Examining Critical Factors for Successful Implementation of Knowledge Management in Indonesian Airport Construction Projects

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Abstract— Knowledge management is believed to provide many competitive advantages for organizations so it is necessary to know what factors can influence its implementation. This study was conducted to determine the key success factors for implementing knowledge management in airport construction projects. The quantitative methods used in this study consist of a literature study, a questionnaire survey to 90 respondents from the state-owned airport company, and statistical data analysis using PLS-SEM. The findings discovered that only two of the six variables influencing the use of knowledge management were recognized as key success factors, there are "human resource management" with a t-value of 3.183 and "learning & training" with a t-value of 2.743, meanwhile "IT support", "knowledge management processes existence", "organizational culture", and "leadership support & commitment" factors had no significant effect to the successful implementation of knowledge management. Knowledge management implementation is considered important because it encourages the emergence of innovative problem-solving strategies in the project organization.

Keywords— Knowledge management, Key success factors, Construction, Project, Airport.

I. INTRODUCTION

Knowledge management is viewed as an organized and beneficial management approach, techniques, and resources that effectively harness organizational knowledge toward achieving strategic goals, making informed decisions, implementing changes, and generating value for an organization [1]. Knowledge management is more than just collecting knowledge to store, as it aims to enhance communication and idea sharing within project teams [2]. Knowledge management is crucial in ensuring that construction firms utilize current knowledge to make decisions with greater speed and effectiveness [3]. Effective knowledge management implementation requires a thorough comprehension of knowledge management processes, along with recognizing the crucial success factors and the tangible and intangible outcomes of knowledge management implementation [4].

Nevertheless, airport projects differ from other construction projects as they require the participation of both domestic and international aviation authority stakeholders [5]. Moreover, the standards that must be achieved in airport construction projects have a high level and must comply with international standards as well as the level of safety and certainty during the construction process [6]. The study is driven by these attributes to explore the crucial factors for successful knowledge management implementation in airport construction projects through a survey of participants with experience in managing airport projects from Indonesian state-owned airport companies.

II. LITERATURE REVIEW

A. Knowledge Management

Knowledge management refers to the process of identifying, optimizing, and actively managing knowledge to generate value, enhance productivity, increase profits, and sustain competitive advantage [7]. According to Yap & Toh [3], the knowledge management process comprises four primary procedures such as knowledge creation, knowledge acquisition, knowledge sharing, and knowledge utilization. Knowledge management offers advantages such as effective information utilization, enhanced productivity, heightened intelligence, storage of intellectual capital, strategic planning, improved flexibility, gathering of best practices, higher likelihood of success, and improved collaboration [8]. There are two types of knowledge: implicit and explicit knowledge. Implicit knowledge is the understanding gained from being actively involved and experiencing a particular environment. It is obtained through education and includes both cognitive and technical elements. It is a quality of a personal nature that cannot be touched. At the same time, formal language can externalize explicit knowledge and convey, encode, and distribute it through language or symbolic forms. Explicit knowledge comprises physical items such as books, reports, and documents [9].

B. Knowledge Management Key Success Factors (KMKSF)

In their study, Idris & Kolawole [10] define key success factors as activities, techniques, and processes that should be considered for the successful implementation of knowledge management in organizations. Identifying the KMKSF can play an important role in increasing competitive advantage, in addition, if the order of priority has been determined, it can improve organizational performance and the chances of success in implementing knowledge management [11].

This study successfully identifies factors that often appear as key success factors for implementing knowledge management in previous research from 2018 to 2022, this research is considered still quite relevant to the current conditions. There are six factors including IT support, human resources management, knowledge management process existence, organizational culture, learning & training, and leadership support & commitment.

IT support facilitates the collection, retention, and exchange of information among team members, allowing them to work together in solving problems and reaching decisions regardless of their location or time [12]. Modern Information Technology plays a crucial part in enabling knowledge management by offering organizations essential resources like client and competitor data, technical databases, decision support systems, management frameworks, effective strategies for competition, and access to expert knowledge sources [13].

H1: IT support has a significant effect on the successful knowledge management implementation in airport projects.

People within the organization are the ones who create knowledge, and most of the organization's knowledge is stored in their brains [14]. The HR department plays a crucial role in promoting knowledge management by changing members' perspectives on its significance [15]. Career development focused on developing and attaining goals positively impacts overall knowledge management [16].

H2: HR management has a significant effect on the successful knowledge management implementation in airport projects.

The organizational knowledge management process involves knowledge creation, sharing, storage, and use activities [17]. A structured knowledge management process depends on insights gained from an organization's past actions and knowledge in knowledge management implementation [18]. People, procedures, technology, and planning are crucial for creating and enhancing a lasting knowledge management initiative within the construction sector [19].

H3: Knowledge management process existence has a significant effect on the successful knowledge management implementation in airport projects.

The values an organization believes in are included in its organizational culture to help achieve sustainable competitive advantage [20]. An organizational culture that places a high importance on knowledge and promotes the generation, exchange, and application of knowledge is believed to enhance the effectiveness of knowledge management [14].

H4: Organizational culture has a significant effect on the successful knowledge management implementation in airport projects.

Training guarantees the organized growth of behavioral attitudes, knowledge, and skills necessary for members to carry out their duties, while also boosting problem-solving skills and enhancing workforce competencies [21]. The significance of training and developing human resources is highly acknowledged for the effective execution of knowledge management as education enhances communication among members, leading to the generation of new knowledge for the organization [22].

H5: Learning & training have a significant effect on the successful knowledge management implementation in airport projects.

According to Muhammed & Zaim [23] the success of knowledge management initiatives in organizations is closely linked to the level of support provided by leadership, which also influences organizational innovation performance. leaders need to actively support decisions regarding knowledge management implementation by recognizing the importance of knowledge management [15].

H6: Leadership support & commitment have a significant effect on the successful knowledge management implementation in airport projects.

Table 1 displays the assessment indicators for all variables in this research.

Table 1. Assessment indicators

Code	Indicators	Ref
ITS1	The organization provides the internet to capture information.	[22]; [24];
ITS2	The organization uses an electronic document management system for easy information sharing.	[15]
ITS3	The organization uses video conferencing software for easy discussion (Gmeet, Zoom, Teams, etc.).	[22]; [24]
HRM1	The organization provides promotion to members for commitment to knowledge management implementation.	[25]; [26]
HRM2	The organization allocates resources to improve members' knowledge.	[25]; [27]
HRM3	The organization develops techniques and mechanisms to maintain members' knowledge.	[18]
HRM4	The Organization mediates to resolve disputes between members.	[28]
HRM5	The organization manages careers based on members' development and achievements.	[16]
KPE1	The organization adopts a knowledge management process model that is easy for members to implement	[29];[18]
KPE2	The organization motivates members to share knowledge both online and offline	[30]; [13]
KPE3	The organization implements knowledge-sharing activities to make faster and better decisions	[19]
KPE4	The organization implements knowledge-sharing activities to improve members' communication skills	
ORC1	The organization encourages collaboration among members to support each other	[11]; [25];[12]
ORC2	The organization conducts regular joint activities to build strong bonds among members	[25];[15]
ORC3	The organization encourages members to share knowledge	[25]; [31]; [32]
ORC4	The organization motivates members to create knowledge and innovation	[33]; [25]
LET1	The organization provides regular training to members to understand their respective roles and duties.	[12]; [14]; [34]
LET2	The organization provides training designed specifically for the application of knowledge management in construction.	[21]; [15]
LET3	The organization provides certification of expertise to members.	[35]
LET4	The organization invests in the training budget as a long-term measure.	[22]; [16]
LSC1	Organizational leaders understand the importance of knowledge management.	[23]; [14]; [15]
LSC2	Organizational leaders motivate members for effective knowledge management.	
LSC3	Organizational leaders become role models in implementing knowledge management.	
LSC4	Organizational leaders build an atmosphere of trust among members.	[22]; [36]
LSC5	Organizational leaders share their knowledge to avoid failure in implementing knowledge management.	[15]
LSC6	Organizational leaders encourage discussion activities in solving problems with members.	[37]

III. METHODOLOGY

A quantitative method was used in this study. Data was gathered through an online survey using Google Forms from 90 participants including both owners and consultants representing the owner in construction execution. The participants must have at least a Diploma 3 in education and five years of experience working on airport projects. The survey utilized a Likert scale ranging from 1 to 5 to evaluate the response of each participant. To establish the correlation between the variables under investigation and validate the proposed hypothesis, an analysis of the data is conducted using the PLS-SEM method with SmartPLS 3.29 software.
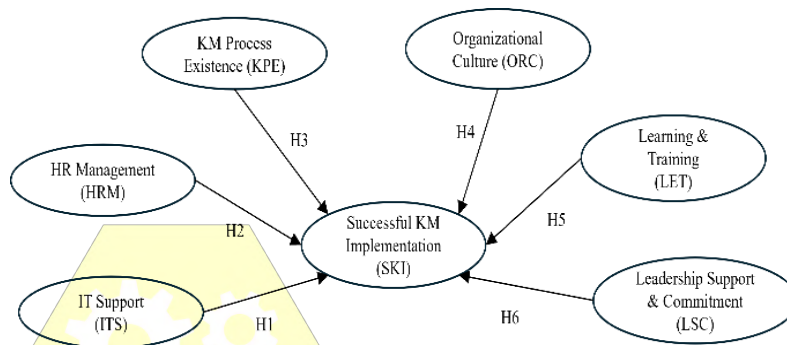

Figure 1. *Research model.*

IV. RESULTS AND DISCUSSIONS

The demographics of all respondents are provided in Table 2. Most respondents are male 69 people, dominated by respondents with 5-10 years of work experience totaling 44 people, while in the category of learning level, most respondents are undergraduates 62 people, and in the category of position, most respondents are engineers totaling 45 respondents.

Table 2. *Demographics of respondents.*

Categories	Sub-Categories	Frequency	%
Role	Owner	81	90
	Consultant	9	10
Job Title	VP/GM/Head of Division	7	8
	Senior Manager	11	12
	Manager/TL	27	30
	Engineer	45	50
Education	Magister (S2)	17	19
	Bachelor (S1)	62	68
	Diploma (D3)	11	12
Experience	> 20 years	9	10
	10 – 20 years	37	41
	5 – 10 years	44	49
Gender	Men	69	77
	Women	21	23

The assessment in this research includes both a structural model (inner model) and a measurement model (outer model) for PLS-SEM, which evaluates the overall performance of both models with the Goodness of Fit (GoF) index value. The primary aim of the outer model evaluation is to determine the results of tests assessing the validity and reliability of the indicator measurements. In Table 3, the PLS-SEM algorithm results display the factor loading value on the research model, indicating that all indicators have a factor loading value greater than 0.7, signifying their ideal status. The research model has achieved convergent validity as the AVE value for all variables is > 0.5. Each variable has a composite reliability score and a Cronbach's Alpha score greater than 0.7, indicating that the research model demonstrates sufficient internal consistency and can be considered reliable.

Table 3. PLS-SEM algorithm result values.

Variable	Indicator	Loading Factor	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
ITS	ITS1	0.773	0.720	0.762	0.840	0.637
	ITS2	0.867				
	ITS3	0.750				
HRM	HRM1	0.717	0.886	0.934	0.915	0.686
	HRM2	0.907				
	HRM3	0.924				
	HRM4	0.779				
	HRM5	0.794				
KPE	KPE1	0.825	0.817	0.913	0.869	0.625
	KPE2	0.824				
	KPE3	0.799				
	KPE4	0.708				
ORC	ORC1	0.724	0.881	0.966	0.914	0.729
	ORC2	0.845				
	ORC3	0.935				
	ORC4	0.895				
LET	LET1	0.872	0.860	0.890	0.904	0.703
	LET2	0.863				
	LET3	0.873				
	LET4	0.737				
LSC	LSC1	0.764	0.917	0.933	0.935	0.707
	LSC2	0.881				
	LSC3	0.855				
	LSC4	0.863				
	LSC5	0.815				
	LSC5	0.861				
SKI	SKI1	0.895	0.766	0.767	0.895	0.810
	SKI2	0.905				

Next, we will evaluate discriminant validity by assessing if an indicator truly differs from other indicators using the Heterotrait-Monotrait (HTMT) ratio test. Each indicator's HTMT ratio value should be less than 0.9 for analysis [38]. The HTMT values were calculated and displayed in Table 4. All indicator variables have HTMT ratio values < 0.9, confirming the validity of discriminant validity assessment for further analysis. The examination of the inner model consists of several stages including measuring collinearity, checking the value and significance of the relationship, and measuring predictive relevance using R square. Table 5 shows the VIF value of the inner model, and it is found that all variable indicators have a VIF value < 3 so it can be concluded that the research model has passed collinearity. Measurement continues using the R square value to measure the predictive power of the research model. There are multiple understandings of the

significance of the R square value range within the inner model. The model's predictive strength ranges from 0 to 0.1 for weak predictive power, from 0.11 to 0.3 for moderate predictive power, from 0.3 to 0.5 for strong predictive power, and above 0.5 for robust predictive power [37]. The adjusted R square value of 0.405 in the SKI relationship model indicates that the level of accuracy or predictive power of the relationship model between HRM, ITS, KPE, LET, LSC, and ORC is strong.

Examining the T value and P value of each relationship reveals the importance of the connection. The significance test indicates a significant relationship between variables when the T value is greater than 1.96 and the P value is less than 0.05, as calculated through the PLS Bootstrapping (5000 samples) in SmartPLS software.

Table 4. HTMT ratio values.

Variables	HRM	ITS	KPE	LET	LSC	ORC	SKI
HRM							
ITS	0.647						
KPE	0.738	0.492					
LET	0.713	0.323	0.509				
LSC	0.584	0.426	0.657	0.558			
ORC	0.697	0.395	0.713	0.625	0.645		
SKI	0.712	0.397	0.459	0.700	0.406	0.521	

Table 5. VIF and R square values.

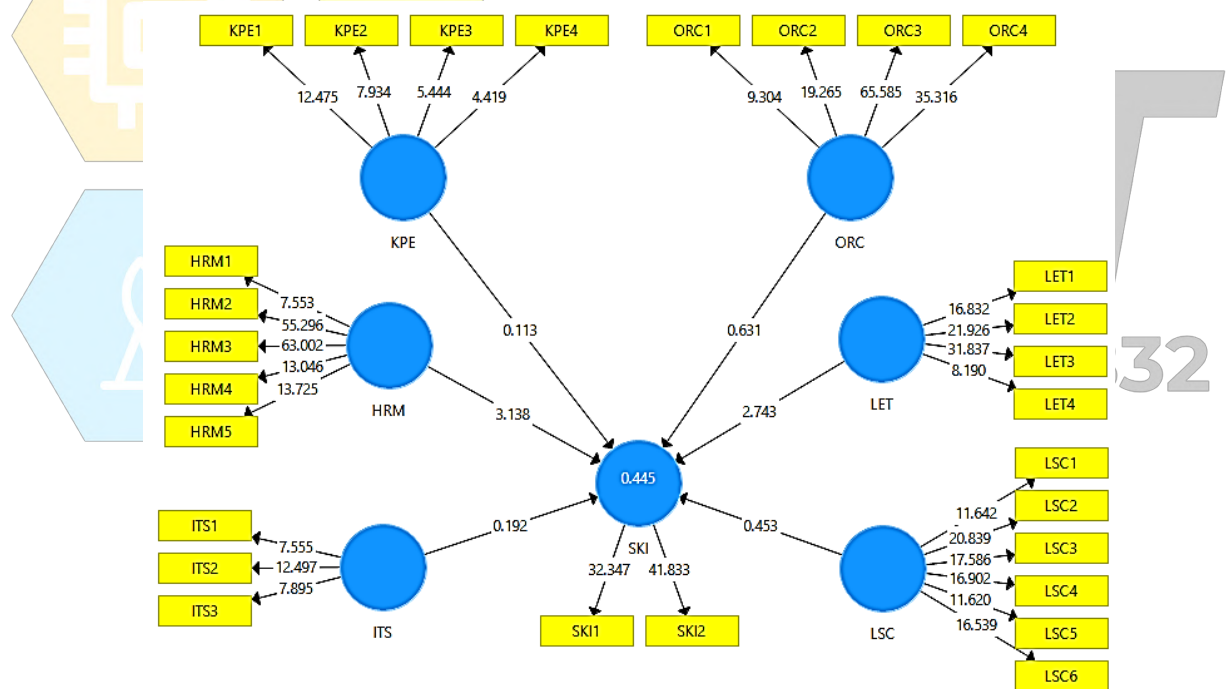| Variables	VIF	R square	R square adjusted
HRM	2.884		
ITS	1.408		
KPE	2.054		
LET	1.944		
LSC	1.819		
ORC	2.234		
SKI		0.445	0.405

Figure 2. Bootstrapping result of the research model.

Table 6. Bootstrapping values.

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Hypothesis Result
HRM → SKI	0.391	0.369	0.125	3.138	0.002	Supported
ITS → SKI	0.018	0.031	0.095	0.192	0.848	Not supported

KPE → SKI	-0.013	0.026	0.111	0.113	0.910	Not supported
LET → SKI	0.326	0.325	0.119	2.743	0.006	Supported
LSC → SKI	-0.059	-0.054	0.131	0.453	0.651	Not supported
ORC → SKI	0.070	0.063	0.112	0.631	0.528	Not supported

Following the assessment of both the outer and inner models, the subsequent measure is to evaluate the overall performance of the combined models using the Goodness of Fit (GoF) index, with thresholds of 0.1 for Small, 0.25 for Moderate, and 0.38 for Large [39]. The manual calculation of the GoF index yielded a result of 0.532, which is greater than 0.38 (considered large), indicating that the research model effectively explains empirical data and has a feasibility level of 53%.

$$GoF = \sqrt{(\ \ x\ )}$$

$$GoF = \sqrt{((\ ) \times (0.405)}$$

$$GoF = \sqrt{(0.700 \times 0.405)}$$

$$GoF = \sqrt{0.175}$$

$$GoF = 0.532$$

The investigation concluded that based on Table 6 HRM and LET are the crucial factors for successful knowledge management implementation in airport construction projects. The T value for HRM is 3.183, which is higher than 1.96, and the P value is 0.002, lower than 0.05. This indicates that HR management positively and significantly impacts the successful knowledge management implementation in airport construction projects, supporting hypothesis H2. Similarly, LET shows a T value of 2.743, which is greater than 1.96, and a P value of 0.006, which is less than 0.05. This indicates that the impact of "learning & training" on the successful implementation of knowledge management in airport construction projects is both positive and significant, leading to the support of hypothesis H5.

Previous studies back up these results, demonstrating that factors related to humans, like HR management, training, and rewards, play a crucial role in the implementation of knowledge management [33]. In line with this concept, the results of the study by Septari and Latief [22] also indicated that participants place a high value on training factors and improving employee performance as learning leads to increased member participation, resulting in fresh insights for the organization. By analyzing these findings, it can be interpreted that currently, HR management in the form of HR needs planning, recruitment, development, and assessment processes have been carried out in the airport development project and this has a significant influence on the successful knowledge management implementation in this organization.

Theory in previous research also states that one of the ways management can achieve effective knowledge management practices is by providing training to its members. Training improves members' skills and knowledge, increasing their ability to meet the demands of their jobs and perform better therefore investing in members' skills will send a positive signal to them that they are the organization's most important asset [40]. So, it can be said that currently learning & training including skills certification, internship programs, benchmarking, and webinars are routinely carried out on airport development projects, and it has a significant influence on the successful knowledge management implementation.

Meanwhile, this study found that other factors including "IT support", "knowledge management process existence", "organizational culture", and "leadership support & commitment" have not a significant effect on the "successful knowledge management implementation" of airport construction projects, then H1, H3, H4, and H6 are not supported.

The "IT support" factor has a T value of 0.192 < 1.96 and a P value of 0.848 > 0.05, which means that it does not have a significant effect on the "successful knowledge management implementation" of airport construction projects. this surprising discovery is consistent with the findings of earlier research conducted by Akhavan et al. [41] who successfully identified knowledge management success factors in

real cases from six major companies and it was found that sixteen main factors can encourage the success of knowledge management systems in companies, but of the sixteen factors, IT support was not found as one of the success factors for implementing knowledge management, so it can be said that it support is not always a success factor.

The next factor that is considered to have no significant effect on the "successful knowledge management implementation" is "knowledge management processes existence" characterized by a T value of 0.113 < 1.96 and a P value of 0.910 > 0.05. This finding contradicts previous research which revealed that people, processes, content/IT, and strategy are the main things to build and develop sustainable knowledge management programs in the construction industry [19]. Nonetheless, knowledge management is on a very basic level almost great administration, collaboration, genuine and legitimate commitment, permitting common sense to run the show, and making an environment where individuals are energized to reflect, share, and learn from each other, whereas particular knowledge management systems, strategies, forms, and apparatuses can be valuable in case the essentials are input, something else their adequacy will be negligible [42].

The results of further assessment found that the "organizational culture" factor has a T value of 0.631 < 1.96 and a P value of 0.528 > 0.05, so it does not have a significant effect on the "successful knowledge management implementation" in airport construction projects. this finding still aligns with the research results of Chang & Lin [43], which reveals that not all organizational cultures significantly impact the knowledge management process. The "strictly controlled" culture has a negative influence. In contrast, the "closed system" and "professional-oriented" cultures do not significantly influence individual intentions to transfer and apply their knowledge to the organization.

The last finding is that the "leadership support & commitment" factor has a T value of 0.453 < 1.96 and a P value of 0.631 > 0.05, which means that it does not have a significant influence on the "successful knowledge management implementation" in airport construction projects. This outcome is consistent with the study's conclusions of Ayu Yawmillisa et al., who found that leadership has no significant effect on the use of knowledge management, as well as other research by KR Muhammad [44], which claims that member

performance, one aspect of which is the member's ability to execute knowledge management, is not much impacted by organizational commitment.

V. CONCLUSIONS

Identifying knowledge management's key success factors can improve organizational performance and the chances of success in implementing knowledge management. This study found that "HR management" and "learning & training" are the key success factors for implementing knowledge management on airport construction projects since they have a positive and significant direct effect. This finding is motivated because organizational performance on airport projects is strongly influenced by human-related factors such as recruitment, training, assessment, and rewards for project members. While "IT support", "knowledge management process existence", "organizational culture" and "leadership support & commitment" have no significant effect in improving the successful implementation of knowledge management in airport construction projects.

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