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THE INFLUENCE OF PROJECT MANAGEMENT KNOWLEDGE ON THE SUCCESS OF CONSTRUCTION IMPLEMENTATION: Case Study Of Building "X" Construction

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Abstract

The development of project management science at this time can be aligned with other fields of management science. One of the important points in the analysis of project management science is the study of the level of success of a project. This paper attempts to study the level of project success based on aspects of project management knowledge. The study was conducted at a company that was working on the construction of a building. Fourteen aspects of project management knowledge were developed to see how each aspect contributed to the success of a project. Seventy respondents who were involved in construction projects became the objects of this study. PLS-SEM was used as an analysis tool to see the contribution of aspects of project knowledge to project success. It was concluded that the three aspects that contributed the most to project success were Project Financial Management, Project Claim Management and Project Communication Management.

Keywords: Project management, project management knowledge aspects, project success.

A. INTRODUCTION

The field of project management has undergone quite significant evolution since the early conditions when this science was developed. In its early days, the field of project management did not have a broad scientific scope (Davis, 2014). However, project management can now be aligned with other fields of management science with an increasing amount of research literature (Mir & Pinnington, 2014).

In 2017, the Project Management Institute conducted a survey involving 3,234 project management professionals from 18 different industries and 200 senior executives worldwide to determine trends in project management by organizations. The survey concluded that when organizations apply project management to programs and portfolios that have been prepared, these projects tend to be more successful (PMI, 2017). A similar survey by PMI in 2018, involving more than 5,000 project management professionals, concluded that understanding and implementing project management has been shown to make projects more successful and reduce waste (PMI, 2018). The same thing is also supported by scientific literature long before the PMI survey was conducted. Implementation of project management knowledge makes project performance more effective. This is also supported by the statement that the implementation of project management knowledge on a project has been quantitatively proven to have a positive effect on project performance (Crawford, 2001).

So far, when a problem occurs in a project carried out by the Project Engineering team, the team will solve the problem without analyzing the cause of the problem; by applying project management knowledge, problems that often occur in projects can be avoided before the problem arises. However, not all employees understand the importance of project management knowledge in this business. This is because only about 15% of workers understand what project management is. Therefore, increasing the number of workers who understand project management can improve project implementation.

The application of project management knowledge tends to produce more successful projects (PMI, 2017). Therefore, it is necessary to improve the qualifications of employees so that they can understand project management knowledge. In order to find out what aspects of project management knowledge are needed in the work being done, an accurate survey needs to be conducted to adjust to the needs in the field. After understanding what aspects are needed, the right project management knowledge can be improved.

This paper tries to explore the correlation between aspects of project management knowledge and the perception of the success of project construction implementation from the perspective of the project implementer. This paper can be a reference for project stakeholders (especially from the project implementer) to improve the quality of their construction results.

B. LITERATURE REVIEW

1. Project Management Knowledge Aspect

A project is a temporary activity that has a predetermined start and finish time aimed at achieving specific and unique results (PMI, 2017). In general, a project consists of the stages of initiation, planning, implementation, monitoring and control, and closing, as seen in Figure 2.1 (PMBOK, 2013). Every activity in the project always goes through these stages, so careful control is needed at each stage. Therefore, project management knowledge is very important for the team to achieve project success.

Project management is a discipline that includes planning, organizing, managing, and controlling resources to achieve project goals. Knowledge in project management consists of ten main areas (PMI, 2018) and an additional four areas specific to construction, which are explained in the Construction Extension to the PMBOK Guide (PMI, 2017). These key areas include project integration management, project scope management, project time management, project cost management, project quality management, project human resource management, project communication management, project risk management, project procurement management, and project stakeholder management. Four additional areas specific to construction include project safety management, project environmental management, project financial management, and project claims management. Traditionally, most researchers have focused on one to three aspects of project management knowledge when examining construction project success in detail. However, a new trend has emerged when adopting nine aspects of project management knowledge to investigate the significance of project management knowledge on construction project performance (Ling, 2008). These aspects include project scope management, project time management, project cost management, project risk management, project quality management, project human resource management, project communication management, project procurement management, and project integration management.

A multinational study on the impact of PMBOK on construction project success was then conducted, using eight aspects of construction project management knowledge (Chou et al., 2013). These aspects include project scope management, project time management, project cost management, project quality management, project human resource management, project communication management, project risk management, and project procurement management. Ling (2008), on the other hand, used 10 aspects of project management knowledge to assess project success in higher education institutions. These aspects include project integration management, project scope management,

project time management, project cost management, project quality management, project human resource management, project communication management, project risk management, project procurement management, and project stakeholder management. In this study, 14 aspects of project management were used, which came from several combinations above. Table 1 below is the 14 aspects of project management that will be the subject of the study.

Table 1 Knowledge Management Project Aspects

No	Project Management Knowledge Aspects
1	Project Integration Management (X1)
2	Project Scope Management (X2)
3	Project Time Management (X3)
4	Project Cost Management (X4)
5	Project Quality Management (X6)
6	Project Human Resources Management (X6)
7	Project Communication Management (X7)
8	Project Risk Management (X8)
9	Project Procurement Management (X9)
10	Project Stakeholder Management (X10)
11	Project Safety Management (X11)
12	Project Environmental Management (X12)
13	Project Financial Management (X13)
14	Project Claims Management (X14)

2. Project Success

Every construction project has unique and diverse objectives. In an effort to achieve these objectives, some constraints must be considered, including budget allocation, construction schedule, and quality standards that must be met (Soeharto, 1995). These three constraints are known as the triple constraints, which are key factors in implementing a project. This is also known as the project objective, which includes: a) Cost or budget, b) Schedule or timeframe and c) Quality

In the early 1970s, the measurement of project success focused on operational aspects, tools, and techniques, known as the three constraints of time, cost, and quality (Davis, 2014). During this period, interpersonal skills and expertise were not yet considered important factors in assessing project success (Munns & Bjeirmi, 1996). Project success at that time was entirely determined by the project manager's perspective, who often only paid attention to technical aspects without paying attention to good communication with the employer. In the 1980s and 1990s, there was a shift in the understanding of project success factors. For the first time, the list of ten project success factors included indicators of project goal achievement and management satisfaction (Pinto & Slevin, 1988). Although some criticisms have been raised about this view, it marked the awareness of project practitioners of the importance of evaluating project success from multiple perspectives. Project success is the design of a business organization (Handiwibowo et al., 2011). So, a business organization should have a fairly comprehensive design for the success of a project (Handiwibowo et al., 2020). Project success should be viewed from the perspective of various stakeholders and the time of measurement (Davis, 2014). During the 1990s and 2000s, the importance of involving and meeting the expectations of internal and external stakeholders began to be

emphasized as a determinant of construction project success. Although the triple constraints method is still often used as a traditional indicator of success, most practitioners have begun to pay attention to stakeholder satisfaction as the main focus (Papke-Shields et al., 2010). The paradigm of project success has shifted from only paying attention to the perception of project managers to paying attention to stakeholder satisfaction. In conclusion, the purpose of project management implementation is to ensure project success, which is now not only determined by the perception of project managers but also involves the expectations and satisfaction of stakeholders (Berssaneti & Carvalho, 2015).

Various studies have identified factors that are considered important in assessing the success of construction projects after reviewing 110 construction projects, highlighting two main dimensions of success, namely customer benefits and fulfilment of design objectives. They emphasized that customer satisfaction and well-being are important indicators of project success. Ten factors are considered crucial in project success, including project schedule, client consultation, technical tasks, client acceptance, monitoring and feedback, communication, problem-solving, support management, and human resource management, such as recruitment, selection, and training (Pinto & Slevin, 1988). Project success is considered the achievement of design objectives, customer benefits, commercial success, and business potential. At the same time, other experts emphasize that customer satisfaction is the main key to project success. A number of factors, including time, budget, quality, design, stakeholders, repeat business, and overall business success, are indicators of project success (Chou et al., 2013). Although there are various factors identified by researchers, in this study, the author focuses on five main indicators of construction project success, namely on-time completion, completion within budget, completion according to established quality standards, in accordance with the initial design, and meeting stakeholder expectations.

C. METHOD

This study uses the analysis unit of employees of a company engaged in the construction sector and working on a construction project. The number of employees involved in the construction process above is 117 people. A total of 70 employees were successfully interviewed and became respondents. The respondents who will be used are those who are considered the most competent in this study. Therefore, respondents will be selected using purposive sampling. The respondents selected are people who are directly involved in retail or tender projects because they are directly involved and have an influence on the progress of the project.

The measurement scale used is a scale of 5, where a value of 1 indicates the level of disagreement and a scale of 5 indicates the level of respondents' perceptive agreement with the statements in the questionnaire. Testing of the instruments in this study includes validity and reliability tests of the data collected. This validity and reliability test is needed to meet the standards of good research methods for the measurement instruments used before the data is processed with SmartPLS 3.0 software.

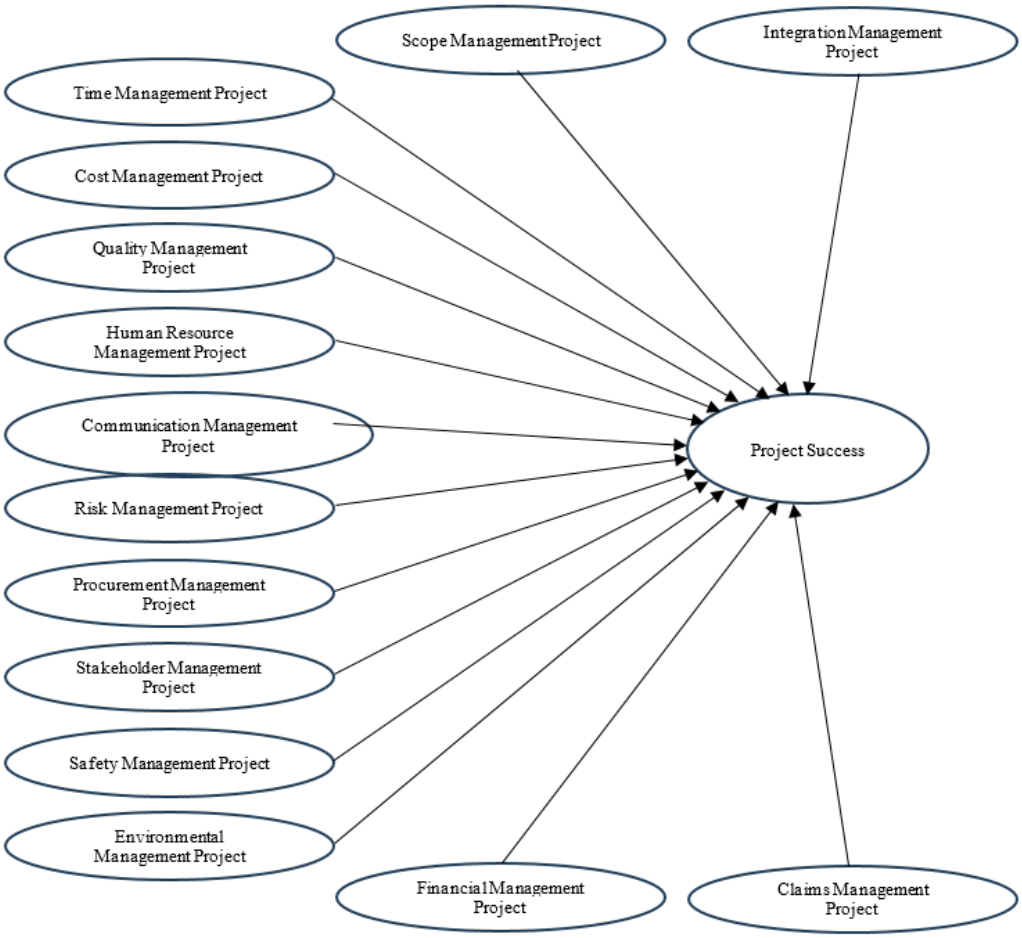

Figure 1. Research framework

D. RESULTS AND DISCUSSION

1. Validity & Reliability Test

Before conducting the analysis using SEM-PLS, the questionnaire was first tested for validity and reliability. The validity test aims to ensure that the questionnaire is able to measure the variables studied correctly (Arikunto, 2006). The validity test was carried out using the Pearson correlation method, where the questionnaire is considered valid if the correlation value is greater than the value in the table. In this study, the significance level used was 5% ($\alpha = 0.05$). With a sample size of 70 respondents, a table value of 0.235 was obtained. The results of testing the questionnaire using the software can be seen in the appendix, while a summary of the correlation values is presented in Table 2 below.

Table 2 *The* calculated r value of research variables and indicators

No.	Variable	Indicator	r_{count}	Validity
1	Integration Management Project (X1)	X1.1	0.74	Valid
		X1.2	0.595	Valid
		X1.3	0.7	Valid
		X1.4	0.703	Valid

Table 2 (continued)

No.	Variable	Indicator	r_{count}	Validity
2	Scope Management Project (X2)	X2.1	0.595	Valid
		X2.2	0.7	Valid
		X2.3	0.776	Valid
		X2.4	0.489	Valid
3	Time Management Project (X3)	X3.1	0.776	Valid
		X3.2	0.74	Valid
		X3.3	0.667	Valid
		X3.4	0.557	Valid
4	Cost Management Project (X4)	X4.1	0.557	Valid
		X4.2	0.474	Valid
		X4.3	0.293	Valid
		X4.4	0.854	Valid
5	Quality Management Project (X5)	X5.1	0.489	Valid
		X5.2	0.595	Valid
		X5.3	0.7	Valid
		X5.4	0.703	Valid
6	Human Resource Management Project (X6)	X6.1	0.595	Valid
		X6.2	0.74	Valid
		X6.3	0.854	Valid
		X6.4	0.97	Valid
7	Communication Management Project (X7)	X7.1	0.97	Valid
		X7.2	0.97	Valid
		X7.3	0.97	Valid
		X7.4	0.667	Valid
8	Risk Management Project (X8)	X8.1	0.575	Valid
		X8.2	0.474	Valid
		X8.3	0.575	Valid
		X8.4	0.776	Valid
9	Procurement Management Project (X9)	X9.1	0.74	Valid
		X9.2	0.595	Valid
		X9.3	0.7	Valid
		X9.4	0.703	Valid
10	Stakeholder Management Project (X10)	X10.1	0.595	Valid
		X10.2	0.7	Valid
		X10.3	0.7	Valid
		X10.4	0.955	Valid
11	Safety Management Project (X11)	X11.1	0.74	Valid
		X11.2	0.74	Valid
		X11.3	0.74	Valid
		X11.4	0.489	Valid

Table 2 (continued)

No.	Variable	Indicator	r_{count}	Validity
12	Environmental Management Project (X12)	X12.1	0.854	Valid
		X12.2	0.575	Valid
		X12.3	0.955	Valid
		X12.4	0.725	Valid
13	Financial Management Project (X13)	X13.1	0.798	Valid
		X13.2	0.364	Valid
		X13.3	0.917	Valid
		X13.4	0.539	Valid
14	Claims Management Project (X14)	X14.1	0.475	Valid
		X14.2	0.72	Valid
		X14.3	0.458	Valid
		X14.4	0.346	Valid
15	Project Success (Y)	Y1	0.82	Valid
		Y2	0.815	Valid
		Y3	0.381	Valid
		Y4	0.381	Valid
		Y5	0.809	Valid

Source: Primary data (2024)

Reliability testing aims to ensure whether each indicator can be relied on to measure its latent variables. In PLS, reliability is measured by looking at Cronbach's Alpha and Composite Reliability values of each latent variable. An indicator is considered reliable if it has a Cronbach's Alpha value of more than 0.6 and a Composite Reliability of more than 0.7. The calculation results from the software provide Cronbach's Alpha and Composite Reliability values for each latent variable, which can be seen in Table 3 below.

Table 3 Cronbach's Alpha & Composite Reliability Values of Variables Latent

No	Project Management Knowledge Aspects	*Cronbach's Alpha*	*Composite Reliability*
1	Project Integration Management (X1)	0.908	0.934
2	Project Scope Management (X2)	0.706	0.955
3	Project Time Management (X3)	0.937	0.909
4	Project Cost Management (X4)	0.867	0.939
5	Project Quality Management (X6)	0.914	0.854
6	Project Human Resources Management (X6)	0.937	0.932
7	Project Communication Management (X7)	0.902	0.884
8	Project Risk Management (X8)	0.827	0.896
9	Project Procurement Management (X9)	0.855	0.764
10	Project Stakeholder Management (X10)	0.746	0.768
11	Project Safety Management (X11)	0.684	0.81
12	Project Environmental Management (X12)	0.664	0.856
13	Project Financial Management (X13)	0.742	0.746
14	Project Claims Management (X14)	0.854	0.822
15	Project Success (Y)	0.782	0.851

Source: Primary data (2024)

From Table 3 above, it can be seen that each latent variable has a Cronbach's Alpha value of more than 0.6 and a Composite Reliability of more than 0.7. This indicates that each indicator has been proven reliable and consistent in measuring its latent variables.

After the measurement model (outer model) is declared valid and reliable, the next step is to evaluate the structural model (inner model). The evaluation of the structural

model aims to understand the relationship between exogenous latent variables and endogenous latent variables in the study. This evaluation process includes analysis of the R-square (R2) value, Q-square predictive Relevance (Q2), path coefficient (Path Coefficient), and the level of significance of the exogenous latent variables.

The R-square (R2) value describes the extent to which the exogenous latent variables can explain variations in the endogenous latent variables. Based on calculations using software, this study obtained an R-square (R2) value of 62.4% for endogenous latent variables. This means that 62.4% of the variation in the tender and retail project success variables can be explained by the 14 exogenous latent variables studied. In comparison, other factors outside the model influence the remaining 37.6%. The R-square (R2) value is considered good if it is greater than 0.5. Therefore, the structural model used in this study meets the criteria with an R-square (R2) value of 0.624.

Q-Square Predictive Relevance (Q2) is a value that describes the extent to which the model can predict the observation value well. Based on calculations using software, this study produced a Q2 value of 0.261. A Q2 value greater than zero indicates that the exogenous latent variables have predictive relevance to the endogenous latent variables that are influenced (Sugiono, 2010). This indicates that the exogenous latent variables used in the research model have good predictive ability against the project success variables.

The path coefficient value shows the extent to which the exogenous latent variable influences the endogenous latent variable. In this study, the path coefficient value was calculated using software, and the results can be seen in Table 4 below:

Table 4. Path Coefficient Values of Exogenous Latent Variables

No	Project Management Knowledge Aspects	Path Coefficient Value	Priority
1	Project Integration Management (X1)	0,02	13
2	Project Scope Management (X2)	0,12	7
3	Project Time Management (X3)	0,199	4
4	Project Cost Management (X4)	0,009	14
5	Project Quality Management (X6)	0,047	11
6	Project Human Resources Management (X6)	0,073	9
7	Project Communication Management (X7)	0,221	3
8	Project Risk Management (X8)	0,166	6
9	Project Procurement Management (X9)	0,167	5
10	Project Stakeholder Management (X10)	0,081	8
11	Project Safety Management (X11)	0,04	12
12	Project Environmental Management (X12)	0,048	10
13	Project Financial Management (X13)	0,295	1
14	Project Claims Management (X14)	0,274	2

Source: Primary data (2024)

From the table above, it can be seen that all path coefficients for exogenous latent variables have positive values. This means that each aspect of project knowledge has a positive impact on the success of retail and tender projects. The magnitude of the influence of each aspect of project knowledge can be seen from the value of its path coefficient. Each unit increase in the application of project management knowledge will increase the value of project success by the value of its path coefficient.

The priority value of the contribution of aspects of project management knowledge to project success can also be seen from the value of the path coefficient. So, in Table 4, the priority ranking of contributions to project success is also given.

In general, this study confirms the Construction Extension to the PMBOK Guide (PMI, 2017), in which 14 aspects of project management knowledge are confirmed to have a positive contribution to project success. This study also contributes that among the 14 aspects of project management knowledge, 3 aspects are considered dominant in providing the perception of project success, namely Project Financial Management, Project Claim Management and Project Communication Management.

E. CONCLUSION

Based on the results of the analysis in this study, it can be concluded that the implementation of 14 aspects of construction project management knowledge as a whole has a positive impact on the success of retail and tender projects. The three aspects of project management knowledge that contribute the most to project success are Project Financial Management, Project Claim Management and Project Communication Management.

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