
The Contribution of Subcontractor's Performance Towards Project Success: Main-Contractor Perspective

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Abstract - A subcontractor is a company or individual who performs work for another company as part of a larger project. However, research shows that one of the factors for project delay is caused by underperformance subcontractor. Therefore, the research objectives of this study are to identify the contribution of subcontractor's in assisting main contractor toward project success, to identify the benefits of appointing subcontractors towards project success and to suggest recommendation to improve subcontractor's performance towards project success. The research method of this study is quantitative method where a questionnaire survey was distributed to respondent from G6 and G7 main contractor in Johor Bahru. The data was collected from 103 respondents which represents 47% response rate. The data analysis method used was descriptive analysis by using Statistical Package for Social Science (SPSS) software. The results show that the main contribution of subcontractors in assisting main contractor towards project success which fulfill labour shortage and expertise in previous project to be work on upcoming project. In addition, the benefits of appointing subcontractors towards project success achieved are availability of knowledgeable and experienced workers and specialized workers that work in the project. Furthermore, the recommendation to improve subcontractors' performance where the main contractor should have good communication with their subcontractors. In conclusion, the result shows that understanding of the contribution of subcontractor's performance will benefit main contractor in avoiding project delay and consequently towards project success.

Keywords - Construction, Contribution, Subcontractors, Main contractors, Project Success

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I. Introduction

In the globalization era, Malaysia is more focusing on construction projects for the future development. According to report from Global Data UK Ltd (2023), the Malaysian construction industry will increase 6.6 percent in upcoming years which is from 2022 to 2025. According to Yakimchuk *et. al.*, (2017), the construction industry is playing an important role for a country's government. The Construction Industry will always face a lot of struggles and challenges to lead the project goals and growth of the construction economy. Overall, construction

is high hazard industry which comprises a wide range of all activities involving plans, design, constructs, alteration, maintaining, repairs and eventually demolishes of buildings, civil engineering works, mechanical and electrical engineering works. The type of construction that will be done is transportation, infrastructure, residential, telecommunication, water infrastructure and more.

In Malaysia, most of construction companies are hiring subcontractors, to assist in the completion of construction works. According to Farrell and Sunindijo (2022), main contractors are the people in charge of overseeing the whole construction project in the construction industry. The client will typically hire a main contractor to ensure that a construction job is completed safely, on time according to the client's specification. Main contractors are essential for both complex commercial construction and simpler residential projects. Meanwhile, according to Tariq and Gardezi (2022), subcontractor is a company or individual who perform work for another company as part of a larger project. Subcontractors carry out work that the main contractor is unable to perform. The subcontractor works under a service contract which will be a legally binding agreement between main contractor and subcontractor. Subcontractors can be hired for fixed term contracts task-based contracts with no set date or long-term projects. A subcontractor is a construction firm that contracts with a main contractor to perform some aspects of the main contractor's work (Hutchinson and Zhang, 2020). In the usual case the main contractor will perform the basic operations and subcontract some work which requires special techniques. Other than that, subcontractors also are companies which are specialized in few activities such as roofing, plastering and they are being an agent for manpower supplies and machineries supplies for the project site.

According to Tomicki (2016), there are many benefits for the main contractors while they are hiring the subcontractors in a construction project. First, subcontractors can work on large projects, subcontractors can be able to produce to the resources and will be very helpful for the main contractor they can complete the project on time with enough resources. Other than that, it is cost efficient, whenever they hire the subcontractor, they also will bring manpower for the project, which the main contractor does not need to hire additional staffs for the project, and it can cut cost of the project. Furthermore, subcontractors will provide expertise, in few projects, the main contractor do not have the knowledge to complete the project, but the subcontractor will have the knowledge and they will bring the experience and knowledgeable worker to complete the project. Then, the subcontractor's also able to provide professional services such as engineers, architect. Most main contractors are not enough engineers and architects, so it will be easy for the main contractor when they hire a subcontractor. According to Rajput and Agarwal (2015), in most of the construction projects 80 to 90 percent of project are done by the subcontractors. Nowadays, the hiring of subcontractors in construction projects is growing due to the adaptation of new technologies, new rules and more which require skills. According to White and Marasini (2014), the subcontractors will have the specialization to complete a project. According to Mudzvorokwa, Mwiya and Mwanaumo (2020), if a main contractor hires a subcontractor, they can complete the project on time, which will be innovative and can improve the quality of work.

However, according to Lew *et al.*, (2020), subcontractors also can bring risks to the construction progress, where subcontractors also can be a reason for the project delay. The subcontractors may be able to face a lot of challenges during the project ongoing such as weather problem, machineries problem, shortage of man powers, financial problems and more. These issues are caused by different issues such lack of communication between the main contractor and sub-contractor, inappropriate construction methods, rework due to error, lack of experience and lack of scheduling. Construction delays are a situation in which the project event occurs later than expected due to some issues such as underperform subcontractors. This kind of case can create a bad image for the main contractor's company. At the same time, the client can also summon the main contractor for the delay. According to Mydin *et al.*, (2014), because of subcontractors' delays in the construction project are budget conflicts, labor shortage, environmental issues, and communication shortfalls. Subcontractors are causing problems which they do not have the capability to carry out the work satisfactorily. Therefore, they are unable to give their clients the required services. Hence, effectively managing the numerous subcontractors involved in a construction project becomes the biggest challenge for the main contractor in ensuring timely project completion with acceptable quality. According to Sambasivan and Soon (2007), many subcontractors are working under main contractor for huge projects in Malaysia, but subcontractors are led to project delay. According to Tariq and Gardezi (2022), delays occur when the project is not complete at the accurate time. The delays in the construction project can cause disruption of work and loss of productivity. The completion of the project late will increase time, cost, and termination of contract.

This paper aims to study the contribution of subcontractor's performance towards project success. In addition, this research also will focus the roles of subcontractors and benefits of subcontractors towards project success in Malaysian construction industry. Additionally, some recommendations were also being suggested to improve the subcontractor's performance towards project success.

II. Literature Review

According to Lew *et al.*, (2020), a construction project is granted to a main contractor, prime contractor, principal contractor, or main contractor who subcontracts specific project activities to a specialized outside firm. Main contractors oversee project management, including client contract administration, project funding and material and equipment procurement and project status monitoring. This involves the general contractor's performance. The capacity of the general contractor and consultant to complete the project on time, on budget and with high quality is primarily dependent on the performance of subcontractors. The scope of the work and logical dependencies between the subcontractors are unclear to the broader public. Subcontractor is a term commonly used in the construction industry. As a result of the uniqueness of each construction project, the transient work force involved, the involvement of multiple crafts, the short timeline of each project and the variety of materials and equipment required, one single construction project may be sublet to several subcontractors. A subcontractor is a construction firm that contracts with a main contractor to perform some aspect of the main contractor's work. Subcontractors are experts in completing the given work, they act as agents of the contracts production system. Their performance can have a considerable impact on the project's overall success. According to White and Marasini (2014), a subcontractor is a person or corporation engaged by the main contractor to carry out some or all the main contractor's contract obligations. Subcontracting allows the contractor to reduce the risk exposure and expand their available workforce, giving them more chances to bid on new projects.

According to Olanrewaju, Bong and Preece (2022), the construction industry is becoming increasingly reliant on subcontractors to complete projects due to the increasing complexity, high resource consumption and changing landscape of construction procurement. Subcontractors were hired by the main contractors for a variety of reasons. Risk sharing, project location funding and regulatory restrictions are among them. Subcontractors are also employed to fulfill the project's cutoff date, decrease overhead expenses, and meet clients' requirements as well as due to a lack of expertise in the main contractor organization. Furthermore, subcontractors can also maximize earnings while also assisting main contractors in reducing estimation errors and project delays. Subcontractor work is done by the main contractor to give flexibility. Subcontracting despite its importance has a detrimental influence on productivity, project quality and health and safety, profit, and customer satisfaction. Although a variety of factors contribute to the poor performance of subcontracting projects, the shortcomings of the prequalification standards are likely the most significant. In the Malaysian construction industry, subcontracting is common. According to Jafari (2013), subcontractors play a significant role in the success of projects. The choice of the best subcontractor is critical to the success of construction projects. Choosing the proper subcontractor will not only ensure the project's overall quality but will allow for cost savings. Furthermore, a successful choice of a subcontractor is often associated with the efficiency of a construction process. Every construction project faces adversity and uncertainty and inappropriate subcontractor can increase the chances of delay, cost overrun and substandard works. In the construction industry, subcontractor failure is becoming more regular.

According to Kumaraswamy and Matthews (2000), construction project team are a temporary organization involves many people with a lot of different boundaries such as division of cultures, climates, knowledge, fields, expertise, practices, resources, roles, organizational types, group, and individual functions. Since here are many separate organizations involved, this makes it more important for people to coordinate and work together and bring success.

(i) Project Management is dependent on the success of the goals.

According to Bryde (2005), the project management success criteria of time, cost and quality are subordinate to the product success goals with higher objectives. As a result, project failures are seen as project success because the higher-level goal of product success has been attained.

(ii) The success of project management directly affects the success of products.

According to Unterhitzenberger (2021), the success of a product is directly proportional to the performance of project management. While project management can help a product succeed, it is impossible to prevent a product from failing. For example, project management can assist in identifying the projects' infeasibility and recommending that they be abandoned or amended. Poor project management can result in product failure, such as profitability or market share, due to cost and or schedule overruns.

(iii) The success of a project is affected by time

According to Bryde (2005), every metric of success has its own timeline. Only when the project product is put into use, which could be many years after the project is completed, can the success of the product be determined. It is a short-term measurement criterion for project management uses that determines whether a project has met its schedule, cost and quality objectives.

Type of Subcontractor's contribution

Subcontractors play a crucial role in the construction industry, providing specialized services and skills to construction projects. Subcontractors are typically hired by main contractors to perform specific tasks, such as electrical or plumbing work, concrete pouring, or carpentry. They work under the direction of the main contractor and are responsible for completing their assigned tasks on time and to the required quality standards. Depending on the size and complexity of the project, a main contractor may hire multiple subcontractors to work together to complete the project. The contribution of subcontractors to the construction industry is essential, as they bring unique expertise to the project and help ensure its success.

(i) The workmanship of subcontractor

According to Rodrigo and Perera. (2017) and Yoke *et. al.*, (2012) the workmanship that was brought by the subcontractors to the construction project is able to improve the quality and fulfil the labour shortage in the construction project. The subcontractor's bring workmanship offers a variety of benefits in addition to flexibility in labour employment. The main contractors also get a chance to lower the labour costs even more.

(ii) Subcontractor's Past experience in performing work

According to Rodrigo and Perera. (2017), subcontractors will have technical knowledge and experience in completing the work project. The subcontractors will have previous experience. Subcontractors who have successfully executed works of similar nature, size, and complexity for other contractors. The subcontractors with an excellent track record will have a better chance of completing the essential subcontract job in a timely and high-quality manner.

(iii) Management of the labours

According to Javanmardi *et. al.*, (2018), subcontractors will be able to manage the labour resources well to satisfy the schedule of several subcontracts at same time. Efficient resource planning by the subcontractors can reduce the project delivery time by up to 45 percent. Subcontractors will have excellent leadership and management skills to manage and plan projects in the most efficient and cost-effective manner.

(iv) Subcontractors be as cost-efficient agent

According to Rostiyanti, Hansen and Ponda (2020), subcontractors seek long term work ties to keep their business afloat, which is why they enter into conditional payment agreements. Conditional payment is based on the cash flow and performance of subcontractors. Hiring a subcontractor rather than hiring a new full-time employee when the company needs extra hands-on big projects might save you a lot of money.

(v) Subcontractors done 80% to 90% work

According to Fahada and Razak (2013), subcontractors will do 80 to 90% of the construction work. Subcontractors will have specialist equipment and machinery. The subcontractors also will have operators for the machinery, and they will know the procedure to handle the projects. Subcontractors have unique skills which can complete all the work on time. It also can improve the quality of work.

The benefits of subcontractors in construction project

Subcontractors are an integral part of the construction industry, and their services are often essential for a project's success. They are specialists in their field and can provide a level of expertise and efficiency that general contractors may not be able to achieve on their own. Utilizing subcontractors can help to streamline a construction project, reduce costs, improve quality, and mitigate risk. In this way, subcontractors can be invaluable in ensuring that a project is completed on time, within budget, and to the highest possible standard. In this paragraph, we will explore the benefits of subcontractors in more detail, highlighting the ways in which they contribute to the success of construction projects.

(i) Reduce Cost

According to Marzouk, el Kherbawy and Khalifa (2013), fixed cost decreases because subcontracting limited equipment maintenance and underutilized labour, fixed costs are lower. Hiring a subcontractor is about 20 to 30 percent more cost effective than hiring a full-time addition worker. Subcontracting also reduces the cost and risk associated with purchasing, renting, and maintaining the equipment.

(ii) Provide More Expertise

According to Demirkesen and Bayhan (2019), provides more expertise, subcontracting allows for a greater expertise and specialized work in specific cases and owing to the nature of the project, particularly when the business staff has the requisite knowledge and aptitude to accomplish the project work. Subcontractors will provide specialized expertise in a specific specialty. Subcontractors frequently provide superior service and knowledge.

(iii) New Technology adoption

According to Aslam, Khan and Tufail, (2020), main Contractor get benefits by subcontracting for new technology because the service provider or subcontractor company has access to specialist state of the art technology. Subcontractors will have knowledge of how to handle new technologies on construction sites.

(iv) Increase productivity rates

According to Olanrewaju *et. al.*, (2022), subcontractors are frequently more productive than business employees, owing to their significant prior expertise with similar projects, as well as the contractual duties imposed by the main Contractor. Working with a subcontractor will almost increase productivity. The main contractor can outsource these chores to a third party rather than burdening their personnel with simple but tedious activities. If the main contractor hires a subcontractor, this will allow the personnel to focus on essential business demand while also potentially completing the task faster.

(v) Risk transfer

According to Adinyira *et. al.*, (2020), subcontractors are also employees to fulfil the project's cut-off date, decrease overhead expenses and meet client requirements as well there will be many risks for main contractor such as lack of expertise and subcontractor can fulfil it by providing expertise workers. Furthermore, subcontractors will reduce the errors in the construction projects and reduce the delay of the project completion time.

(vi) Subcontractors reduce the project delays

According to Meng (2012), good partnering with subcontractors will improve the project performance, not only in terms of meeting deadlines. To be finished on time, projects normally require continual coordination among the subcontractor's terms of work speed and timing during the execution phase. Subcontracting is a common practice in civil engineering projects. Subcontractor's handle a significant portion of the work in building projects

Recommendations to Improve Subcontractor's Performance Towards Project Success

Effective project management is essential to the success of any construction project. One of the critical factors in achieving successful project outcomes is the performance of subcontractors. Subcontractors play a vital role in the construction process, as they are responsible for carrying out specific tasks and delivering results on time and within budget. Poor subcontractor performance can cause significant delays, cost overruns, and even project failure. Therefore, it is essential to develop strategies to improve subcontractor performance to ensure project success. A few recommendations to improve subcontractors' performance are as discussed below.

(i) Management among subcontractors'

According to Olanrewaju *et. al.*, (2022), many subcontractors need to rent the equipment for the new project from outside of the market. Most modern projects will require a lot of equipment and machinery. The subcontractors do not have enough machinery. Therefore, the main contractor should ensure that they have enough machinery to complete the project on time. So, the main contractor can prepare machinery for the site or can give advance payment for them to make sure the subcontractors have all the machinery.

(ii) Main contractor's payment to the suppliers

According to Mirawati, Othman and Ismail (2015), the subcontractor can make the project delay by late arrival of material on site due to payment problem with supplier. The main contractor should make the payment on time to the suppliers to get the product and materials such as aggregate on time. It is very important for subcontractors to be engaged with suppliers.

(iii) Policy

According to Adinyira *et. al.*, (2020), the main contractor' should prepare a safe working environment for the subcontractor's and labours. Main Contractor also should hire safety officers to conduct regular inspections onsite to prevent accident and to give safety information to the subcontractors. Main contractors should always make sure that the subcontractors are wearing personnel protective equipment such as safety helmets and safety vests on project site.

(iv) Time

According to Hasmori *et. al.*, (2018), the main contractor should have regular inspection on site to make sure that subcontractors are doing the work as planned to complete the project on time. The most important factor in determining the project success is time, which refers to the amount of time it takes to complete the project. It is planned to allow the facility to be used on a date set by the client's long-term plans.

III. Research Methodology

Research Design

The purpose of the research design is to create an acceptable framework for a study (Sileyew, 2019). This study uses a quantitative strategy to collect data from specific sample groups using questionnaires. This method is used to determine the contribution and benefits of appointing subcontractors towards project success and recommendation to improve subcontractor's performance. The questionnaire form was emailed and sent via WhatsApp to the main contractors from Johor Bahru for them to complete the data. This study presents numerical data from questionnaires, and the data acquired was statistically analysed using Statistical Package for Social Sciences (SPSS) and Microsoft words transformed into graphical, chart and table formats.

Population and Sampling

In this research the target respondents were focused on the G6 and G7 main contractors that were involved with construction projects. In this study G6 and G7 contractors were selected as a sample since G6 and G7 main contractors are classified as the highest grade in Construction Industry Development Board (CIDB) registration and tend to receive a mega project. The population size of G6 and G7 main contractor G6 in Johor Bahru is 519 (CIDB). According to the Krejcie and Morgan (1970), the sample size for population 519 is 217.

IV. Data Collection

a) Types of Data Source

The information was gathered through a questionnaire survey and a review of the literature. The topic of the literature review was the contribution of subcontractor performance to project success. There are two categories of data sources which are primary and secondary data. The primary data is where information conducted throughout survey which is questionnaire. The questionnaire consists of section A, B, C and D. The secondary data collected through a variety of sources such as publications, books, journal articles, websites, and reports. The information was gathered through a review of the literature.

b) Questionnaire

This research was conducted utilizing an online questionnaire survey via Google Form. The questionnaire consists of four parts. For part A, the general information is collected from the respondents. Part B of this questionnaire is about the contribution of subcontractors in assisting main contractors towards project success. In part C of this questionnaire to identify the benefits of appointing subcontractors towards project success while part D were to identify the recommendation to improve subcontractors' performance towards project success. To collect data for each component of the study model most of the questions use a five-point Likert scale. Respondents were asked to score their agreeableness using the Likert scale with 1 representing strongly disagree, 2 representing disagree, 3 representing neither agree, 4 Agree and 5 representing strongly Agree.

V. Data Analysis

The data collected was compiled and analysed to achieve the objective of this study. It was arranged systematically for clear to see by using Statistical Package for Social Science (SPSS) software. According to Berg (2018), SPSS helps to organize and analyze non numerical or unstructured data. Microsoft excel and Microsoft word are used to analyse and present the data obtained from questionnaire survey. The result of this is being analysed and summarized by using descriptive analysis. Descriptive analysis can assist researchers to describe the data and phenomenon so that it will be easier to understand (Nassaji, 2015).

VI. Result and Discussion

The data analysis was divided into several sections based on the questionnaire form. The first part (A) discussed the descriptive analysis of respondent's background. The second part (B) discussed the contribution of subcontractors in helping main contractor towards project success. While for the Third part (C) discussed about the benefits of appointing subcontractors towards project success and part (D) discussed about recommendation to improve subcontractor's performance towards project success.

Respondent's Background

The respondents of this study included G6 and G7 main contractors from Johor Bahru. The data were collected and analysed from questionnaire surveys that have been distributed to G6 and G7 main contractors. There were 513 G6 and G7 main contractors from Johor Bahru according to CIDB registration. The sample size of respondents for this study is 217. This study involves responses from 103 respondents (47% of response rate) which is acceptable. According to Dulaimi, Ling and Bajracharya (2003), the normal response rate in the construction industry for questionnaires is within the range of 20%-40%. Table 1 summarise the finding related to respondent's background.

Table 1: Summary of Respondent's Background

No	Description	Frequency	Percentage (%)
1	Gender		
	Male	80	77.7
	Female	23	22.3
2	Age		
	20-29	40	38.8
	30-39	39	37.9
	40-49	15	14.6
	Above 50	9	8.9
3	Education		
	SPM	22	21.4
	Diploma	16	15.5
	Degree	60	58.3
	Master	2	1.9
	PhD	1	1.0
	Others	2	1.9
4	Working Experience		
	Less Than 5 Year	31	30.1
	5-10 Years	35	34.0
	10-15 years	20	19.4
	Above 16 years	17	16.5
5	Grade of Construction Company		
	G6	7	6.90
	G7	96	93.2

This section was classified into 5 questions which are gender, age, education, working experience, and construction company grade. According to the result, that majority of responded questionnaires were answered by male which is 80 respondent's and carry a percentage of 77.67%, whereas female respondents had a possession of 22.3% which is 23 of them. In this research study, there are 4 groups of respondents. From the table above, most respondents are from the 20-29 age group, which is 38.8% from the 103 respondents. Next, the second biggest group followed by 30-39 age years old, which are 37.9% of total respondents followed by group of 40-49 years old which are 14.6% and 8.9% which are above 50 years old. As for the respondent's education background, most respondents have a degree which is 58.3% (60 respondents). In addition, there are 22 respondent's education background are SPM which is 21.4% and 16 respondents who have diploma, which is 15.5%. Apart from that, 1.9% of respondents have master's degree which is 2 respondents, 2 respondents state that they have other education background (1.9%) and 1 respondent has a PhD (1%). The respondent's working experience by years. Among the 103 respondents that answered questionnaires, 30.1 % had less than 5 years of working experience which is 31 respondents. Respondent's 5-10 years of working experience is the top of the list with the percentage of 34% which is 35 respondents. Respondents who have 10-15 years working experience and above 16 years of working experience carry the percentage of 19.4% and 16.5% which is 20 and 17 respondents respectively. There are two grades of respondents in this study. Based on Table 4, the majority is from grade G7 which is 93.1% or 103 respondents. The second group is from G6 contractors, which is 6.9% of which are 7 respondents.

Contribution of Subcontractor in Assisting Main Contractor Towards Project Success

Part B of the questionnaire pays more attention to the understanding of the contribution of subcontractors in assisting main contractors towards project success. In this section, there are 15 questions which had a Likert scale option. After analysing the data, the level of measurement by Wiersma (1995) as shown in Table 2 was used as the measurement classification in this research.

Table 2: Level of measurement (Wiersma, 1995)

=Mean Range	Central Tendency Level
High	3.68-5.00
Moderate	2.34-3.67
Low	1.00-2.33

Table 3 below shows the findings related to the contribution of subcontractors in assisting main contractor. Fulfill labour shortage was listed by the respondents as the top contribution of subcontractors in assisting main contractor towards project success with the highest mean score of 4.22. According to Rodrigo and Perera (2017), the workmanship that was brought by the subcontractors to the construction project can improve the quality and fulfill the labour shortage in the construction project. The expertise in previous projects to be work on upcoming project was ranked in 2 with the score mean of 4.13. The following rank statement was technical knowledge of previous project and the workers who have more skills will be working on construction project with the high interpretation with the mean of 4.11 and 4.08. According to Lew *et. al.*, (2012), subcontractors have previous construction project experience, and they will get more skill about the project and they able to bring that to the present project. In addition, most of the respondents strongly agree that subcontractors have unique skills to complete the project ranked as the 5th place with score mean of 4.06. According to Fahada (2013), subcontractors who are a specialist in certain work trade have complete equipment and machinery. The subcontractors also will have operators for the machinery, who have a skill to operate the machinery and help in handling the projects. Besides that, respondents also admit that subcontractor's able to manage the labour's on the site well with the experience they have with the score mean of 4.04 and ranked as 6th in the contribution. According to A Javanmardi *et. al.*, (2018), subcontractors will be able to manage well in terms of the labour resources to satisfy the schedule of several subcontracts at same time. The following ranked statement improved quality of work with specialised workers with the score mean of 4.03 and previous experience of construction project with the mean of 4.01 which also ranked as the 8th in the contribution. Moreover, the conditional payment agreement ranked as the 9th ranked mean with 3.92. Furthermore, a satisfactory schedule will be performed by subcontractor to manage labours ranked 10th with the mean score of 3.88. According to Fahada and Razak (2013), subcontractors will do 80 to 90% of the construction work which the work is able to complete on time. The 11th ranked contribution of subcontractors is subcontractor's labours are less expensive with mean score of 3.79. According to Azman *et. al.*, (2014), main contractors will hire subcontractors to reduce the cost of labour about 20 to 30 percent. The subcontractor's able to complete the project in acquired time ranked as the 12th ranking with the mean of 3.75. The least favors contribution of subcontractor to the project success that are ranked from 13th to 15th place are namely, no employee taxes for the subcontractor's labour's (3.74), resource planning will be carried out by subcontractor to manage labours (3.72) and lower the labour costs (3.70) is the last ranked contribution of subcontractor.

Table 3: Contribution of Subcontractor's in Assisting Main contractor towards Project Success

No	Contribution of subcontractor's in assisting main contractor towards project success	Mean	Interpretation	Ranking
1	Fulfil Labour shortage	4.22	High	1
2	Expertise in previous projects to be work on upcoming project	4.13	High	2
3	Technical knowledge of previous project	4.11	High	3
4	The workers who have more skills will be working on construction project	4.08	High	4

5	Subcontractors have unique skills to complete the project	4.06	High	5
6	Subcontractor's able to manage the labours on the site well with the experience they have	4.04	High	6
7	Improved quality of work with specialised workers	4.03	High	7
8	Previous experience of construction project	4.01	High	8
9	Conditional payment agreement	3.92	High	9
10	Satisfy schedule will perform by subcontractor to manage labours	3.88	High	10
11	Subcontractor's labours are less expensive	3.79	High	11
12	The subcontractor's able to complete the project in acquired time	3.75	High	12
13	No employee taxes for the subcontractor's labour's	3.74	High	13
14	Resource Planning will be carryout by subcontractor to manage labours	3.72	High	14
15	Lower the labour costs	3.70	High	15

Benefits of Appointing Subcontractor Towards Project Success

Part C in the questionnaire pays more attention to the benefits of appointing subcontractors towards the project. In this section, there are 14 questions which had a Likert scale option. After analysing the data, the summary of the benefits of appointing subcontractors towards the project is shown in Table 4.

Table 4: Benefits of Appointing Subcontractor Towards Project Success

No	Benefits of appointing subcontractor towards project	Mean	Interpretation	Ranking
1	Knowledgeable and experienced workers will be working in the project	4.16	High	1
2	Specialised workers will be work in the project	4.05	High	2
3	Bring new technologies	4.05	High	3
4	Project can be complete with allocate budgets	4.03	High	4
5	Specified quality workers and machineries	4.01	High	5
6	Reduce technical risks	3.99	High	6
7	Complete work as specified	3.97	High	7
8	Past experience of construction will bring by subcontractors	3.94	High	8
9	Subcontractor work on schedule	3.93	High	9
10	ISO certified workers and machineries	3.92	High	10
11	Quality control done by subcontractors	3.92	High	11
12	Limited equipment will be used by the subcontractor	3.91	High	12
13	Reduce the unnecessary materials and machinery	3.90	High	13
14	Subcontractor will assign roles	3.81	High	14

As shown in Table 4, knowledgeable and experienced workers ranked as the highest at the 1st rank place with the highest mean score of 4.16. Followed by the specialised workers who will be working on the project and bring new technologies ranked in 2nd and 3rd place with the same mean score of 4.05. According to Subramaniam *et. al.*, (2022), adequacy qualification and experienced skilled labour are current workload of the subcontractor and capability to support the new project, sufficient of the subcontractor's plant and equipment and adequacy, qualification, and experience of the subcontractor management staff. Project can be complete with allocated budgets ranked at the 4th place with mean score of 4.03. According to Marzouk *et. al.*, (2013), fixed costs can be decreased because subcontracting limited equipment maintenance and underutilized labour. Besides that, specified quality workers and machinery ranked in 5th place with the mean score of 4.01. According to Demirkesen and Bayhan (2019), subcontracting allows for a greater expertise and specialised work in specific cases and owing to the nature of the project, particularly when the business staff has the requisite knowledge and aptitude to accomplish the project work. Reduce technical risk ranked in the 6th place with mean score of 3.99. According to Adinyira *et. al.*, (2020), administration competency should be regarded as one of the important

criteria for appointing subcontractors due to their understanding of the project development. Subcontractors must grasp the project scope and deploy suitable resources, including taking full responsibility for financial risks. The respondents also believe that subcontractors are able to complete work as specified and past experience of construction will be brought by the subcontractors. Moreover, complete work as specified, and experience construction will bring by subcontractors ranked as the 7th and 8th ranking with mean score of 3.97 and 3.94. Benefits of appointing subcontractor that was place in the 9th place is the subcontractor able to works on schedule with the mean score of 3.93. The 10th and 11th benefits with the same mean score of 3.92 are namely subcontractors who have ISO certified workers and machinery and quality control done by subcontractors. According to Kshaf, Mohamed and El-Dash (2022), subcontractors will carry out a large part of the work done in construction such as machinery and good work quality. Limited equipment will be used by the subcontractor is one of the benefits of appointing the subcontractors with the mean score of 3.91. Benefits of being able to reduce the unnecessary materials and machinery and subcontractor will assign roles during construction activities ranked at the 13th and 14th with mean score of 3.90 and 3.81 accordingly. All of the benefits of appointing a subcontractor were categories as high interpretation since the mean score are in between 3.68 to 5.

Recommendation to Improve Subcontractors Performance Towards Project Success

Part D in the questionnaire attempts to answer related to recommendations to improve subcontractors' performance towards project success. In this section, there are 5 questions which had a Likert scale option. The summary of research findings related to recommendation is shown in Table 5.

Table 5: Recommendation to Improve Subcontractors Performance Towards Project Success

No	Recommendation to improve subcontractors' performance towards project success	Mean	Interpretation	Ranking
1	The main contractor should have good communication between subcontractors	4.40	High	1
2	The main contractor should have regular inspection on site	4.30	High	2
3	The main contractor should make payment on time for the subcontractor to avoid delay or stop of work	4.29	High	3
4	The main contractor should have proper supervision towards subcontractor strategy	4.28	High	4
5	The main contractor should prepare a safe working environment for the subcontractor's	4.19	High	5

As shown in Table 5, the 1st ranked recommendation to improve subcontractors' performance is the main contractor should have good communication between subcontractors with the highest mean score of 4.40. According to Chileshe and Boadua (2012), the success of the construction project is largely dependent on effective communication between the main contractor and subcontractor. The main contractor should have regular inspection on site also strongly agreed by the respondents as a recommendation to improve subcontractors' performance with the mean score of 4.30 and ranking in 2nd place. Besides that, the main contractor should make payment on time for the subcontractor to avoid delay or stop of work was ranked at the 3rd place with the mean of 4.29. According to Mirawati *et. al.*, (2015), the subcontractor can cause the project delay due to late arrival of material on site because of payment problem with supplier. The subcontractors should make the payment on time to the suppliers to get the product and materials such aggregate, cement and others on time. It is very important for subcontractors to have a good relationship with suppliers. The other recommendations to improve subcontractors' performance respondents are the main contractor should have proper supervision towards subcontractor strategy and the main contractor should prepare a safe working environment for the subcontractors with ranking at 4th and 5th place with the mean score of 4.28 and 4.19 accordingly. According to Subramaniam *et. al.*, (2022), one way that main contractors can increase productivity on construction sites is by using the proper construction method. For example, gives proper training for the subcontractor's labours before they start the project. All the recommendations were categories as high importance where the mean score was above 3.68.

VI. Conclusion

As a conclusion, this research was conducted to identify the contribution of subcontractor's performance towards project success. All objectives of the research had been achieved, which to understand about the contribution of subcontractors in helping main contractor towards project success, benefits of appointing

subcontractors towards project success and recommendation to improve subcontractors' performance towards project success. Moreover, hiring a subcontractor in a construction project gives a lot of contribution and benefits towards project success. The main contractor and subcontractor should work together to improve subcontractor's performance in construction project. Subcontractors are typically recruited by the contractors when they lack competence in a certain type of project activity. Subcontractor's playing a lot of contribution towards construction project in Malaysia. Subcontracting allows the contractor to reduce the risk exposure and expand their available workforce, giving them chances to bid on new projects. However, rising complexity, an oversupply of specialised firms and diminishing construction production have created an antagonistic environment that has harmed relationships between main contractors and subcontractors.

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Conflict of Interest Statement

There is no conflict of interest between the authors and co-author.

Author's Contribution

Norliana Sarpin and Sharman Ramesh wrote the paper together where Norliana focuses on introduction and conclusion sections and Sharman focuses on the literature review and finding sections.

References

- Adinyira, E., Agyekum, K., Danku, J. C., Addison, P., & Kukah, A. S. (2020). Influence of subcontractor risk management on quality performance of building construction projects in Ghana. *Journal of Construction in Developing Countries*, 25(2), 175-197.
- Aslam, J., Khan, R. A., & Tufail, M. M. B. (2020, November). Perceived Effect of Outsourcing on Organizational Performance in Pakistani Construction Industry. In *The Fifth Padang International Conference On Economics Education, Economics, Business and Management, Accounting and Entrepreneurship (PICEEBA-5 2020)* (pp. 1040-1054). Atlantis Press.
- Azman, M. N. A., Dzulkalnine, N., Abd Hamid, Z., & Beng, K. W. (2014). Payment Issue in Malaysian Construction Industry: Contractors Perspective. *Jurnal Teknologi*, 70(1).
- Bryde, D. J. (2005). Methods for managing different perspectives of project success. *British Journal of Management*, 16(2), 119-131.
- Chileshe, N., & Boadua Yirenkyi-Fianko, A. (2012). An evaluation of risk factors impacting construction projects in Ghana. *Journal of Engineering, Design and Technology*, 10(3), 306-329.
- Demirkesen, S., & Bayhan, H. G. (2019, February). Subcontractor selection with choosing-by-advantages (CBA) method. In *IOP Conference Series: Materials Science and Engineering* (Vol. 471, No. 2, p. 022020). IOP Publishing.
- Dulaimi, M. F., Ling, F. Y., & Bajracharya, A. (2003). Organizational motivation and inter-organizational interaction in construction innovation in Singapore. *Construction Management and Economics*, 21(3), 307-318.
- Fahada, N., & Razak, A. (2013). The Impact of Multilayer Subcontracting System in Construction Industry in Pahang. Degree thesis. Universiti Malaysia Pahang.
- Farrell, A., & Sunindijo, R. Y. (2022). Overcoming challenges of early contractor involvement in local government projects. *International Journal of Construction Management*, 22(10), 1902-1909.
- Global Data UK Ltd (2023, April 11) Malaysia construction market size, trend analysis by sector (commercial, industrial, infrastructure, energy and utilities, institutional and residential) and forecast, 2023-2027. Market Research Reports & Consulting from <https://www.globaldata.com/store/report/malaysia-construction-market-analysis-2/>
- Hasmori, M. F., Said, I., Deraman, R., Abas, N. H., Nagapan, S., Ismail, M. H., ... & Roslan, A. F. (2018). Significant factors of construction delays among contractors in Klang Valley and its mitigation. *International Journal of Integrated Engineering*, 10(2).
- Hutchinson and Zhang, (2020). Governing construction project procurement to mitigate contractor's opportunism: A conceptual framework. *Academia.edu*, from <https://www.academia.edu>

- Jafari, A. (2013). A contractor pre-qualification model based on the quality function deployment method. *Construction Management and Economics*, 31(7), 746-760.
- Javanmardi, A., Abbasian-Hosseini, S. A., Liu, M., & Hsiang, S. M. (2018). Benefit of Cooperation among Subcontractors in Performing High-Reliable Planning. *Journal of Management in Engineering*, 34(2), 04017062. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000578](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000578)
- Kshaf, D. A., Mohamed, M. A., & El-Dash, K. M. (2022). The major problems between main contractors and subcontractors in construction projects in Egypt. *Ain Shams Engineering Journal*, 13(6), 101813. <https://doi.org/10.1016/J.ASEJ.2022.101813>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement*, 30(3), 607-610.
- Kumaraswamy, M. M., & Matthews, J. D. (2000). Improved subcontractor selection employing partnering principles. *Journal of management in engineering*, 16(3), 47-57.
- Lew, Y.-L., Ho, Z.-X., Toh, T.-C., Tan, O.-K., Felicia, Y.-Y.-Y., & Yow, L.-P. (2020). Change Management In Malaysia Infrastructure Project: Role Of Subcontractors. *International Journal of Industrial Management*, 8, 43-51.
- Marzouk, M. M., el Kherbawy, A. A., & Khalifa, M. (2013). Factors influencing sub-contractors' selection in construction projects. *HBRC Journal*, 9(2), 150-158.
- Mirawati, N. A., Othman, S. N., & Mohamed Ismail, R. (2015). Supplier-contractor partnering impact on construction performance: A study on Malaysian construction industry. *Journal of Economics, Business and Management*, 3(1), 29-33.
- Nassaji, H. (2015, March 16). Qualitative and descriptive research: Data type versus data analysis. Language Teaching Research. SAGE Publications Ltd.
- Meng, X. (2012). The effect of relationship management on project performance in construction. *International journal of project management*, 30(2), 188-198.
- Mudzvokorwa, T., Mwiya, B., & Mwanaumo, E. M. (2020). Factors Affecting the Main Contractor-Subcontractor Relationship in the Zambian Construction Industry. *Journal of Natural and Applied Sciences*, 4(1), 9-18.
- Mydin, M. O., Sani, N. M., Taib, M., & Alias, N. M. (2014). Imperative causes of delays in construction projects from developers' outlook. In MATEC Web of Conferences (Vol. 10, p. 06005). EDP Sciences.
- Olanrewaju, A. L., Bong, M. Z. X., & Preece, C. (2022). Establishment of pre-qualification criteria for the selection of subcontractors by the prime constructors for building projects. *Journal of Building Engineering*, 45, 103644. <https://doi.org/10.1016/J.JOBE.2021.103644>
- Rodrigo, M. N. N., & Perera, B. A. K. S. (2017). Management of nominated subcontractors in the construction of commercial buildings in Sri Lanka. *Bhumi, The Planning Research Journal*, 5(2).
- Sambasivan, M., & Soon, Y. W. (2007). Causes and effects of delays in Malaysian construction industry. *International Journal of project management*, 25(5), 517-526.
- Sileyew, K. J. (2019). Research design and methodology (pp. 1-12). Rijeka: IntechOpen.
- Subramaniam, C., Ismail, S., Rani, W. N. M. W. M., & Mahdiyar, A. (2022). Improving project communications management practices in the construction sector during the COVID-19 Pandemic: A Malaysian scenario. *Buildings*, 12(9), 1291.
- Rajput B.L., and A.L., Agarwal (2015). Study of Pros and Cons of Subcontracting System Adopted in Executing Indian Construction Projects. *International Journal of Modern Trends in Engineering*, No.:2349-9745
- Rostiyanti, S. F., Hansen, S., & Ponda, T. N. (2020). Cause and effect of conditional payments provision to subcontractors. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 12(1), 04519045.
- Tariq, J., & Gardezi, S. S. S. (2022). Study the delays and conflicts for construction projects and their mutual relationship: A review. *Ain Shams Engineering Journal*, 101815.
- Tomicki, S. (2016), 7 reasons why subcontracting may be right for you. Handex Consulting & Remediation., from <https://www.hcr-llc.-why-subcontracting-may-be-right-for-you>
- Wiersma (1995) *Research Methods in Education: An Introduction*, Edition 6, Allyn & Bacon, Incorporated, 1995
- White, H., & Marasini, R. (2014). Management of interface between main contractor and subcontractors for successful project outcomes. *Journal of Engineering, Project, and Production Management*, 4(1), 36-50.
- Yakimchuk, S. V., Chistnikova, I. V., Bondareva, Y. Y., & Dynnikov, Y. A. (2017). The role of construction industry in the economic development. *Journal of Economic & Management Perspectives*, 11(3), 1381-1388.
- Yoke-Lian, Lew., Hassim, S., Muniandy, R., & Teik-Hua, L. (2012). Review of subcontracting practice in construction industry. *International Journal of Engineering and Technology*, 4(4), 442.