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ORIGINAL ARTICLE

FACTORS INFLUENCING PROJECT PLANNING FOR PHYSICAL PROJECTS IN SABAH

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ABSTRACT – In the context of the public sector, projects are implemented to fulfil the government's social responsibility to ensure more balanced growth with equity in a developing country. Even though the country has entered the 12th Malaysia Plan (12MP), there are still inefficiencies in the financial and physical performance of public projects due to the weaknesses at the project planning stage. This study examines the influence of human/personnel, project management, technical, and organisational factors on project planning for physical projects in Sabah. This study utilised a quantitative method using a questionnaire and the respondents involved 273 officers from the Management and Professional group (Grades 41- 54) at the Federal Government and Sabah State Government levels. Data were analysed using descriptive analysis. The study found that the factors influencing project planning are at a very agreeable level of 4.08 mean (81.50%) which explains that these four factors greatly influence the planning of a project. The organisational factor is the most dominant factor, with the highest mean of 4.35 (86.8%). Therefore, it can be concluded that the top management of the Ministry/Agency needs to enhance support and commitment to the project team where this support can give a positive signal to the parties involved with the project.

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INTRODUCTION

In Malaysia, the history of public project management began when the country achievedindependence or, more precisely, when the government launched the Rural Development Plan followedby the National Five-Year Plan. In the context of the public sector, projects are implemented to fulfil the government's social responsibility to ensure more balanced growth with equity in a developing country. The success of a project can improve the social, economic, and mental well-being of the stakeholders involved (Irfan et al., 2021). Even though the country has entered the 12th Malaysia Plan (12MP), there are still inefficiencies in the financial and physical performance of public projects caused by various factors including weaknesses at the project planning stage.

Findings from the Auditor General's Report found that from 2013 to 2018, 66 projects involving 31 ministries, departments, and government agencies were reprimanded for failure in project management. In addition, the Red Book of the Economic Planning Unit, Prime Minister's Department (EPU, JPM): Steps to Improve the Implementation of Five-Year Malaysia Plan Development Projects issued in 2015 has also identified delays for 179 projects that are behind schedule from two aspects, namely projects started late due to problems at the planning and pre-implementation stages and projects that were completed late on schedule due to problems at the implementation stage. Among the problems identified at the planning stage are site issues, project briefs, allocations, and planning weaknesses. Subsequently, the Red Book of EPU, JPM Version 2.0, was released as an improvement to the previous edition and refined problems for 169 projects behind schedule. Findings found that site issues, project briefs, allocations and planning weaknesses still occur at the project planning stage.

Each stage in the project life cycle is crucial in determining the success or failure of the projects, especially at the project planning stage. Adzmi and Hassan (2018), Aladawani (2002), and Dvir et al., (2003) in their studies found a positive interaction between project planning and the success of a project. Adzmi and Hassan (2018) stated that there are various factors at the planning stage that contribute to the success of the project, including project management factors, the competencies of the project director/project team, organisational competencies, methodology, project planning methods and techniques used, as well as project documentation. Meanwhile, previous studies also stated that poor project planning is one of the reasons for the failure of a project (Tesfaye et al., 2017). This is supported by Sambasivan and Soon (2007), who found that poor planning is one of the causes of project delay.

Therefore, the importance of project planning is emphasised through the Guidelines for the Preparation of the Twelfth Malaysia Plan, 2021-2025: Economic Prospects, National Integrated Success Framework, and Development Project Planning and Implementation by the EPU, JPM. The documents stated that in order to strengthen the planning and preparation of development projects, the Ministry should prioritise projects based on planning tools such as the Logical Framework Matrix (LFM), Creativity Index(CI), Public Sector Comparator (PSC), and Geographical Information System (GIS). Subsequently, the Malaysian Treasury also issued Guidelines for the Preparation of the 2021 Federal Expenditure

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Budget Proposal, which stated that ministries/departments/agencies/statutory bodies need to ensure that the elements of project implementation readiness are taken into account to ensure that the project can be implemented immediately.

Thus, this article discusses the influence of human/personnel, project management, technical, and organisational factors on project planning for physical projects in Sabah. Through the results of this study, it is hoped that project delays caused by weaknesses in project planning can be overcome, and the project can be completed according to the set period. As a result, the people can enjoy the economic spillover effect from the public projects that are developed and help improve the people's quality of life.

LITERATURE REVIEW

Importance of Project Planning

Phullsunder (2019) defined planning as a phase and effort made before the implementation of a project that involves allocation in terms of cost and time. Planning is also a dynamic process and needs to be reviewed from time to time if there is new information that requires changes to planning (Chaveset al., 2016). Kozhakhmetova et al. (2019) stated that planning is an important phase in the project because it represents 51% of the entire process that needs to be implemented by the project director. At the same time, in his study, Zwikael (2009) refers to PMBOK Fourth Edition book, which stated that the project director needs to implement 42 work processes in the project cycle where 20 processes, or 48% of them, are at the planning stage. Thus, project planning is often identified as a critical factor in the success of a project in past studies (Zwikael & Sadeh, 2007; Serrador, 2013; Glenn, 2008; Pinto &Slevin, 1988). This is also supported by the finding of Tesfaye et al. (2016) and Aladwani (2002).

Human/Personnel Factor at The Project Planning Stage

The human/personnel factor is proven to be an important factor in the project planning stage (Aladwani, 2002; Chatzoglou & Macaulay, 1996). Based on the previous studies, the human/personnel factor can be divided into work experience and competencies. Rubin and Seeling (1967) found that experienced project managers can complete more projects successfully than inexperienced project managers. Blixt and Kirytopoulos (2017) examined the competencies of project managers in the Australian public service and found that lack of experience is one of the factors in project failure. Thisis also supported by findings by Burger et al. (2015), González et al. (2016), and Ceric (2014). In addition to the work experience of the project manager, the experience of the project team also plays an important role in the success of the project (Kostalova & Tetrevova, 2014).

Competencies refer to the abilities, knowledge, and skills of an individual (Ulrich, 1995). Yoon et al. (2020) stated that project managers need to have a set of competencies that enable them to plan and implement projects effectively. These competencies also apply to the entire project team (Puthamont & Chareonngam, 2007). In order to ensure that a project is successful, the project manager not only needs to apply his own knowledge and skills but also needs to identify the knowledge and skills of the project team members under his supervision (Feger & Thomas, 2012).

Project Management Factors at The Project Planning Stage

Project management involves allocation, project timelines, and personnel for a project (Adzmi &Hassan, 2018). In their studies, Chatzoglu (1997), Whittaker (1999) and Yeo (2002) identified project management factors that have a direct impact on the project planning process. In these studies, projectmanagement factors are divided into the involvement of stakeholders in planning and the authority of the project director. The stakeholders' involvement refers to individuals, organisations, and departments that have an interest or are directly involved in the implementation of the project as required under theLogical Framework Approach (LFA). Under the LFA, stakeholders' views must be taken into account when the stakeholder analysis process is carried out. Early stakeholders' involvement leads to customer satisfaction regarding the functionality and use of the project. It also allows space for creative solutions and an intensive exchange of ideas (Aapaoja et al., 2013). A good project manager will always ensure that any project information and developments are communicated to the stakeholders from time to time (Laird, 2016; Tesfaye et al., 2017; Gingnell et al., 2014).

The second aspect is the authority of the project director. Confusion and ambiguity between responsibility and authority are problems often associated with project managers (Reeser, 1969). Thus,a project director needs to be clear with the authority given to obtain the necessary resources, manage the allocation given, and make critical decisions on the project (Fortune & White, 2006). Dill et al. (1982) and Khang and Moe (2008) found a positive relationship with project directors who feltempowered in making decisions.

Technical Factors at The Project Planning Stage

In this study, technical factors refer to methodologies, techniques and methods, and project management software at the planning stage. Werner et al. (1999) and Adzmi and Hassan (2018) stated that the methodologies and techniques used affect project planning. Gomes et al. (2012) also stated that the skill of using appropriate project management techniques and methods plays a vital role in the planning stage for each project. The project management methodologies that are widely used at the project planning stage are PRojects IN Controlled Environments (PRINCE2) and PMBOK (Karaman & Kurt, 2015). Meanwhile, the Gantt Chart and Critical Path Method (CPM) are among the methods developed to improve the project planning process (Zareei, 2018). Decision-making techniques at the project planning stage are also essential aspects of project planning (Adzmi & Hassan 2018), including using cost-benefit analysis. Meanwhile, for the use of project management software, a study was conducted on the use of project software such as Microsoft Project, Microsoft

Excel, Primavera, and others that affect project planning (Adzmi & Hassan, 2018) as well as the use of systems for public project monitoring in Malaysia including MyProjek.

Organisational Factors at The Project Planning Stage

Yeo (2002) identified organisational factors as valuable instruments in the project planning process and it is supported by the findings in the studies conducted by Gomes et al. (2012) and Laird (2016). Based on the previous studies, there were two main aspects of organisational factors: top management support and communication. Belout and Gauvreau (2004) found that top management support at the planning stage was significantly associated with the project's success. Belassi and Tukel (1996) stated that top management support is in the form of providing sufficient resources for the project's success, sharing responsibility with the project team, communicating with the project team, and supporting the project team when in crisis or unforeseen situations. As for communication, communication within the organisation is vital in that the project team can exchange information and connect to achieve project objectives (Tai et al., 2009). Effective project team communication is critical in the decision-making process for a project (Carr et al., 2002). In their study, Schnetler et al. (2015) found that the quality of communication between project team members increased the perception of project success.

METHODOLOGY

This study utilised a quantitative method and data was collected using a questionnaire to examine the influence of human/personnel, project management, technical, and organisation factors to project planning for physical projects in Sabah. The instrument for this study adapted the questionnaire from Adzmi and Hassan (2018). The questionnaire incorporated a Likert scale with a measurement scale of one to five: (1) strongly disagree and (5) strongly agree. The respondents in this study included officers from the Management and Professional group (Grades 41-54) who were involved in the planning process at the Federal and Sabah State Government levels. This is to ensure that the findings of the study can be generalised to all physical projects in Malaysia. At the Federal Government level, 496 respondents from 18 Ministries with physical projects in Rolling Plan 1 (RP-1) of the 12MP of 2021 were involved. Meanwhile, for the Sabah State Government, 63 respondents from two Federal Departments in the State of Sabah and eight Ministries/Agencies under the Sabah State Government were involved, where the total number of respondents was 559 as mentioned in Appendix A. Therefore, the total sample required was 232 respondents based on the sample size formula introduced by Ariola (2006) below:

$$n = \quad N/(1+ Ne^2) \tag{1}$$

Where;
n = number of samples
N=total population
e = error tolerance (for social and education usually 0.05)

$$\begin{aligned} n \quad &= 559/[1+ (559)(0.05^2)] \\ &= 559/[1+1.4] \\ &= 232 \end{aligned}$$

Based on the study's time, cost and scope, the sampling method used was stratified random sampling. Through this method, the population was separated based on the criteria of officers from the Management and Professional Group Grade 41-54 at the Federal and Sabah State Government levels involved in project planning. This questionnaire was distributed from 1st March to 30th April 2022 through a Google Form and physical forms. A total of 273 respondents have filled out the questionnaire, which was 117.6% compared to the actual sample requirement of 232.Subsequently, Cronbach's alpha test was performed on 30 selected respondents to test the reliability of the questionnaire for this study. The analysis showed that the reliability of the questionnaire in this study is at a high level, with a Cronbach's alpha value of 0.89. Based on this finding, it can be concluded that the items in this survey form have a high level of reliability, as suggested by George and Mallery (1995) and Sekaran (2003). The statistical analysis used in this study was Descriptive Statistical analyses using Statistical Package for Social Science (SPSS) Version 27 software. These data were then evaluated based on the mean overall suitability scale in Table 1.

Table 1. Mean Overall Suitability Scale

Mean Score	Percentage interpretation	Suitability Scale
0.00 – 1.00	0.00% - 20.00%	Strongly Disagree
1.01 – 2.00	20.01% - 40.00%	Disagree
2.01 – 3.00	40.01% - 60.00%	Neutral
3.01 – 4.00	60.01% - 80.00%	Agree
4.01 – 5.00	80.01% - 100.00%	Strongly Agree

RESULTS

RESPONDENTS' PROFILE

This study involved a total of 273 respondents. The results in Table 2 showed that the majority of the respondents in this study were men, 163 respondents (59.7%) and 110 women (40.3%). As for the age group category, the majority of the respondents were from the age group of 41 to 50 years old,with 118 respondents (43.2%), while only 16 respondents were from the age group of 51 to 60 years old. Regarding education level, the Bachelor's Degree level showed the highest number of respondents, with 154 respondents (56.4%), and the Doctor of Philosophy education level showed the lowest value,with six respondents (2.2%). As for the job category, 211 respondents (77.3%) were from non-technical positions, and the remaining 62 (22.7%) were from technical positions.

As for the Grade category, Grade 44 recorded the most respondents, with 86 respondents (31.5%), and Grade 54 was the lowest, with 15 respondents (5.5%). For the category of service period in the public service, the period of 11 to 15 years recorded the most findings of the study, which was 91 respondents (33.3%), and the service period of less than one year was the lowest, with six respondents(2.2%). The category of experience in public project management showed that the majority of the respondents have one to five years of experience, which was 106 respondents (38.8%). In comparison,the experience category of 21 years and above showed the lowest, with only ten respondents (3.7%). For the aspect of the total number of public projects managed/involved, 21 projects and more recordedthe highest participation in this study which was 138 respondents (50.5%), and the total of 11 to 15 projects showed the least number of respondents, which was 12 respondents (4.4%). For the maximum project cost managed by the respondents, the majority was in the range of RM50.0 million and above, which was 146 respondents (53.5%). Meanwhile, less than RM100,000 was the lowest number in the maximum project management cost, with three respondents (1.1%).

Table 2. Respondent demographics

Items		Frequency	Percentage (%)
Gender	Male	163	59.7
	Female	110	40.3
Age	20 to 30 years old	23	8.4
	31 to 40 years old	116	42.5
	41 to 50 years old	118	43.2
	51 to 60 years old	16	5.9
Education Level	Bachelor's Degree	154	56.4
	Master's Degree	113	41.4
	Doctor of Philosophy Degree (PhD.)	6	2.2
Job Category	Technical	62	22.7
	Non-Technical	211	77.3
Grade Category	Grade 41	54	19.8
	Grade 44	86	31.5
	Grade 48	67	24.5
	Grade 52	51	18.7
	Grade 54	15	5.5
Period of Service in Public Service	Less than a year	6	2.2
	1 to 5 years	47	17.2
	6 to 10 years	34	12.5
	11 to 15 years	91	33.3
	16 to 20 years	65	23.8
	21 years and over	30	11.0
Experience in Public Project Management	1 to 5 projects	49	17.9
	6 to 10 projects	39	14.3
	11 to 15 projects	12	4.4
	16 to 20 projects	17	6.2
	21 projects and more	138	50.5
	None	18	6.6
Maximum cost of projects that have been managed/involved	Less than RM100,000	3	1.1
	RM100,000 to RM999,999	15	5.5
	RM1.0 million to RM9.9 million	37	13.6
	RM10.0 million to RM49.9 million	55	20.1
	RM50.0 million and more	146	53.5
	None	17	6.2

FACTORS INFLUENCING PROJECT PLANNING FOR PHYSICAL PROJECTS

An analysis of the factors that influence project planning for physical projects was made to answer the objective of this study. Each of these factors was analyzed descriptively in the form of mean and standard deviation. The assessment was made using the suitability scale to conclude each aspect of the factors.

Human/Personnel Factor

The human/personnel factor was evaluated according to two components: work experience and competencies. The analysis found that the respondents' feedback on the work experience aspect was very agreeable and shown through the overall mean score of 4.22 (84.4%) with a standard deviation of 0.791 as shown in Table 3. The item of "sufficient work experience of the project director and project team members is very important in the success of a project" recorded the highest mean of 4.49 (89.9%). In comparison, the item "lack of work experience of the project director and project team members can cause delays and failure of the project" recorded the lowest mean of 4.00 (80.0 %).

The results of this study were consistent with Kostalova and Tetrevova (2014), who stated that in addition to the work experience of the project director, the experience of the project team also plays an important role in the success of the project. In their study, Blixt and Kirytopoulos (2017) examined the competencies of project directors in the Australian public service. The results showed that lack of experience was a factor in project failure which is also consistent with this study's result.

Table 3. Mean Score and Standard Deviation for Work Experience

No.	Work Experience	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	The lack of work experience of the project director and project team members can lead to project delays and failures.	4.00	0.847	80.0	Strongly Agree
2	The project director and project team members have previous experience handling other development projects.	4.15	0.808	83.1	Strongly Agree
3	The work experience of the project director and project team members in other projects before helped to make other project successful.	4.22	0.714	84.4	Strongly Agree
4	In my organisation, the project director's involvement starts from the initial planning until the project closure process.	4.23	0.923	84.5	Strongly Agree
5	Sufficient work experience of the project director and project team members is very important in the success of a project.	4.49	0.665	89.9	Strongly Agree
	Total	4.22	0.791	84.4	Strongly Agree

Table 4 showed the mean score and percentage of respondents' responses to the aspect of competencies. The analysis found that the respondents' feedback on the aspect of competencies was very agreeable and shown through the overall mean score of 4.13 (82.6%) with a standard deviation of 0.704. The item "project director has sufficient background, knowledge and skills in project planning" recorded the highest mean of 4.24 (84.8%). In his study, Yoon et al. (2020) stated that project directors need to have a set of competencies that enable them to plan and implement projects effectively which supports this study's findings. Meanwhile, "the project director item identifying the knowledge and skills of each project team member" recorded the lowest mean of 3.99 (79.8%). This happens because not all project directors have the skills to identify the strengths and weaknesses of each project team member under their responsibility. Thus, each project director needs to apply their knowledge and skills and identify the knowledge and skills of the project team members under their supervision (Feger & Thomas, 2012).

Table 4. Mean Score and Standard Deviation for Competencies

No.	Competencies	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	The project director identifies the knowledge and skills of each project team member.	3.99	0.710	79.8	Agree
2	The project director has strategic thinking and the ability to lead project teams.	4.12	0.713	82.3	Strongly Agree
3	Each project team member understands their role within the project team.	4.14	0.612	82.7	Strongly Agree
4	In my organisation, project team members are knowledgeable, proactive and committed to the task.	4.18	0.692	83.6	Strongly Agree
5	The project director has sufficient background, knowledge and skills in project planning.	4.24	0.794	84.8	Strongly Agree
	Total	4.13	0.704	82.6	Strongly Agree

Project Management Factor

Project management factors were assessed by stakeholder involvement and authority to the project director. The analysis found that the respondents' feedback on the stakeholder involvement aspect was in agreement and is shown through the overall mean score of 3.92 (78.3%), as shown in Table 5. The item "in my organisation, stakeholder satisfaction measured after the project is completed (example: customer satisfaction form)" recorded the highest mean of 4.06 (81.2%). In contrast, the item "in my organisation, project implementation is according to the set timeline" recorded the lowest mean of 3.53 (70.6 %).

Thus, the early involvement of stakeholders in the planning is crucial, where the findings by Dowlatshahi (1998) and Van et al. (2008) stated that the early involvement of stakeholders in project planning reduces the risk of developing a poor project design, thus being able to produce a more effective design. Early stakeholder involvement can also provide customer satisfaction regarding the functionality and use of the project through the use of a customer satisfaction form after the project is completed. It also allows space for creative solutions and an intensive exchange of ideas (Aapaoja et al., 2013).

Table 5. Mean Score and Standard Deviation for Stakeholder Involvement

No.	Stakeholder Involvement	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	The lack of work experience of the project director and project team members can lead to project delays and failures	3.53	0.883	70.6	Agree
2	Stakeholders are involved from the initial planning stage until the project closure process.	3.97	0.855	79.5	Agree
3	The views of stakeholders, i.e., individuals, organisations and departments that have an interest or are directly involved in the implementation of the project are taken into account when the Stakeholder Analysis process is carried out under the Logical Framework Approach (LFA).	3.99	0.813	79.7	Agree
4	In my organisation, the distribution of allocations for development projects is realistic during project planning.	4.03	0.776	80.6	Strongly Agree
5	In my organisation, stakeholder satisfaction is measured after the project is completed (for example: customer satisfaction form)	4.06	0.842	81.2	Strongly Agree
	Total	3.92	0.834	78.3	Agree

Meanwhile, the analysis found that the respondents' feedback on the aspect of authority to the project director was very agreeable and shown through the overall mean score of 4.10 (81.9%) with a standard deviation of 0.667 as shown in Table 6. The item of "project team member always supports the decisions made by the project director" recorded the highest mean of 4.12 (82.5%), while "the project director item is very clear with the role, responsibility and authority in the project" recorded the lowest mean of 4.04 (80.9%). The findings of this study are consistent with Reeser (1969), who

stated that confusion and ambiguity between responsibility and authority is a problem that is often associated with project directors. Thus, a project director not only needs to be given the role and responsibility to complete a project on time but also needs to go hand in hand with giving the authority to obtain the necessary resources, manage the allocations given, and make critical decisions in the project (Fortune & White, 2006).

Table 6. Mean Score and Standard Deviation for Authority to the Project Director

No.	Authority to the Project Director	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	The project director is very clear with the role, responsibility and authority in the project.	4.04	0.716	80.9	Strongly Agree
2	The project director have been clearly identified and explained.	4.10	0.637	82.0	Strongly Agree
3	Project team members are defined and formally assigned to a project.	4.10	0.654	82.0	Strongly Agree
4	The project director is given authority by top management to make project-related decisions and support project-related decisions.	4.11	0.759	82.2	Strongly Agree
5	Project team members always support the decisions made by the project director.	4.12	0.568	82.5	Strongly Agree
	Total	4.10	0.667	81.9	Strongly Agree

Technical Factor

The data showed that the respondents' feedback on the methodologies, techniques, and methods is in agreement and is shown through the overall mean score of 3.82 (76.5%) with a standard deviation of 0.865 as shown in Table 7. Items of "project management methods used during project planning until project closure (example: Gantt Chart, Critical Path Method (CPM), Work Breakdown Structures (WBS), project reporting system etc.)" recorded a level of agreement of strongly agreed with the highest mean of 4.17 (83.4%). In contrast, the "project management methodology item is applied during project planning" also recorded agreement with the lowest mean of 3.31 (66.2%).

The findings of this study showed that most ministries/agencies are aware of the importance of using appropriate methodologies, methods, and techniques at the project planning stage to ensure that projects run smoothly. This finding is consistent with the findings by Verner et al. (1999) and Adzmi and Hassan (2018), who stated that the methodologies and techniques used at the planning stage affect project planning. This is supported by Gomes et al. (2012), who stated that the skill of using appropriate project management techniques and methods plays an important role in the planning stage for each project. Thus, the JPM EPU's efforts to establish the use of project planning tools such as the Logical Framework Matrix (LFM), Creativity Index (CI) and Public Sector Comparator (PSC) as well as Value at Entry (VAE) when considering project applications coincide with the findings of studies related to the importance of methodologies, methods, and techniques at the project planning stage.

Table 7. Mean Score and Standard Deviation for Methodologies, Techniques and Methods

No.	Methodologies, Techniques and Methods	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	Project management methodology is applied during project planning (example:A Guide to Project Management Body of Knowledge (PMBOK) or Projects In Controlled Environments (PRINCE2).	3.31	0.928	66.2	Agree
2	In my organization the risk management process is implemented during project planning (example: SWOT analysis, risk management matrix).	3.76	0.931	75.2	Agree
3	In my organisation, decision making techniques are used during project planning (example: cost benefit analysis, decision analysis).	3.83	0.875	76.6	Agree
4	Project planning tools such as Logical Framework Matrix (LFM), Creativity Index (CI) and Public Sector Comparator (PSC) as well as Value at Entry (VAE) are used at the project planning stage.	4.05	0.818	81.1	Strongly Agree
5	Project management methods are used during project planning until project closure (example: Gantt Chart, Critical Path Method (CPM), Work Breakdown Structures (WBS), project reporting system etc.)	4.17	0.772	83.4	Strongly Agree
	Total	3.82	0.865	76.5	Agree

As for the use of project management software, the analysis showed that the respondents' feedback is in agreement and is shown through the overall mean score of 3.74 (74.8%) with a standard deviation of 0.930 as shown in Table 8. "The project management software and other systems such as the MyProjek system are very helpful in project planning", recorded a very agreeable level with the highest mean of 4.05 (81.1%). The item "in my organisation, manual methods are used more compared to the use of project management software" recorded the lowest mean of 3.11 (62.2%). This finding showed the importance of using project management software to facilitate monitoring and reporting on the progress of a project.

Table 8. Mean Score and Standard Deviation for Project Management Software

No.	Project Management Software	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	In my organisation, manual methods are used more than the use of project management software.	3.11	0.956	62.2	Agree
2	The project management software used is the latest.	3.68	0.869	73.6	Agree
3	The MyProjek system is used during project planning.	3.91	1.043	78.2	Agree
4	Project management software is optimally used during project planning (Ms. Project, Ms. Excel, Primavera)	3.94	0.849	78.8	Agree
5	Project management software and other systems such as the MyProjek system are very helpful in project planning.	4.05	0.932	81.1	Strongly Agree
	Total	3.82	0.865	76.5	Agree

Organisational Factor

The analysis found that the respondents' feedback from the aspect of top management support was very agreeable and shown through the overall mean score of 4.26 (85.1%) with a standard deviation of 0.766 as shown in Table 9. The item "top management determining the list of projects that need to be developed" recorded the highest mean of 4.3 (87.1%), while "top management was very responsive with requests for increased resources if there is a need to" recorded the lowest mean of 4.17 (83.4%). The involvement of top management support in a project is very important because it gives a positive signal to the parties involved in the project and indirectly has a positive effect on their performance (Brem & Wolfram, 2017; Law & Ngai, 2007). Belout and Gauvreau (2004), Tukel and Rom (1995), Young and Jordan (2008), and Young and Poon (2013) in their studies also found that top management support at the planning stage is significantly associated with project success.

Table 9. Mean Score and Standard Deviation for Top Management Support

No.	Top Management Support	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	Top management is very responsive with requests for increased resources if there is a need.	4.17	0.810	83.4	Strongly Agree
2	Top management has the ability to help resolve issues for a project.	4.22	0.692	84.3	Strongly Agree
3	Top management shares responsibility with the project team to ensure project success.	4.26	0.753	85.1	Strongly Agree
4	The scope, vision and goals of the project are clearly defined before the project begins.	4.28	0.816	85.6	Strongly Agree
5	Top management determines the list of projects that need to be developed.	4.3	0.759	87.1	Strongly Agree
	Total	4.26	0.766	85.1	Agree

In addition, the respondents' feedback from the communication aspect was very agreeable and shown through the overall mean score of 4.43 (88.6%) with a standard deviation of 0.644 as shown in Table 10. Respondents strongly agree with the item "communication effectively helps the decision-making process", with the highest mean of 4.59 (91.9%). The item "project director/supervisor and project team members have excellent communication" recorded the lowest mean of 4.15 (83.0%). The findings of this study showed that the majority of respondents agree that effective communication plays an important role in the public project cycle, especially at the project planning stage (Schnetler et al., 2015). Through communication, the construction project team can share and exchange information with the project team (Wu et al., 2017). Effective project team communication is an important basis in the decision-making process for a project (Carr et al., 2002).

Table 10. Mean Score and Standard Deviation for Communication

No.	Communication	Mean Score	Standard Deviation	Percentage (%)	Suitability Scale
1	Project director and project team Members have excellent communication	4.15	0.650	83.0	Strongly Agree
2	All the latest decisions and information related to the project are communicated from time to time.	4.41	0.658	88.1	Strongly Agree
3	Projects are reported and monitored periodically to upper management (eg: Steering Committee, Working Comitee)	4.49	0.642	89.8	Strongly Agree
4	A communication plan is established before the project starts (example: kick-off meeting, Steering Committee meeting, technical meeting and monthly meeting).	4.50	0.681	90.0	Strongly Agree
5	Effective communication aids the decision-making process.	4.59	0.587	91.9	Strongly Agree
	Total	4.43	0.644	88.6	Strongly Agree

DISCUSSION AND CONCLUSION

It can be explained that the factors influencing project planning are at a very agreeable level of 4.08 mean (81.50%) which explains that these four factors greatly influence the planning of a project. The organisational factor is the most dominant factor, with the highest mean of 4.35 (86.8%). The analysis found that respondents' responses to organisational factors from the aspect of top management support were very agreeable in providing sufficient resources for the success of the project, sharing responsibilities with the project team, communicating with the project team and supporting the project team when in crisis or unforeseen situations (Belassi & Tukel, 1996). Respondents also strongly agree with organisational factors from the aspect of communication which is in line with the findings of the study by Schnetler et al. (2015) and Carr et al. (2002). The human/personnel factor recorded the second factor with 4.18 mean (83.5%), followed by the project management factor with a mean of 4.01 (80.1%), while the technical factor recorded the lowest mean of 3.78 (75.6%).

Therefore, the top management of the ministries/agencies needs to enhance support and commitment to the project team as suggested by Belassi and Tukel (1996) where this support can give a positive signal to the parties involved with the project (Brem & Wolfram, 2017). In order to improve the communication aspect, ministries/agencies are also

proposed to improve the effectiveness of communication platforms, including through engagement sessions with the State Government to ensure development planning at the state level is taken into account.

For the human/personnel factor, the development of competent human capital is necessary to ensure the implementation of all government projects can be completed within the approved period and cost as stipulated in the 3rd Strategic Core of Shared Prosperity Vision 2030. Therefore, officers who manage all public development projects must attend recognised and continuous training. For example, the officers can attend the Integrated Public Project Management course offered by the National Institute of Public Administration (INTAN) or other recognised professional certificates. This is because the findings of this study showed that respondents from the category of non-technical officers are more involved in project planning than technical officers. The importance of providing courses and training is supported by the findings of Santos et al. (2019), who have suggested that an organisation needs to focus on human resource development in the context of project management.

In order to improve technical factors, all officials involved with public projects need to have skills and knowledge in using project management methodologies, methods, and techniques because they are proven to help in project planning. Based on research findings from various analyses for this study, this factor is the least dominant factor in project planning which showed that most ministries/agencies do not use project management methodologies, methods, and techniques optimally. Gomes et al. (2012) in their study emphasized the importance of using the right project management techniques and methods to ensure that the project can be completed according to the time, cost, and quality set. In conclusion, this study requires the attention of all parties involved with project management to ensure that project delays caused by weaknesses in the project planning stage can be overcome.

CONCLUSION

This paper reports the first attempt to enhance the exploration capability of SKF by applying COOBL technique. In addition, jumping rate is also integrated in the proposed method. Once the jumping rate condition is met, the opposite solution is selected if the solution is better than the current one. The analysis confirmed that the proposed COOBSKF is superior to SKF and better than GA, GWO, PSO and BH. For future research, different OBL techniques shall be considered to enhance further the SKF. This study is limited to physical projects only; therefore, further studies are proposed to be extended to the improvement of project planning for non-physical projects such as programs, training, grants, information communication and technology (ICT) system development that also involve high allocations.

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CONFLICT OF INTEREST

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