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The influence of transformational leadership, digital technology and work culture diversity on the effectiveness of the construction implementation team

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Abstract. The construction project implementation team generally consists of clients, project managers, financiers, legal consultants, design leaders (architects or structural engineers), other specialized consultants, main contractors, subcontractors, cost consultants and suppliers, who must work together effectively to realize project goals. Leadership, the use of digital technology and cultural diversity characterize the effectiveness of the project implementation team. This study aims to determine the positive effects of transformational leadership, digital technology (digitization), and cultural diversity on the effectiveness of the project implementation team. This research is a survey research, involving 200 company respondents, members of the construction industry professional association in Jakarta. Multiple regression is used to analyse data. The results showed that transformational leadership, digital technology (digitization) and cultural diversity had a significant positive effect on the effectiveness of the project implementation team.

1. Introduction

The project implementation team, in terms of size and composition can vary from one project phase to another, but what is important to the success of the team is how integrated and effective the team is. Globalization, technology and the complexity of construction projects, as well as the dynamics of the project implementation team, indicate the need to consider the achievement of team effectiveness as very important and an image of the life of team performance and success in the construction industry [1].

In essence, the effectiveness of the project implementation team is greatly influenced by factors of intrapersonal, interpersonal relationships and team organization. Theoretically, the effectiveness of the project implementation team really requires team integration and cooperation so that the team can work well in achieving its goals. The success of the project implementation team is determined by how much effort is put into providing an acceptable level of performance in completing the task. In addition, the team must have sufficient knowledge and skills that support the work and functions of the team and also adapt the most appropriate strategies for the job and the context in which the work is carried out [2]. This study will discuss three of the many important factors related to the effectiveness of the project implementation team, namely leadership, digital technology (digitization), and cultural diversity.

The effectiveness of the project implementation team is believed to result in top-class project results that exceed standards and, therefore, increase overall productivity [1]. Therefore in this study the



effectiveness of the project implementation team was chosen as the dependent variable of the research model.

2. Literature review

Katzenbach and Smith defines a team as "a small number of people with complementary skills who are committed to the same goals, performance goals, and approaches they perceive to be mutually accountable." Parker lists twelve characteristics of an effective team, including clear objectives; informality; participation; listen; civilized disagreement; decisions based on consensus; open communication and trust; clear job roles and tasks; joint leadership; external relations; diversity of styles; self-assessment [1].

Avolio, Walumbwa and Weber define transformational leadership as "leader behaviour that transforms and inspires followers to exceed expectations while transcending self-interest for the good of the organization" [3]. Transformational leadership has five dimensions, namely: vision; inspiring communication; intellectual stimulation; supportive leadership; and personal confession [4].

Empirical research was conducted Tabassi et al. [5]; Anwar [6]; Chou et al. [7]; and Zheng et al. [8] showed a significant positive relationship between international leadership and team effectiveness. So that the first hypothesis of the study is:

H1: Transformational leadership has a positive effect on the effectiveness of the project implementation team.

Rouse defines digitization as the process of organizing and transforming information into different data sets that are digital in nature. This information is converted into binary data that is understandable and can be processed by computers and other devices with computational capacity. Digital technology has ten dimensions of perceived benefits that can be obtained from the application of digital technology in the construction industry from a professional perspective, namely saving time; increase productivity; increase work speed; improve document quality; speed up response time; simplify working methods; more accurate documentation; reduce the level of difficulty; reduce construction errors; and the proportion of new jobs [9].

Empirical research was conducted Tetik et al. [10]; Rimmington et al. [11]; Chowdhury et al. [12]; Hetemi et al. [13]; and Madanayake and Çıdık [14] showed a significant positive relationship between digital technology and team effectiveness. So that the second hypothesis of the study is:

H2: Digital technology (digitization) has a positive effect on the effectiveness of the project implementation team.

Cultural diversity is the reality of the coexistence of diverse knowledge, beliefs, arts, morals, laws, customs, religions, languages, abilities and disabilities, gender, ethnicity, race, nationality, sexual orientation, etc., from humans [15]. Kim et al. posited five dimensions of factors that influence cultural diversity and project performance; namely: integration; cooperation; goal orientation; flexibility; and people orientation [16].

Empirical research was conducted Güver and Motschnig [17]; Martin [18]; Misoc [19]; Charlesraj and Khan [15]; and Adi and Musbah [20] showed a significant positive relationship between cultural diversity and team effectiveness. So that the third hypothesis of the study is:

H3: Cultural diversity has a positive effect on the effectiveness of the project implementation team.

3. Methodology

The research method used was a survey with a causal design. The research sample consisted of 200 respondents from Consultant companies (Planners, Quantity Surveyors and Construction Management or Supervisors) and Implementing Contractors domiciled in Jakarta who are members of professional

associations. Sampling was carried out by random means, research questions were sent via e-mail via each professional association.

The project implementation team effectiveness questionnaire consisting of 17 items was made with reference to Parker's 12 characteristics of the effective team [20]. The transformational leadership questionnaire consists of 10 statements based on five dimensions according to Rimmington et al. [11]. The digital technology questionnaire consists of 11 statement items arranged based on 10 perceptions of the benefits that can be obtained from the application of digital technology in the construction industry from a professional perspective according to Charlesraj and Khan [15]. The cultural diversity questionnaire consists of 8 items which are strengthened based on five dimensions according to Kim et al. [9]. Each questionnaire was prepared with five Likert scale answer choices. Before being distributed, the research questionnaire was tested on 40 respondents to determine its validity and reliability. Data analysis used multiple regression preceded by data normality testing and the presence of autocorrelation, multicollinearity, and heteroscedasticity symptoms.

4. Results

Transformational Leadership (X1), Digital Technology (X2), and Cultural Diversity (X3) are factors that can explain the effectiveness of the Project Implementation Team (Y) of 92.5% (R-Square = 0.925), while the remaining 7.5% is determined or explained by factors other than research (See Table 1).

Table 1. Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.962 ^a	.925	.924	.923

a. Predictor: (Constant). X3, X1, X2

b. Dependent Variable: Y

Transformational Leadership (X1), Digital Technology (X2), and Cultural Diversity (X3) simultaneously have a significant positive effect on the effectiveness of the project implementation team, with a Sig value, ANOVA = 0.000 (See Table 2).

Table 2. ANOVA.

Model		Sum of Squares	Df	Mean Square	F	sig
1	Regression	2053.057	3	684.352	803.465	.000 ^a
	Residual	166.943	196	.852		
	Total	2220.000	199			

a. Predictor : (Constant), X3.X1.X2

b. Dependent Variable : Y

Based on Table 3, Sig value each independent variable = 0.000 which is less than 0.05. This means that each of the independent variables of Transformational Leadership (X1), Digital Technology (X2), and Cultural Diversity (X3) partially has a significant positive effect on the Effectiveness of the Project Implementation Team (Y).

Table 3. Coefficients.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std	Beta		
1	(Constant)	31.830	1.551		20.517	.000
	X1	.331	.063	.300	5.260	.000
	X2	.378	.070	.314	5.419	.000
	X3	.390	.062	.373	6.254	.000

Dependent Variable Y

5. Discussion

The results of the analysis show that Transformational Leadership has a significant positive effect on the Effectiveness of the Project Implementation Team. The results of this study are in line with studies Tabassi et al. [5]; Anwar [6]; Chou et al. [7]; and Zheng et al. [8] which showed a significant positive relationship between international leadership and team effectiveness. Empirical studies show that transformational leadership and transactional leadership have a significant positive effect on knowledge sharing and innovation performance [8]. In the construction industry, knowledge sharing and innovation performance are necessary given the dynamics of project characteristics that vary over time. However, transformational leaders with attractive emotional behaviour tend to be more suitable for use in the construction industry [5].

The results of the analysis show that Digital Technology has a significant positive effect on the Effectiveness of the Project Implementation Team. The results of this study are in line with studies [10]; Rimmington et al. [11]; Chowdhury et al. [12]; Hetemi et al. [13]; and Madanayake and Çıdık [14] which showed a significant positive relationship between digital technology and team effectiveness. According to Chowdhury et al. [12], from a practical perspective, clients and contractors can be convinced to invest in digital technology, increase or accelerate absorption, and be more aware of the benefits of digital technology that can increase the productivity performance, growth, and long-term success of the construction industry, as studies so far reveal. That digitization allows for improved performance which can be associated with increased productivity [14], however it is realized that this depends on the presence of certain skills and knowledge, which require training.

The results of the analysis show that cultural diversity has a significant positive effect on the effectiveness of the project implementation team. The results of this study are in line with Lin studies [16]; Martin [18]; Misoc [19]; Charlesraj and Khan [15]; and Adi and Musbah [20] who showed a significant positive relationship between cultural diversity and team effectiveness. Although there is not one generally accepted effect of cultural diversity on performance; hence cultural diversity is likely to have a negative impact on cohesion, communication, and integration, and is likely to increase conflict within a teamwork organization. But on the plus side, cultural diversity to some extent tends to enhance decision-making and problem-solving processes through higher creativity and innovation potential [17]. So it should be understood that the impact of cultural diversity in the workplace can be both beneficial and unfavourable [20]. Some of the negative effects include dysfunctional conflict, loss of productivity, and difficulty achieving harmony in group settings. The positive effects that can be generated include a strong knowledge base created by various cultural experiences, training resources and internal cultural information, having a greater tendency to broaden business horizons.

6. Conclusion

Transformational leadership, digital technology, and cultural diversity simultaneously and partially have a significant positive effect on the effectiveness of the project implementation team. Although many factors affect the effectiveness of the project implementation team, this study reveals that at least among the construction industry in Jakarta, transformational leadership, digital technology (digitization), and

cultural diversity have a positive and significant effect on the effectiveness of the project implementation team.

Project group leadership is difficult. A project manager is faced with two sets of problems. First, the problem of building a team that was directly under his control. Second, he must get cooperation from other departments outside his authority. They are responsible for projects but often with little or no formal authority over the groups providing essential information and services [21]. Transformational and transactional leadership styles have a significant positive effect on knowledge sharing and innovation performance [8]. However, transformational leadership styles with attractive emotional behavior tend to be more suitable for use in the construction industry [5]. This study strengthens the opinion of these experts that transformational leadership has a significant positive effect on the effectiveness of the project implementation team. In other words, the transformational leadership style is appropriate to be applied to support the effectiveness of the project implementation team.

Hashim et al. in Aghimien et al. [9] identified the benefits of using digital technology in the procurement of construction projects, including improved process quality, adequate construction cost savings, adequate client and participant satisfaction, increased responsiveness and productivity, market expansion, and project completion in the most effective way. Therefore the adoption of digital technology (digitization) is feasible to be applied in the construction industry, as this study proves that digital technology (digitization) has a significant positive effect on the effectiveness of the project implementation team which is in line with the opinion of previous experts.

Cultural diversity in the construction industry is a necessity given the diversity of professions and organizations involved in it. It is important to understand that the impact of cultural diversity in the workplace can be both beneficial and unfavorable [18]. Some of the negative effects include dysfunctional conflict, loss of productivity, and difficulty achieving harmony in group settings. The positive effects that can be generated include a strong knowledge base created by various cultural experiences, training resources and internal cultural information, having a greater tendency to broaden business horizons. This study also revealed that cultural diversity had a significant positive effect on the effectiveness of the project implementation team. What needs to be considered perhaps is how to manage this cultural diversity in such a way as to support the effectiveness of the project implementation team in achieving the ultimate goal of implementing a project development.

As stated in the introductory chapter that this research has limitations in terms of location and research sampling which is only in Jakarta; as well as the scope of research that only discusses the independent variables of transformational leadership, digital technology (digitization), and cultural diversity which are the determining factors for the effectiveness of the project implementation team. Recognizing the limitations and scope of this study, it is suggested to future researchers who wish to address the problem of the effectiveness of the project implementation team, to expand the range of research locations and samples, and to expand the independent variables of the study, in order to obtain a more complete picture of the effectiveness of the project implementation team.

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