

A Meta-Analysis Study of Leadership and Project Success

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Abstract— The characteristic of a project is different with the operational process, therefore the role of a leader in the project is also different. The researchers of project management have examined the role of project leaders in project success. The results of those studies are still very diverse. Some researchers say that there is a strong correlation between the two, but some say that there is no significant direct link between leadership and the success of the project. The meta-analysis study is conducted to obtain a comprehensive overview of the previous studies to clarify the different opinions. Based on the exploration of 115 cases of research from 36 project management studies, it is found that between leadership and project success has low direct correlation. This situation happens because contextual factors of project type and the country of project location influence the role and style of leadership in the success of the project.

Keywords— leadership, meta-analysis, project success

I. INTRODUCTION

Leadership is a prevailing theory in organizational management. In the study of social science and management, leadership is a classical theme that has grown for more than three decades [1][2]. The issue of leadership become one of the most studied aspects compared to other things in the analysis of organizational human resource behavior [3].

There are many definitions of leadership around the world, ranging from researchers who define it as a trait or behavior, to others who expose it from the standpoint of the relationship of information processing between entities in the organization [4]. According to the lexical definition of the Oxford dictionary, leadership is the activity of leading a group. Reference [5] stated that leadership is the focus of change from group activity. Academics explain that leadership is a creativity, knowledge, and skills that can influence a group of individuals to achieve common goals [4]. While there are multiple definitions and perspectives, researchers agree that leaders play an essential role in achieving organizational success. In organizational management theory, leadership becomes one of the critical factors to achieve organizational success.

Different things are found in project management. In the literature of project management research, the role of the leader or the project manager is not mentioned as one of the critical factors supporting the project success [1][2][6]. In Project Management Body of Knowledge (PMBOK), leadership is part of the interpersonal skills that must be possessed by project managers. It is also stated that leadership is required during the project life cycle. However, the role of leadership here is not a single stand, but in its position within the team, that is to communicate the project vision and inspire the project team members to make the project team work in high performance [8]. In line with PMBOK, in project management researches, the leadership role in managing projects is included in personnel variables [9] and also in team performance [10].

Project has unique characteristics, it is temporary, and it has elements of uncertainty such as rapid changes or unknown risks. Those characteristics are in contrast to the operational characteristics which are repetitive, procedural, permanent for its cycles, and clear for its entities and activities in specific operating processes [8][11][12]. In case there is a risk, usually the anticipation of operational risk has been predicted. Project characteristics that are different with operational management processes make the leadership characteristics not explicitly stated in the success of the project [3][7].

Such a rapid changing and temporary character of the project influences the performance characteristics of the project leaders. Project managers may switch before the project is completed or should be replaced because project activities require other project leaders. The dynamism is one of the factors to conclude that whatever the nature, the behavior or the role of the leaders, it is not considered as a significant factor as long as the project completed according to the target time, cost, and specification [9].

Along with the development of social theory to support problem-solving in the field of engineering, recently researchers of project management have begun to incorporate the concept of leadership in their studies, and do the empirical test in the object area of different projects [2]. However, there has not been any agreement among the researchers regarding the correlation and the influence of the leaders or managers in managing the project to achieve success. Some researchers have suggested that the leadership has little impact on the success of the project [13-15], the others claim that the leadership directly affects the success of the project [7][16-18].

The researchers have not explicitly agreed with the results of the study about the correlation between leadership and the success of the project. One of the factors of such hesitancy may be sourced from the variation of the correlation values between role, style, and behavior of the leadership towards the success of a project. These problems still make confusion regarding the relationship between two of them. This difference may also occur due to the different contextual factors of research, including the type of leadership, the project type, or the country region as the place of the project.

Based on the description, it can be said that leadership contributes to the project performance or the success of the project. However, how much the influence and whether the correlation is reliable or not still need to be studied further. Contextual projects such as project type, project area, country culture, and others condition are also suspected to influence project leader to achieve project success. The relevance of project type and project area to the leadership type in achieving project success will be explored further in this study (Figure 1).

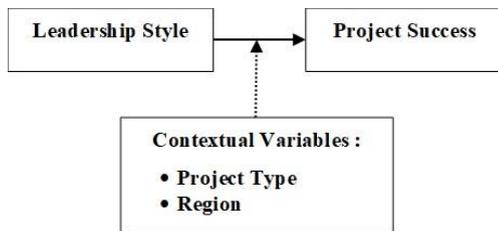


Figure 1. Leadership and Project Success Model

To clarify this problem, this study proposes three hypotheses:

- Hypothesis 1: Leadership is positively correlated with project success
- Hypothesis 2: The type of project affects the correlation between leadership and project success.
- Hypothesis 3: Region affects the correlation between leadership style and project success

II. METHODOLOGY

This study is to analyze the influence and the correlation of independent variables of leadership with the dependent variable of project success. This study uses a meta-analysis method to clarify the conflict of research results on the influence, correlation or linkage of leadership factors to the success of the project. Meta-analysis is one of the mechanisms to identify the correlation distribution between independent variables and dependent variables from a collection of existing studies, which is then used to draw new conclusions after correcting the errors of the previous researches [19].

Studies with meta-analysis methods are possible to correct errors from last individual studies by taking into account the impact of overall size (effect size) [19]. In this study, the corrected error was a sampling error. This type of error was the most influential effect in meta-analysis study [19]. Literature exploration stage was conducted with the theme of leadership in the success of the project, then it was analyzed using meta-analysis equation (1) to (10). The detailed steps of this study are shown in Figure 2.

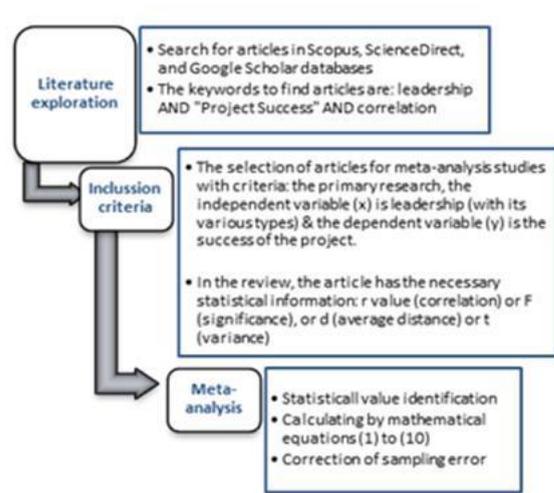


Figure 2. Stages of Meta-Analysis Study.

The mechanism for converting the significance values (F), variance (t), or the average distance (d) to the correlation value (r) is expressed in equations (1) to (4) [19]:

$$t = \sqrt{F} \tag{1}$$

$$d = \frac{2t}{\sqrt{N}} \tag{2}$$

$$d = \frac{2r}{\sqrt{(1-r^2)}} \tag{3}$$

$$r = \frac{d}{\sqrt{(4+d^2)}} \tag{4}$$

For the calculation of sampling error correction is done by equation (5) to (10) [19]:

- Calculate the average population correlation:

$$\check{r} = \frac{\sum(N_i r_i)}{\sum N_i} \tag{5}$$

- Calculate the varians $r_{xy}(\sigma^2 r)$:

$$\sigma^2 r = \frac{\sum[N_i(r_i - \check{r}^2)]}{\sum N_i} \tag{6}$$

- Calculate the sampling error:

$$\sigma^2 e = \frac{(1 - \check{r}^2)^2}{(N - 1)} \tag{7}$$

- Calculate the estimated variance of population correlation:

$$\sigma^2 \rho = \sigma^2 r - \sigma^2 e \tag{8}$$

- Calculate the confidence interval 95%:

$$\check{r} \pm 1,96 \sqrt{\sigma^2 r} \tag{9}$$

- Calculate the impact of sampling error:

$$\text{Impact of sampling errors: } \frac{\sigma^2 e}{\sigma^2 \rho} \times 100\% \tag{10}$$

III. RESULTS

Literature exploration obtained 36 studies that analyze the correlation between leadership and project success. Based on this, 115 cases can be used for meta-analysis study. Based on the data, there are various types of leadership studied by the researchers, those are transformational, transactional, and competency leadership (intelligence competency (IQ); management competency (MQ) and emotional competency (EQ)).

For the parameters of project success, most researchers analyzed it based on the cost, time, quality [34][43][45][50][58-62], and customer satisfaction [2][38]. Besides, there are some researchers who are identified to use the metrics of product success if the project is an organizational product improvement [13][57-59].

In this part, each meta-analysis study result is presented, i.e. the project's leadership and success, leadership type with project success, leadership type with project success based on project type, and leadership type with project success based on the region of the country.

A. Meta-Analysis of Leadership and Project Success

The data for the meta-analysis are treated according to the equations (1) to (10). In this study, data processing is done by using Microsoft Excel. A summary of the meta-analysis study is shown in Table 1.

Table 1. Summary of Meta-Analysis Study

Calculation	Result
Average population correlation	0.242
Variance	0.0853
Variance error sampling	0.0045
Estimation of correlation variance	0.0807
Confidence interval	(-0.330) – (0.814)
Sampling error impact	5.6 %

The correlation of the population after the correction of sample error is estimated at 0.242 with a deviation of 0.284. The correlation rate is moderate, but the deviation of the data population is large (the ratio is 0.85). Based on this result, although there is a positive correlation between leadership and project success, the correlation results cannot be said to be strong. The range of the confidence interval contains a negative and positive value: $(-0.330) < r < (0.814)$. It can be concluded that there is a study that is negatively correlated, not correlated at all (zero correlation) and positively correlated.

This result implies that the leadership studies and the success of the project have various correlation. The value of sampling error is 5.6%, which means that the other unspecified error factor is 94.4%. Other sources of errors, other than sampling errors that may accompany a review and need further exploitation include measurement error, dichotomization, variation range variation, variable structure deviation, transcript error, and other external influences [19].

B. Leadership Type and Project Success

The types of leadership identified in this study are transformational leadership, transactional leadership, intelligence (IQ) competence, managerial intelligence (MQ), and emotional intelligence (EQ) competence. The result of the correlation between leadership types and project success presented in Table 2.

Table 2. The Correlation of Leadership Type and Project Success

Leadership Type	r		Ratio	Result
Transformational	0,476	0,298	1,59	Unreal correlation
Transactional	0,177	0,368	0,48	Unreal correlation
IQ Competency	0,183	0,882	0,207	Unreal correlation
MQ Competency	0,198	0,058	3,397	Real correlation
EQ Competency	0,216	0,092	2,351	Real correlation

Table 4.2 shows that the transformational leadership is the most correlated to the success of the project, but the deviation in the data is also large, so the correlation is not strong enough or unreal to support the success of the project.

Data's deviation of the managerial intelligence MQ and EQ emotional intelligence is small (<0.1), which means that existing research results consistently indicate a positive correlation between these leadership types and project success. This condition can be concluded that MQ intelligence and EQ intelligence support the project success significantly. The transactional leadership and IQ competencies leadership are low correlation to project success, the deviation of research data is also high, so these two types of leadership are not significantly correlated with project success.

B. Leadership and Project Success Based on Project Type

In this study, the type of project is divided in two kinds: construction and non-construction project. The construction projects include bridge construction, buildings, dams, and other infrastructure projects. While for non-construction project consists of project organization product development, information technology, finance, irrigation services, and sports event projects. Table 3 shows the results of the correlation between leadership type and project success based on each project type.

Based on the calculation, it is obtained an information that transformational leadership is significantly correlated with the success of construction projects, as well as for the leadership with managerial intelligence (MQ) and emotional intelligence (EQ). Leadership with emotional intelligence (EQ) correlates significantly with the success of both construction and non-construction projects. These results indicate that the leadership style depends on the context of the project. A type of leadership can support the success of a particular project but may not in another field.

Table 3. Leadership to Project Success Based on Project Type

Leadership	Project Type	r		Ratio	Result
Transformational	Construction	0,565	0,1833	3,082	Real correlation
	Non-Construction	0,299	0,3930	0,761	Unreal correlation
Transactional	Construction	0,291	0,4191	0,695	Unreal correlation
	Non-Construction	0,153	0,1955	0,784	Unreal correlation
IQ	Construction	0,176	0,952	0,185	Unreal correlation
	Non-Construction	0,227	0,887	0,256	Unreal correlation
MQ	Construction	0,176	0,0574	3,070	Real correlation
	Non-Construction	0,284	0,995	0,284	Unreal correlation
EQ	Construction	0,190	0,0905	2,101	Real correlation
	Non-Construction	0,274	0,0672	4,081	Real correlation

D. Leadership and Project Success Based on The Country

The location of the country where the cultural aspects of the country vary is possible to influence the leadership style of the project manager to achieve a successful project. The project sites are identified in America, Asia, Europe, Asia and Africa. The details of the analysis results are shown in Table 4.

In the United States (USA, Brazil, North America) leadership's styles that are real and positively correlated to the success of the project are a leader who has the competence of managerial intelligence (MQ) and emotional intelligence (EQ). In Australia's region, the kind of leadership that stands out and has a real and positive correlation to the project success is transformational leadership. Leadership that also has the potential to support the success of projects in Australia is the emotional intelligence (EQ) leadership.

For the African region (South Africa, Ghana), the type of leadership that has a real and positive correlation to the project success is transactional leader. For Asian region (China, Thailand, Malaysia, Indonesia, China, UAE, Iran), it cannot be mapped out which prominent leadership type supporting the project success. The style of leadership that has the potential to have a real and positive correlation for the Asian region is the transformational leadership. This sample correlation with the overall variance is 1.867. Even though this ratio is in category unreal with the 95 % confidence interval, this value is close enough to the target ratio significance (above 1.96). For European countries (UK, Sweden, Ukraine), leadership types are significantly and directly correlated with project success. The leadership style that correlates significantly with the success of projects in Europe is transformational leadership.

Based on these results, it can be concluded that to achieve successful projects, the type of leadership depends on the territory of each country which has a specific type of leadership.

Table 4. Project Leadership and Project Success Based on The Region

Leadership	Country	r		Ratio	Result
Transformational	America	0,168	0,0998	1,685	Unreal correlation
	Asia	0,386	0,2067	1,867	Unreal correlation
	Africa	0,112	0,484	0,235	Unreal correlation
	Europe	0,330	0,0998	3,300	Real correlation
	Australia	0,649	0,1456	4,456	Real correlation
Transactional	America	-	-	-	-
	Asia	0,090	0,1598	0,564	Unreal correlation
	Africa	0,352	0,0957	3,679	Real correlation
	Europe	-	-	-	-
	Australia	0,167	0,4798	0,347	Unreal correlation
IQ	America	0,161	0,385	0,418	Unreal correlation
	Asia	-	-	-	-
	Africa	-	-	-	-
	Europe	0,227	0,322	0,70	Unreal correlation
	Australia	-	-	-	-
MQ	America	0,174	0,0596	2,912	Unreal correlation
	Asia	-	-	-	-
	Africa	-	-	-	-
	Europe	0,283	0,358	0,79	Unreal correlation
	Australia	-	-	-	-
EQ	America	0,185	0,0947	1,953	Real correlation
	Asia	-	-	-	-
	Africa	-	-	-	-
	Europe	0,224	0,521	0,429	Unreal correlation
	Australia	0,410	0,0821	4,9	Real correlation

IV. DISCUSSION

In this meta-analysis study, three hypotheses are proposed. Based on the data processing and meta-analysis results, the hypothesis is discussed in this section.

Hypothesis 1: Leadership is positively correlated with the project success

Based on the meta-analysis analysis, it was found out that leadership is correlated positively to support the project success, although the correlation is not strong one. The consistent leadership types which are positively correlated and have real effect on project success are leadership with managerial intelligence type (MQ) and emotional intelligence (EQ). Both types of leadership can support both construction and non-construction projects. This style of leadership is the most recent development of leadership theory [3] which can adapt contextually, especially in areas of projects that have dynamic and laden characters of change.

The competency-based leadership style consists of IQ, MQ, and EQ intelligence competencies. In this study, the leadership type with EQ and MQ intelligence has positive relationship with the success of the project. This result is in line with the research in 119 information technology companies that MQ and EQ leadership is more supportive of the project's success [2].

Hypothesis 2: The type of project affects the correlation between leadership with the project success.

The variables that can potentially be a correlation booster between leadership and project success are project types. Each project has different characteristics, even projects in the same field. This reason is consistent with the unique nature of the project. The features of a construction project are different from those in information technology, finance, services and other fields. Each project type requires a different project manager's background [40]. Thus, the impact on the style of leadership also depends on the kind of project. This result supports the composition of this second hypothesis.

Based on the results of the meta-analysis, the hypothesis can't be rejected. The type of project influences the correlation between leadership and project success. For the construction project, the leadership that support the project success is the transformational, the MQ and the EQ leadership types. While for non-construction project type, i.e. financial, service, and information technology, leadership with EQ intelligence is the one that support project success the most. The results of this study are in line with the analysis that EQ intelligence can support the complexity of non-construction projects [2].

Hypothesis 3: The Country Region affects the correlation between leadership and project success.

A project manager is a person who should be the most sensitive to the cultural issues of the country in which the project is underway [40]. This condition will undoubtedly affect the type or style of leadership of the project manager. Based on the results of the meta-analysis study, the type of project leadership to achieve project success in a country varies. The third hypothesis can't be rejected.

In America, the leadership type that supports success is the project manager with managerial intelligence (MQ) and emotional intelligence (EQ). In the Asian region, although no identifiable leadership type has been significantly correlated with project success, transformational is the type of leadership with the most significant potential for project success. This result is in line with the region of Australia and Europe. In the African region, leadership style supporting the project success is transactional leadership. Countries in Africa are the only area in this study that transactional leadership has a real correlation with project success.

V. CONCLUSION

A meta-analysis study of leadership and project success has a result that leadership has a positive relationship to project success, but the correlation is not strong one. This result happens because in-order to achieve project success, it depends on the type of leadership, and the leadership style is affected by the type of project and the territory of the region where the project is being run.

The types of leadership in most construction projects that support project success are transformational leaders, managers with managerial intelligence (MQ) and leaders

with emotional intelligence (EQ). For non-construction projects, leaders with emotional intelligence (EQ) are the ones who support the project success. Managerial intelligence leadership type (MQ) supports project success in America, while emotional intelligence (EQ) is suitable in America and Australia. Transformational leadership types support successful projects in Australia, Europe and potentially in Asia. Transactional leadership only supports projects in Africa.

Based on this study, it can be concluded in general that project leadership supports and positively contributes to the project success depending on the context of each project. In this study, the context that has been studied is the type of project and the territory of the country where the project is run. The possible further study is the exploration of other contextual variables that influence the leadership of project managers in achieving project success. The contextual variables include project complexity, project contract's type, project size, and the project team.

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