the training programme as work progress stage by stage is explained. This will change the perception of key stakeholders and project ideas of IBS in their future constructions. Stakeholders may encourage their entire project team. to understand and instill the modern system for their projects.

CONCLUSION

The study emphasises the importance of a thorough public education campaign to educate stakeholders about the benefits of IBS. While certain characteristics, such as time effectiveness, is acknowledged, changing entrenched practises remains difficult. To fully realise the promise of IBS, concerted efforts should be made to address concerns, increase knowledge, and stimulate active participation of private players in various IBS programmes. An objective of this research has been successfully achieved. The level of knowledge attained by the respondents in regards to IBS and its information are low. Most of the respondents are not entailed to the betterment of the Malaysian construction industry and have settled with the conventional method. This shows that the cognizance on IBS and its assurance in the development of its industry is low hence, it leads to the third objective of this study in providing cognizance to IBS among private industrial players.

Time effectiveness and its relativity to the quality of construction is successfully achieved when the data have shown apprehension on the improvement on time management on site will increase production quality was well understood by the postgraduates and fresh graduates mostly when compared to other category of occupation in the industry. It also exhibits that other stakeholders involved in the construction industry too have agreed to time and quality raise with IBS but with a very low percentage. The adaptation of IBS in a company begins with the superiors such as project managers and main contractors deciding to execute IBS in their projects. This shows that the time effectiveness in quality of a construction project is highly received. The only challenge remaining is the infusion of method in the future projects.

The reduction in construction work wages has decreased most of the construction cost. Most of the respondents do understand this factor. However, few of the population, still disagree due to the worry factor of unexpected expenses when the manufactured models have complications in dimensions and functionality. However, the convenience and trust built on conventional method is the obstacle faced in the process wanting to widen the use of IBS. This satisfies a portion of the research's third objective in terms of cost and quality. The quality is improved in proportion with the reduction of wastage on site. This supports the third objective as well as most of the respondents agree. Some of the respondents still do not accept the cost effectiveness due to lack of cognizance received on IBS capabilities.

The level of cognizance that is interpreted by the results obtained concluded that most of the population has shown maximum positive remark of one programme of all such as 'Construction Levy Exemption'. To conclude, it is true that more population is needed to take cognizance to more IBS programmes for better understanding. Final objective is achieved completely as distinctly that more private stakeholders need to take cognizance that are well provided by the IBS institutions and other organizations to inaugurate an IBS growth.

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