

## **Success Indicators of Knowledge Transfer for the Transferee on the Construction Joint Venture in Indonesia**

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**Abstract.** Generally, construction joint venture is a joint venture form in the construction sector of developing countries is used a tool of knowledge transfer from the foreign construction companies, or transferor, to the local construction companies, or transferee. For more than two decades, construction joint venture has been implemented, but it has not obtained the clarity of the extent on its success of the transferee. This research aims to explore a set of success indicators of knowledge transfer on the perspective of the transferee in the construction joint venture, as a result of the transferee's involvement in the construction joint venture on the construction sector during the time. By using the method of content analysis and Partial Least Squares in the Indonesian context, this study carries out to obtain a set of valid success indicators of the knowledge transfer for the transferee in usage. The result of the study shows that there are 22 identified valid indicators which can be relied upon to explain the success of knowledge transfer on the perspective of the transferee, as a result of the transferee's involvement in the construction joint venture during the time. The results of the study also answer the gap of the research regarding the scope of knowledge transfer in both the joint venture in the construction sector and the manufacturing sector widely.

**Keywords:** *construction; contractor; joint venture; construction joint venture; Indonesia; joint operation; knowledge transfer*

### **1 Introduction**

Research related to the success of knowledge transfer in the joint venture (intercompany) has emerged since the last few decades. It causes a change of paradigm in respect of the company's competitiveness based on tangible asset switched to intangible assets in over the past decade (Davenport & Prusak [1], Volkov & Granina [2]). It is also supported by studies on organizational learning and knowledge transfer (Kogut [3], Cohen & Levinthal [4], Hamel [5], Doz [6],

Lyles & Salk [7], Lane & Lubatkin [8], Inkpen [9], and Lane et al. [10]) which prove that knowledge is an important factor to strengthen corporate competitiveness. Moreover, the increased market intelligence and high competitiveness on the global market demand a company to improve the capacity of knowledge which is created internally or acquired externally (Oxley & Wada [11]).

The results of the study show that the literary researches concerning the success of knowledge transfer in joint venture are still widely performed in the non-construction sector, such as: manufacturing (Lyles [12], Lane et al. [10], Cummings & Teng [13], Anh et al. [14], Park [15], Cummings & Teng [13], and Oxley & Wada [11]), services (Lane et al. [10], Cummings & Teng [13], Park [15], Xiong & Deng [16], Oxley & Wada [11], and Atalay [17]), agricultures (Oxley & Wada [11]), and trading (Nordtvedt & Perez [18]). In contrary, the researches specifically in the construction sector (Gale & Luo [19], Eliufoo [20], Lihua & Greenwood [21], Dulaimi [22], and Osabutey et al. [23]) are still very limited. The limitations of these researches are not comparable to the rapid growth of the international joint venture in the construction sector as a new economic trend since the end of the 1980s (Park [15]). Moreover, the joint venture is very often used in construction sector in developing countries by the name of construction joint venture, particularly in handling the large-scale projects within the format of BOT, BOO, or BOOT (Chan et al. [24]). Generally, in developing countries, the construction joint venture is utilized as a tool in knowledge transfer from foreign construction companies as the transferor to local construction companies as the transferee. Focusing on the Indonesian context, this study aims to explore the success indicators of knowledge transfer on the perspective of the transferee in the construction joint venture or, popularly called in Indonesia, joint operation (JO).

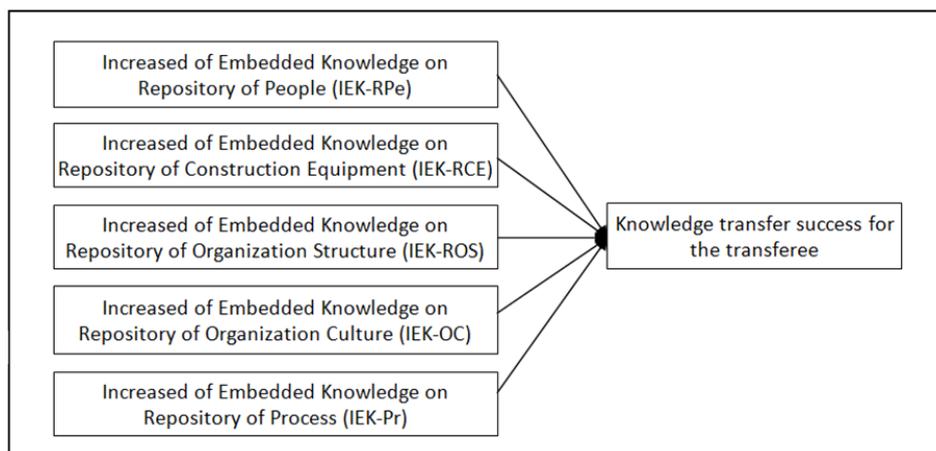
To explore this research, the paper consists of four main sections: first, the conceptual framework; second, the research method, consisting of operationalizing of concept, questionnaire design, validation method, and sampling and data collection; third, the analysis of the collected data; and fourth, the conclusion of research, presenting important findings and offering guidelines for future research areas.

## **2 Conceptual Framework**

Although researchers sometimes give different labels on the terms of knowledge transfer, in this paper, the meaning of the terms is encompassed in the knowledge acquisition, knowledge sharing, knowledge dissemination, and technology transfer. Technology transfer also means the same as knowledge transfer because the research undertaken, which is related to technology transfer in general studies,

is related to technical knowledge, managerial knowledge, administrative knowledge, and marketing knowledge (Simonin [25]), rather than to the transfer of technology in the sense of the physical (hardware) as well as the traditional understanding of the technology.

Chini [26] explains that the aim of knowledge transfer of the recipient units is to integrate the new knowledge in the unit of context and to make use of it. The statement of Chini [26] implicitly explains that knowledge transfer is successful in the transferee (recipient) if the new knowledge is absorbed (integrated) and applied on the transferee's organization. According to Argote & Ingram [27], the success of knowledge transfer is affected by changes of embedded knowledge of the multi-repositories on the transferee. In this study, the terms of the change of embedded knowledge are interpreted as the increased of embedded knowledge. Argote & Ingram [27] define the repository as the locus of embedded knowledge on the transferee (the recipient), while multi-repositories as the people (Oner & Kayguzus [28], and Housel & Bell [29]), system (Oner & Kaygusuz [28]), organization (Oner & Kaygusuz [28]), organization's culture (Walsh & Ungson [30]) and process (Walsh & Ungson [30], Davenport & Prusak [1], Housel & Bell [29], Mertins et al. [31], Nonaka & Takeuchi [32], and King [33]). In the context of this research, the system is interpreted as construction equipment, while the organization is interpreted as the organization structure. Thus, these arguments can be modeled in the form of conceptual framework as shown below.



**Figure 1** Conceptual framework

### 3 Method

#### 3.1 Operationalizing of Concept

Based on the conceptual framework on Figure 1, each dimension (facet) of this concept is further operationalized into a set of indicators. Content analysis method is used for operationalizing the concept. Content analysis is one of the classical approaches used in the research (Holsti [34]). The method is considered effective and has been widely used in social science (Rattleff [35]). Using this method, the indicators are explored by pragmatic and semantic analysis (Krippendorff [36]) from the literary sources. The set of indicators of each dimension comes from the content analysis shown in Table 1.

**Table 1** Indicators of Knowledge Transfer Success

No.	Increased of Embedded Knowledge on Repository of People (IEK-RPe)	Resources
X1	Increased quantity of work in the application of skills	[37]
X2	Reduction energy used in the application of skills	[37]
X3	Decreased time used in the application of skills	[37]
X4	Increased profits as a result of decisions made	[38]
X5	Increased cost efficiency due to the decision made	[38]
X6	Increased in terms of environmental friendliness as a result of decisions made	[38]
X7	Increased relevancy of the results and the predicted result of the decisions made	[38]
X8	Increased satisfaction as a result of decisions made	[38]
X9	Increased accuracy of objectives achieved as a result of decisions made	[39]
X10	Increased speed in decision-making	[39]
No.	Increased of Embedded Knowledge on Repository of Construction Equipment (IEK-RCE)	Resources
Y1	Decreased of the number of waste material in use CE	[27]
Y2	Increased cost effectiveness in the use of CE	[27]
Y3	Decreased of costs in the use of CE	[27]
Y4	Increased quality of results in the use of CE	[27]
Y5	Decreased time in the use of CE	[27]
No.	Increased of Embedded Knowledge on Repository of Organization Structure (IEK-ROS)	Resources
Z1	Increased support for the organizational structure of the missions and goals of the organization	[40]
Z2	Increased support for the organizational structure of the capacity building organization	[41]
Z3	Increased support for the organizational structure of the process of information within the organization	[41]
Z4	Increased support for the organizational structure of the communication process within the organization	[41]
Z5	Increased support for the organizational structure of the collective decision-making process within the organization	[41]
Z6	Decreased costs of coordination within the organization	[41]

**Tabel 1** indicators of Knowledge Transfer Success (continuing)

<b>No.</b>	<b>Increased of Embedded Knowledge on Repository of Organization Structure (IEK-ROS)</b>	<b>Resources</b>
Z7	Increased organizational structure to support strategic change in the organization	[41]
Z8	Decreased complexity within the organization	[42]
<b>No.</b>	<b>Increased of Embedded Knowledge on Repository of Organization Culture (IEK-ROC)</b>	<b>Resources</b>
V1	Employees have the authority, initiative, and ability to manage their job	[43]
V2	There is existence of sense of ownership and responsibility for the organization of workers	[43]
V3	There is existence of mutual cooperative values and sense of shared responsibility in achieving common goals	[43]
V4	The organization relies on team effort to get work done	[43]
V5	The organization continually invests in the development of employee's skills in order to stay competitive and meet on-going business needs	[43]
V6	Members of the organization share a set of values which creates a sense of identity and a clear set of expectations	[43]
V7	Members of the organization are able to reach agreement on critical issues, and also able to reconcile differences when they occur	[43]
V8	Functions and units of the organization are able to work together well to achieve common goals	[43]
V9	The organization is able to create adaptive ways to meet changing needs	[43]
V10	The organization is able to read the business environment, react quickly to current trends, and anticipate future changes	[43]
V11	The organizations understand and be responsive to business relations	[43]
V12	The organization is able to anticipate the future needs of the business relation	[43]
V13	The Strategies and policies of the organization forward are highly adapted to the degree of satisfaction of business relations	[43]
V14	The organization receives, translates, and interprets signals from the environment into opportunities for encouraging innovation, gaining knowledge, and developing capabilities	[43]
V15	The organization receives, translates, and interprets signals from the environment into opportunities for encouraging innovation, gaining knowledge, and developing capabilities	[43]
V16	The existence of clearly defined strategic intent is directed to the purpose of the organization so that every of workers can contribute and "make their mark" in the job	[43]
V17	The existence of a clear set of goals and objectives can be linked to the mission, vision, and strategy, and provide everyone with a clear direction in their work	[43]
<b>No.</b>	<b>Increased of Embedded Knowledge on Repository of Process (IEK-RPr)</b>	<b>Resources</b>
W1	Decreased costs in the process	[44]
W2	Increased quality of the output in the process	[44]
W3	Increased speed in the process	[44]

### 3.2 The Questionnaire

A set of indicators that has been identified through the previous method then will be tested related to the validity in producing the set of the final indicators that valids for the usage. For these purposes, a questionnaire survey is constructed based on the set of indicators as shown in the table above. The questionnaire consists of five groups of questions related to the embedded knowledge on multi-repositories of the transferee, ie: people, construction equipment, organization structure, organization culture, and process. The total of 45 questions is composed of 44 questions for the purposes of validation indicators and a single dependent variable as the criterion for checking the correlation of the concept that is assessed. Each item of the questionnaire is complemented with four lickert scale ratings. The following paragraph is a detailed description of the questionnaire components.

For the dimension (group) of IEK-RPe (increased of embedded knowledge on repository of people), the question is: “after engaging so far in the project organized in the joint venture, we ask for assessing changes on the ability of your personal as well as your colleagues in the company where you work, as a result of that engagement based on a set of indicators of the following ratings. A four-point lickert scale is used here to assess the degree of embedded knowledge: 1 (no increased) through 4 (many increased) for item number X1, and X4 to X10; while for the item number X2 and X3, scale of 1 (no reduction) to 4 (many reductions) are used”.

For the dimension of IEK-RCE (increased of embedded knowledge on repository of construction equipment), the question is: “after engaging so far in the project organized in the joint venture, we ask for assessing changes in the ability of your construction equipment in the company where you work, as a result of that engagement based on a set of indicators of the following ratings. A four-point lickert scale is used here to assess the degree of embedded knowledge: 1 (no increased) through 4 (many increased) for item number Y2 and Y4; while for the item number Y1, Y3, and Y5, scale of 1 (no reduction) to 4 (many reductions) are used”.

For the dimension of IEK-ROS (increased of embedded knowledge on repository of organization structure), the question is: “after engaging so far in the project organized in the joint venture, we ask for assessing changes in the ability of your organizational structural in the company where you work, as a result of that engagement based on a set of indicators of the following ratings. A four-point lickert scale is used here to assess the degree of embedded knowledge: 1 (no

increased) through 4 (many increased) for item number Z1 to Z5 and Z7; while for the item number Z6 and Z8, scale of 1 (no reduction) to 4 (many reductions) are used”.

For the dimension of IEK-ROC (increased of embedded knowledge on repository of organization culture), the question is: “after engaging so far in the project organized in the joint venture, we ask for assessing the changes of the condition of your organizational culture in the company where you work, as a result of that engagement based on a set of indicators of the following ratings. A four-point lickert scale is used here to assess the degree of embedded knowledge: 1 (none at all) through 4 (more than enough) for item number V1 to V14”.

For the dimension of IEK-RPr (increased of embedded knowledge on repository of process), the question is: “after engaging so far in the project organized in the joint venture, we ask for assessing changes in the ability of your process in the company where you work, as a result of that engagement based on a set of indicators of the following ratings. A four-point lickert scale is used here to assess the degree of embedded knowledge: 1 (no reduction) to 4 (many reductions) for item number W1; while for the item number W2 to W4, scale 1 (no increased) through 4 (many increased) are used”.

For the final question, the single question which functions as criterion on this questionnaire is: “based on the experience of your involvement in the construction of joint venture (joint operation) during this time, please grade the degree of knowledge transfer success from the foreign contractor to the national contractor (the place you work now) until today. A four-point lickert scale is used here to assess the question: 1 (unsuccessful), 2 (little successful), 3 (successful enough), and 4 (highly successful).

### **3.3 Validation Method**

Partial Least Square (PLS) as a variety of Structural Equation Modelling (SEM) method is used in the process of data analysis in this study. PLS-SEM is used widely by the researchers for indicating validation of instrument (Whitment [45], Recker [46], and Quaddus & Woodside [47]). A valid indicator has a value outer loading of more than 0.7 with the average variance extracted (AVE) value of more than 0.5 on the convergent validity testing; meanwhile, on the discriminant validity testing, it is suggested that all value outer loading in measured construct intended should greater than in measure another construct (Hair et al. [48]). In addition, the significance of each loading and R-square is also examined in this study.

### 3.4 Sample and Data Collection

The target population to validate the indicators in this study is construction practitioners who have experiences in the joint venture project with foreign companies. The specific respondent of the sample is construction practitioners who had served as a project manager on local contractors in the joint venture project with the foreign company.

The adequacy and readability of the questionnaire are tested using pilot study. Six expert practitioners are involved in this pilot study, and their suggestions are incorporated into final questionnaire. Once the questionnaire is finalized, then, the construction practitioners at local contractor are invited to indicate each item of the questions based on their experiences in joint venture project with the foreign company in Indonesia. Approximately, within three months, the data collection process is finished. About 60 respondents participate in the questionnaire, but only data from 24 respondents are feasible to be analyzed. The demographics data of respondent are shown in Table 2 and Table 3.

*Table 2 Respondent profile*

Respondent Profile								
Based on Age		Based on Sex		Based on Education Level			Based on Institution	
< 40 old	> 40 old	Male	Female	Under Graduate	Graduate	Doctorate Degree	State-Owned Enterprises (BUMN)	Private
3	21	24	0	17	7	0	24	0

*Table 3 Experince in joint venture project*

Based on Company Experinced in JV		Based on Personal Experienced as the P/S Manager in JV Project	
< 5 years	> 5 years	< 5 years	> 5 years
0	24	0	24

## 4 Analysis

Data analysis using software SmartPLS (version 2.0) is conducted to test the validity and significance of the 44 indicators. The data analysis is performed in three stages. In the first stage, the analysis is done by executing the algorithm iteration with SmartPLS to obtain the outer loading of the 44 indicators. The results of the analysis on the first stage are shown in Table 4. In the second stage, based on the outer loadings of each indicator, the convergent and discriminant

validity test are performed on 44 indicators. The SmartPLS algorithm execution continues to be applied on every completed-elimination indicators that has not passed off the validity criteria. In the third stage, re-analysis is carried-out by the SmartPLS algorithm and bootstrapping on the indicators that pass the validity test in the previous stage. This analysis resulted in a set of final outer loading, AVE value and significance of these indicators, and the R-square value. The results of analysis are shown in Table 5.

*Table 4 The first stage of PLS-SEM analysis*

<b>Dimensions</b>	<b>Indicators</b>	<b>Outer Loading</b>	<b>AVE</b>
IEK_RPe	X1	0,727697	0,570404
	X2	0,682323	
	X3	0,798757	
	X4	0,858182	
	X5	0,657134	
	X6	0,762682	
	X7	0,72524	
	X8	0,904064	
	X9	0,831641	
	X10	0,534792	
IEK_RCE	Y1	0,272996	0,538158
	Y2	0,726812	
	Y3	0,841283	
	Y4	0,89212	
	Y5	0,764442	
IEK_ROS	Z1	0,823057	0,359913
	Z2	0,636423	
	Z3	0,451108	
	Z4	0,433004	
	Z5	0,886079	
	Z6	0,485848	
	Z7	0,25604	
	Z8	0,564903	
IEK_ROC	V1	0,082296	0,351542
	V2	0,412767	
	V3	0,241248	

*Table 4 The first stage of PLS -SEM analysis (continuing)*

	V4	0,728152	
	V5	0,763473	
	V6	0,492468	
	V7	0,469259	
	V8	0,694175	
	V9	0,29016	
	V10	0,564363	
	V11	0,74934	
	V12	0,523299	
	V13	0,7198	
	V14	0,751095	
	V15	0,584327	
	V16	0,602181	
	V17	0,81166	
IEK_RPr	W1	0,606623	0,472855
	W2	0,709162	
	W3	0,566378	
	W4	0,836502	

*Table 5 The final results of PLS-SEM analysis*

Dimensions	Indicators	Outer	T-statistic	AVE	R-square
IEK_RPe	X1	0,775067	9,739086	0,671972	0,800306
	X3	0,836927	14,491009		
	X4	0,845754	11,452047		
	X6	0,779027	10,995728		
	X7	0,712137	6,576205		
	X8	0,905955	14,855041		
	X9	0,867498	16,771842		
IEK_RCE	Y2	0,702205	10,470926	0,664235	
	Y3	0,844664	26,223796		
	Y4	0,911193	66,586795		
	Y5	0,787474	21,876462		

*Table 5 The final results of PLS-SEM analysis (continuing)*

IEK_ROS	Z1	0,90393	65,780478	0,822206
	Z5	0,909573	67,996293	
IEK_ROC	V4	0,756804	13,406582	0,57052
	V5	0,814083	34,042546	
	V8	0,759232	19,823239	
	V11	0,702052	11,937192	
	V13	0,717705	11,316573	
	V14	0,706505	14,041294	
	V17	0,821341	24,983064	
IEK_RPr	W2	0,798189	3,498962	0,673394
	W4	0,842427	10,224054	

## 5 Conclusion

Based on the results of the analysis above (Table 5), there are 22 indicators that pass the validity test. They are seven indicators on the dimension of IEK\_RPe, four indicators on the dimension of IEK\_RCE, two indicators on the dimension of IEK\_ROS, seven indicators on the dimension of IEK\_ROC, and two indicators on the dimension of IEK\_RPr.

The analysis also shows that the indicator X8 (increased satisfaction as a result of decisions made) with a score of 0.905955 implies that the indicator has the greatest ability to explain the construction of (dimension) IEK\_RPe (increased of embedded knowledge on the repository of people). The indicator Y4 (increased quality of results in the use of construction equipment) with a score 0,911193 implies that the indicator has the greatest ability to explain the construction of (dimension) IEK\_RCE (increased of embedded knowledge on the repository of construction equipment). The indicator Z5 (increased support for the organizational structure of the collective the decision-making process within the organization) with a score 0,909573 implies that the indicator has the greatest ability to explain the construction of (dimension) IEK\_ROS (increased of embedded knowledge on the repository of organization structure). The indicator V17 (existence a clear set of goals and objectives can be linked to the mission, vision, and strategy, and provide everyone with a clear direction in their work) with a score 0,821341 implies that the indicator has the greatest ability to explain the construction of (dimension) IEK\_ROC (increased of embedded knowledge on the repository of organization culture). The indicator W4 (increased profits to the process used) with a score 0,842427 implies that the indicator has the greatest

ability to explain the construction of (dimension) IEK\_RPr (increased of embedded knowledge on the repository of process).

Table 5 also shows that the whole construction (dimensions) has AVE value of more than 0.5 and it is meaningful that the overall indicator is eligible convergent validity. R-square value of 0.800306 (more than 0.75) means that the overall indicator is substantial (Hair et al., 2014). it also means that the overall indicator is able to explain 80% of the concept of knowledge transfer success from the perspective of the transferee in the construction joint venture (joint operation) in Indonesia. AVE values and R-square also supports the validity of the twenty-two indicators mentioned above.

Further research can be carried out on a national consulting service company which carries on the business as transferee with a foreign consulting service company as transferor in the context of the construction joint venture in Indonesia. The concept and methodology of in this study can be used as a reference to elaborate further research. The authors are aware that the indicators produced in this research are still subjective. Therefore, further research can be carried out to develop the objective indicators based on the subjective indicators of this study for a better set of indicators.

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