



Effect of Tacit and Explicit Knowledge Sharing on Teacher Innovation Capability

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Education 4.0, Explicit Knowledge; Knowledge Management; Organizational Learning; Tacit Knowledge; Teacher Innovation Capability

Abstract

This research aimed to measure the effect of tacit and explicit knowledge sharing on teacher innovation capability mediated by organizational learning. Data collection was done by simple random sampling via electronic to the teacher population in Indonesia. The returned and valid questionnaire results were 781 samples. Data processing used SEM method with SmartPLS 3.0 software. The results of this research showed that explicit knowledge sharing had a positive and significant effect on teacher innovation capability, both directly and through organizational learning mediation, while tacit knowledge sharing had a positive and significant effect on teacher innovation capability through organizational learning mediation. Novelty research was proposing a model for building teacher innovation capability through tacit and explicit knowledge sharing with organizational learning as mediation. This research can pave the way to improve teacher readiness in facing the era of education 4.0.

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INTRODUCTION

The new challenge that is currently affecting education is the dramatic change that has come from industrial revolution 4.0. This industrial revolution requires quality human resources that are more qualified, agile, adaptive and responsive to rapid change. The world of education is facing rapid economic, social, political and technological change. Therefore, schools must be flexible to be able to adapt to changing situations and contexts. Schools and other educational institutions need an environment that continues to grow positively and is conducive in global human resource competition. Therefore, it cannot be denied that schools need synergy between teachers and the work environment that is able to make continuous improvements in innovation and performance. The point is that in this era of economy knowledge, societies need innovation and flexibility as energy to survive competition. Therefore, the strategic development of educational institutions in the future is to increase knowledge resources, especially teachers, which open space for innovation and growth.

To ensure that educational institutions, especially schools can be competitive and adaptive, teachers need to be directed and involved in developing school performance. Teachers must be empowered. As a result, schools must transform into real organizational learning. Organizational learning that empowers teachers as one of the main elements of school transformation, as well as teachers as instruments of civilization. The form of schools as organizational learning is very important for educational institutions that operate in environments with rapid and unexpected changes, so that the speed of response to change becomes an absolute requirement to create human resources, students who are competitive and win global HR competition.

The knowledge of individual teachers and schools becomes intellectual capital which quickly becomes a new icon that illustrates the economic value of a school. This is the new

paradigm adapted from industrial revolution 4.0. Dependence on traditional productive assets such as buildings, land and other tangible assets will no longer be a major contribution to future investments. Productive and sustainable assets in the future are intangible assets in the form of knowledge inherent in the teacher. This research seeks to understand the effect of the learning process and knowledge sharing (tacit and explicit knowledge) of teachers in Indonesia that are associated with increasing teacher innovation capability.

Knowledge is classified into two types including: tacit knowledge and explicit knowledge (Polanyi, 1966). The definition of tacit knowledge is knowledge that is still in the human mind and is very personal (Chen et al, 2018; Holford, 2018; Khoshorour & Gilani, 2018; Zebal, Ferdous & Chambers, 2019; Agyemang & Boateng, 2019; Perez-Fuillerat et al, 2018), it is difficult to be formulated and divided naturally (Deranek, McLeod & Schmidt, 2017; Wang & Liu, 2019; Asher & Popper, 2019) so that the transformation requires personal interaction (Lee, 2019). This tactical knowledge is rooted in one's actions and experiences, including his idealism, values, and emotions (Boske & Osanloo, 2015; Kawamura, 2016; Hartley, 2018).

Based on its understanding, tacit knowledge is categorized as personal knowledge or in other words knowledge obtained from individuals (Nonaka & Toyama, 2015; Munoz et al, 2015; Stewart et al, 2017; Razmerita et al, 2016; Jaleel & Verghis, 2015; Wang et al., 2016; Serna et al., 2017; Jou et al., 2016; Rothberg & Erickson, 2017). The experience gained by each teacher certainly varies based on situations and conditions that cannot be predicted. Tacit knowledge is not easily articulated and converted to explicit knowledge (Mohajan, 2016; Prasarnphanich et al, 2016; Addis, 2016; Cairo Battistutti, 2017; Zang et al, 2015; Spraggon & Bodolica, 2017). Nevertheless, tacit knowledge can be empowered by SECI Model (Li, Liu & Zhou, 2018; Nonaka & Hirose, 2018; Chatterjee et al, 2018; Sasaki, 2017; Lievre & Tang, 2015; Stanica & Peyd-

ro, 2016 ; Norwich et al., 2016; Hodgins & Dadich, 2017; Balde et al., 2018; Okuyama, 2017; Huang et al., 2016).

Every school education institution must utilize the teacher's tacit knowledge by encouraging sharing knowledge and keeping learning. School educational institutions like this will become more creative, innovative and lead in the era of education 4.0. Schools can facilitate the management and use of tacit knowledge that is outside the awareness stored in the subconscious mind of each teacher with an embedding and sharing approach (Ma et al, 2018; Ferreira et al, 2018; Borges et al, 2019; Ferraris et al, 2018; Guo et al, 2018; Tsai & Hsu, 2019; Swierczek, 2019; Cantwell & Zaman, 2018).

Explicit knowledge is one type of knowledge that is easily documented and formed (Choi & Lee, 2003; Sousa & Rocha, 2019; Borrego et al, 2019; Wokcik et al, 2019; Cifariello, Ferragina & Ponza, 2019; Che et al, 2018; Tang et al, 2016; Bashir & Farooq, 2019; Attia & Salama, 2018), easily articulated (Haamann & Basten, 2018) and usually knowledge inherent in schools (Afsar, Masood & Umrani, 2019). In addition, explicit knowledge can be created, written and transferred between school activity units (Lombardi, 2019). The explicit transfer of knowledge among teachers is more easily driven by conducive school mechanisms and culture.

Good organizational learning will be more resilient to crises (Starbuck, 2017). Dimensions such as desire, discipline, decision making, and alignment are presented as important elements of organizational learning (Wetzel & Tint, 2019; Urban & Gaffurini, 2018). Organizational learning is also an important performance indicator for evaluating overall organizational performance (Qi & Chau, 2018) which is able to build the necessary knowledge resources and maintain school growth and continuity. The ability to access knowledge is a distinguishing factor between one school and another. The success of the strategy of school education institutions is very significant related to the solid knowledge

base that is owned by every individual of the school education institution.

Industrial era 4.0 currently requires teacher innovation capability as a competitive advantage in schools (Malik, 2019; Muscio & Ciffolili, 2019; Durana et al, 2019; Lund & Karlsen, 2019; Haseeb et al, 2019; Jakhar et al, 2018; Hamada, 2019; 2019), competitive strategy (Culot, Orzes & Sartor, 2019), is the key to face industry era 4.0 (Stachova et al, 2019) part of the quality of 21st century management (Gunasekaran, Sabramanian & Ngai, 2019), has many advantages business (Zambon et al, 2019; Parida, Sjodin & Reim, 2019). Innovation capability is recognized as one of the most important internal resources that can produce superior school educational institution performance (Zouaghi et al, 2018; Santoro et al, 2017; Castela et al, 2018; Ruiz-Torres et al, 2018; Huesig & Endres , 2019). Innovation is an important aspect of quality education (Klaeijsen, Vermeulen, & Martens, 2017).

In the current industry era 4.0, it is marked by increasingly fierce competition; sustainability remains an important concern and issue. Teacher innovation capability is driver of business sustainability. This performance depends on the culture of knowledge contained in the organization. Knowledge consists of tacit and explicit knowledge. Many researchers discuss teacher innovation capability which concludes that innovation is affected by leadership (Samsir, 2018; Schuckert et al, 2018; Villaluz & Hechanova, 2019), employee involvement climate (Naqshbandi, Tabche & Choudhary, 2019) knowledge sharing (Kim & Shim, 2018) knowledge search (Wang, Chen & Chang, 2019) collaborative culture (Yang, Nguyen & Le, 2018) and knowledge process (Imran et al, 2018). This research examined the effect of tacit and explicit knowledge on teacher innovation capability in school education institutions in the context of welcoming industrial revolution 4.0. Previous researchers have proven the positive and significant effect of tacit and explicit knowledge on teacher innovation capability (Ganguly et al, 2019; Au-

lawi, 2018; Rumanti et al, 2018 & 2019; Torres & Liang, 2016; Li et al, 2019). More specifically, many researchers concluded that tacit knowledge had a positive and significant effect on teacher innovation capability (Perez-Luno et al, 2018). All of them are within the scope of business organizations. However, there are researchers who said that formal & informal learning affected teacher innovation capability of teachers in schools (Lecat, Beusaert, & Raemdonck, 2018).

Learning organization is one of the strategies for organizations to research the dynamics of their business environment (Senge, 1990; Zhu et al., 2018; Kasim et al., 2018; Darwish et al., 2018). Schools with managed learning routines will produce a collection of knowledgeable individuals, both explicit knowledge and tacit knowledge (Hussain et al, 2018). Some researchers concluded that organizational learning was affected by collaborative culture and knowledge sharing (Nugroho, 2018). Tacit knowledge was found to be a very significant predictor for the development of organizational learning (Muthueloo, Shanmugam & Teoh, 2017).

Knowledge creation conditioned by organizational learning will trigger and spur teacher innovation capability and organizational performance (Asbari, Purwanto & Santoso, 2019; Vijande & Sanchez, 2017; Lin & Lee, 2017). School innovation will be sustainable when it is based on a culture of learning that gives value-added. This learning culture makes all teachers interact with each other so that their current knowledge and new knowledge acquired can be effectively transferred, exchanged and combined into school intelligence and knowledge (Lin & Lee, 2017; Lee et al, 2016; Chang & Lin, 2015). An organizational environment that provides excitement at work is an important factor in creating teacher innovation capability of organizational members (Bani-Melhem, Zeffane & Albaity, 2018).

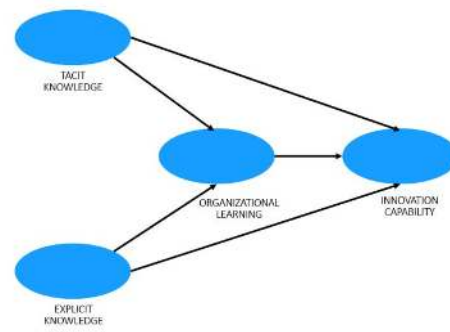


Figure 1. *Research Model*

Source: Primary Processed Data (2019)

METHODS

The method used in this research is quantitative method. Data was collected by distributing questionnaires electronically with simple random sampling technique to all teachers of school education institutions in Indonesia as the research population. The population is not surely counted. The results of the returned questionnaires were 825 and valid were 781 samples.

The instrument used to measure explicit knowledge sharing was adapted from Liebowitz & Chen (2001) and Wang & Wang (2012). Tacit knowledge sharing was adapted from Holste & Fields (2010), Lin (2006), and Wang & Wang (2012). Organizational learning was measured from instruments adapted from Jiménez-Jiménez and Sanz-Valle (2011). Teacher innovation capability was adapted from Lee & Choi (2003). The questionnaire was designed “closed-questionnaire” except for questions / statements about the identity of respondents in the form of a semi-open questionnaire. Each closed question / statement item is given five answer options, namely: Strongly Agree (SA) score 5, Agree (A) score 4, Less Agree (LA) score 3, Disagree (D) score 2, and Strongly Disagree (SD) score 1. The method for processing data was by PLS and using SmartPLS software version 3.0 as a tool.

RESULT AND DISCUSSION

Descriptive Analysis

From the incoming and valid sample data, it was concluded that the teachers who filled out the most questionnaires were 30-40 years (52.75%), and the largest span of teaching work period was 5-10 years (56.21%) and \geq bachelor degree was 90.65%. The table of the summary description of the analysis can be seen in Table 1.

Table 1. Summary of Descriptive Analysis

Criteria		Total	%
Age (per October 2019)	< 30 years	170	21.77%
	30 - 40 years	412	52.75%
	> 40 years	199	25.48%
Teacher Status	Public (Civil Servant)	334	42.77%
	Private	447	57.23%
Working period as a teacher	< 5 years	167	21.38%
	5-10 years	439	56.21%
	> 10 years	175	22.41%
Education	< Bachelor Degree	73	9.35%
	\geq Bachelor Degree	708	90.65%

Source: Primary Processed Data (2019)

Validity and Reliability Testing

The testing phases of the measurement model include testing convergent validity, discriminant validity and construct reliability. The results of the PLS analysis can be used to test the research hypothesis if all the indicators in the PLS model have met the requirements of convergent validity, discriminant validity and reliability testing.

Convergent Validity

Convergent validity test was done by looking at the loading factor value of each indicator to the construct. For most references, a factor weight of 0.5 or more is considered to have validation that is strong enough to explain latent constructs (Chin, 1998; Hair et al, 2010; Ghazali, 2014). In this research the minimum limit of the size of the loading factor received was 0.5, with the requirement that the AVE value of each construct > 0.5 (Ghozali, 2014).

Based on the estimation results of the PLS model in the Figure 2, all indicators already had a loading factor value above 0.5 so that the model met the convergent validity requirements. In addition to looking at the loading factor value of each indicator, convergent validity was also assessed from the AVE value of each construct. AVE value for each contract of this research was above 0.5., so the convergent validity of this research model met the requirements. The value of loadings,

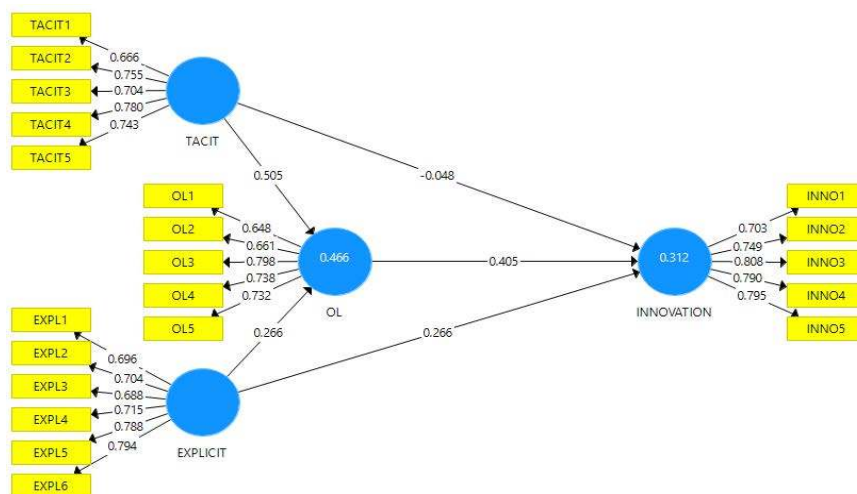


Figure 2. Valid model estimation

Source: Primary Processed Data (2019)

cronbach's alpha, composite reliability and AVE for each construct can be seen in Table 2.

Discriminant Validity

Discriminant validity was done to ensure that each concept of each latent variable was different from the other latent variables. The model has good discriminant validity if the AVE squared value of each exogenous construct (the value on the diagonal) exceeds the correlation between the construct and the

other construct (values below the diagonal) (Ghozali, 2014). The results of discriminant validity testing using AVE squared values, namely by looking at the Fornell-Larcker Criterion Value were obtained in the Table 3.

The results of the discriminant validity test in Table 3 showed that all constructs had AVE square root values above the correlation value with other latent constructs (through the Fornell-Larcker criteria) so that it can be concluded that the model met the discriminant

Table 2. Items Loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE)

Variables	Items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Tacit Knowledge (TACIT)	TACIT1	0.666	0.781	0.851	0.534
	TACIT2	0.755			
	TACIT3	0.704			
	TACIT4	0.780			
	TACIT5	0.743			
Explicit Knowledge (EXPLICIT)	EXPL1	0.696	0.828	0.874	0.536
	EXPL2	0.704			
	EXPL3	0.688			
	EXPL4	0.715			
	EXPL5	0.788			
	EXPL6	0.794			
Organizational learning (OL)	OL1	0.648	0.761	0.840	0.515
	OL2	0.661			
	OL3	0.798			
	OL4	0.738			
	OL5	0.732			
Teacher innovation capability (INNOVATION)	INNO1	0.703	0.827	0.879	0.593
	INNO2	0.749			
	INNO3	0.808			
	INNO4	0.790			
	INNO5	0.795			

Source: Primary Processed Data (2019)

validity.

Table 3. Discriminant Validity

Variables	Ex- plicit	Innova- tion	OL	Tacit
Explicit	0.732			
Innova- tion	0.455	0.770		
OL	0.528	0.514	0.717	
Tacit	0.519	0.350	0.643	0.731

Source: Primary Processed Data (2019)

Construct Reliability

Construct reliability can be assessed from the value of Cronbach's alpha and composite reliability of each construct. The recommended composite reliability and Cronbach's alpha values are more than 0.7. (Ghozali, 2014). The reliability test results in table 2 above showed that all constructs had composite reliability and Cronbach's alpha values greater than 0.7 (> 0.7). In conclusion, all constructs met the required reliability.

Hypothesis Testing

Hypothesis testing in PLS is also called the inner model test. This test includes a test of the significance of direct and indirect effects and measurement of the magnitude of the effect of exogenous variables on endogenous variables. To determine the effect of tacit and explicit knowledge sharing on organizational learning and teacher innovation capability, it took a direct effect test. The direct effect test was performed by using the statistic t-test in the partial least squared (PLS) analysis model using the help of SmartPLS 3.0 software. With the bootstrapping technique, R Square values and significance test values were obtained as in Table 4.

Based on Table 4, the R Square OL value was 0.466 which means that organizational learning (OL) can be explained by the tacit knowledge (TACIT) and explicit knowledge (EXPLICIT) variables by 46.6%, while

the remaining 53.4% was explained by other variables not discussed in this research. Meanwhile, the value of R Square of teacher innovation capability (INNOVATION) was 0.312, which means that the teacher innovation capability variable was able to explain the knowledge, explicit knowledge and organizational learning variables by 31.2%, while the remaining 68.8% was explained by other variables not discussed in this research. While Table 5 displays the T-Statistics and P-Values which showed the effect between the research variables that had been mentioned.

Table 4. R Square Value

	R Square	R Square Adjusted
Innovation	0.312	0.310
OL	0.466	0.464

Source: Primary Processed Data (2019)

Based on the results of the research, it can be concluded that explicit knowledge sharing had a positive and significant effect on teacher innovation capability both directly and through organizational learning mediation. So, hypothesis 1 was accepted. This means that the more positive explicit knowledge sharing is carried out by the teacher, the more conducive the teacher innovation capability of the individual teacher of the school education institution will be. This finding is in line with previous research on business organizations, namely Perez-Luno et al (2018), Terhorst et al (2018), Boadu et al (2018), Che et al (2019). In contrast to explicit knowledge sharing, tacit knowledge sharing had no significant effect on teacher innovation capability (hypothesis 2 was rejected), except through mediating organizational learning. That is, organizational learning became a full mediation between tacit knowledge sharing and teacher innovation capability.

The results of this research also concluded that tacit and explicit knowledge sharing had a positive and significant effect on organizational learning (hypotheses 3 and 4 were

Table 5. Hypotheses Testing

Hypotheses	Relationship	Beta	SE	T Statistics	V-Values	Decision
H1	EXPLICIT -> INNOVATION	0.266	0.041	6.469	0.000	Supported
H2	TACIT -> INNOVATION	-0.048	0.046	1.046	0.296	Not Supported
H3	EXPLICIT -> OL	0.266	0.033	8.001	0.000	Supported
H4	TACIT -> OL	0.505	0.031	16.411	0.000	Supported
H5	OL -> INNOVATION	0.405	0.040	10.109	0.000	Supported
H6	EXPLICIT -> OL -> INNOVATION	0.108	0.018	5.939	0.000	Supported
H7	TACIT -> OL -> INNOVATION	0.205	0.024	8.675	0.000	Supported

Source: Primary Processed Data (2019)

accepted). This means that the better the tacit and explicit knowledge sharing of a teacher, the more positive the formation and development of organizational learning in school education institutions. This is in line with the conclusions of Qi & Chau (2018) research on business organizations. This implies that the rarest and most valuable resources in the digital age are not ordinary teachers and mediocre, but teachers who can create new ideas and innovations (Xu, David & Kim, 2018). Teachers play a key role in producing and reusing their knowledge and intellectual property through education and teaching (Al-Kurdi, El-Haddadeh & Eldabi, 2018). Likewise, knowledge management will run effectively in school education institutions if each teacher's individual performance is in good condition (Manaf et al, 2017). For this reason, the scarcity of teachers who have adequate and skilled tacit and explicit knowledge can stifle the power of innovation, competitiveness, growth and flexibility of school education institutions. No doubt, in the future, the talents and responses of school teachers in the process of knowledge sharing will represent an important factor for the nation's future education. School teachers

with ideas and innovations will become capital luxury goods and instruments of civilization.

Based on the findings of this research also concluded that organizational learning had a positive and significant effect on teacher innovation capability (hypothesis 5 was accepted). Organizational learning also mediated the effect of tacit and explicit knowledge on teacher innovation capability (hypothesis 6 and 7 were accepted). This is consistent with the conclusion of Martinez-Costa (2018). The research also concluded that school education institutions could manage past experiences to be combined with tacit and explicit knowledge possessed by teachers today. Learning process which is a school culture can encourage innovation (Asbari, Santoso & Purwanto, 2019). In essence, team learning behavior created in the school environment will be a driving force for teacher innovation (Widmann & Mulder, 2018). So that in turn, organizational learning is able to provide positive conditions in the process of knowledge creation whereas knowledge creation and knowledge management are closely related to school performance in the current education era 4.0.

CONCLUSION

To add the role of tacit knowledge as a predictor of teacher innovation capability, schools need to provide autonomy and breadth to share knowledge with teachers. Therefore, schools need to create organizational learning as positive environment that drives the competence and engagement of individual teachers in school education institutions.

Researchers continue to learn about knowledge as an important school resource. It can be said that knowledge sharing, both tacit and explicit knowledge, can significantly improve school performance. Organizational learning transforms individual knowledge into school knowledge. This research concluded that organizational learning acted as a catalyst of the process of knowledge sharing among teachers in schools. This knowledge sharing culture becomes crucial in the midst of the development of the current knowledge society because in fact, the teachers carry the obligation to prepare their students to learn and work in today's knowledge society.

Based on the conclusion of this research, the management of school education institutions needs to build maximum involvement of all teachers to conduct knowledge sharing both in the form of tacit knowledge and explicit knowledge. The SECI model can be used to carry out this process. Teacher training in each section of the school is a necessity with the level of intensity, content and context tailored to the key performance indicators of each teacher.

The process of sharing knowledge to build teacher innovation capability of school education institutions should not only be limited to the internal processes of the school. However, school management needs to expand the process of building this innovation through efforts to absorb, articulate, utilize and manage knowledge sourced from external school partners such as students' parents, governments, communities, and other educational institutions. School management can activate learning from others when assigning

their teachers to attend training, seminars, workshops, visits to other schools, meet with school committees and other strategic partners because external knowledge, such as those from trainers, coaches, parents of students, the government, the community, and other educational institutions supports the power of teacher innovation capability in school education institutions.

In addition, commitment to learning and seriousness to be involved in managing the learning environment is a thing that needs attention because school education institutions can become organizational learning when all members of the school educational institutions feel that they enjoy the learning process. The key factors of organizational learning are trust, open communication, high involvement, the presence of industry challenges, and a creative work atmosphere. The task of school management is to facilitate the fulfillment of these key factors.

This research has several limitations. First, this research analyzes the effect of tacit and explicit knowledge on teacher innovation capability of teachers, both directly and indirectly through variable organizational learning because there may be several other variables that affect teacher innovation capability, the authors strongly recommend finding, exploring and analyzing them. Secondly, this research is conducted in a school educational institution environment and may not be generalized to other industries. Therefore it is highly recommended that further research be carried out on this topic in other industries.

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