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KNOWLEDGE MANAGEMENT DEVELOPMENT TO INCREASE RESEARCH PRODUCTIVITY IN HIGHER EDUCATION

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Abstract

This study aims to identify the effect of the Knowledge Management process on research productivity in higher education. This research uses mixed methods with a sequential explanatory design. The analysis was carried out in two stages, the first stage was quantitative analysis using multiple regression analysis. The research participants were 112 lecturers who worked in several private higher education institutions in Indonesia. The second stage is a quantitative analysis using a triangulation approach and focus group discussion (FGD). The results of the study show that Knowledge Management processes have a significant positive effect on research productivity. Where from the three components of the Knowledge Management process studied, namely knowledge acquisition, sharing, and utilization, all of them were identified as having been able to make a clear contribution to the intended target. In addition, it was revealed that facilitating access to knowledge, support for research budgets, routine agendas of sharing knowledge, and cross-disciplinary collaboration are the main factors driving research productivity.

Keywords: Knowledge Management, Mixed Methods, Sequential Explanatory, Research Productivity

1. INTRODUCTION

The very rapid development in the field of information and communication technology has changed the life of the global community. The impact of its development, on the one hand, has led to the loss of jobs in several sectors, but on the other hand has created a need for new jobs (M. Li et al., 2018). Therefore, the success story of an entity in the past cannot guarantee the success of that entity in the future. One of the key success factors to able to survive in a dynamic environment is the ability to innovate (Acosta-Prado, 2020). Higher education as one of the centers for the development of science and technology is expected to be the main driver in the creation of innovation (Visvizi et al., 2018). Efforts to produce innovation in higher education are carried out through the development of research activities (Lassnigg et al., 2017).

Based on the measurement results of the Global Innovation Index (GII) published by Cornell University together with several other world organizations in 2021, Indonesia is ranked 87 out of 132 countries in the world. Based on this data, Indonesia is ranked 14th out of 17 countries in Southeast Asia, East Asia, and Oceania, where one of the indicators that get a low score is research. This data certainly provides an impetus for higher education in Indonesia to be able to develop research activities to increase the nation's competitiveness. In addition, research productivity is also one of the main indicators to describe the quality of higher education management (Aithal & Kumar, 2016; Kwiek, 2018).

Several studies have been conducted to identify efforts to increase research productivity in higher education, including: testing the effect of mentoring programs on research ability (Muschallik & Pull, 2016); explain the influence of individual and academic factors on research

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productivity (Albert et al., 2016); evaluate the impact of incentives on the number of publications and the proportion of widely cited papers (Larivière & Costas, 2016); analyze the relationship between various types of collaboration with research productivity (Abramo et al., 2017); explore individual and institutional factors that contribute to research productivity, and compare the impact of these factors on different disciplines (Jalal, 2020); explore the impact of knowledge sharing on research productivity (Aulawi, 2021).

Various efforts can be made to increase research productivity, one of which is through KM development. Currently, KM is considered an important process to be developed in the world of education (Kasemsap, 2015), considering that knowledge is a core competency to maintain an organization's competitive advantage and the task of higher education is to conduct research to create and disseminate knowledge (Hu et al., 2019). The growing interest in KM development in higher education is motivated by the thought that KM will encourage higher education to be able to process knowledge creation to produce quality products/solutions for the community. This is considered important considering that one of the benefits of KM is to strengthen the learning process within the organization which in turn has implications for the creation of new knowledge (Abualoush et al., 2018).

Some researchers have explained the influence of KM on organizational performance, namely: integrating KM and innovation management to encourage knowledge-sharing activities and organizational knowledge value chains (M. C. Lee, 2016); analyzing the impact of KM practices on green innovation and the company's sustainable development (Abbas & Sağsan, 2019); identify the role of KM processes and intellectual capital in mediating the influence of KM infrastructure on organizational performance (Abualoush et al., 2018); measuring the influence of KM and entrepreneurial orientation on organizational performance (Hanif et al., 2018); designing how to develop KM strategies to encourage intellectual capital to produce innovation and superior market performance (Cabrilo & Dahms, 2018).

Besides that, some researchers conduct KM studies in higher education, namely identifying the driving factors and obstacles to the implementation of KM in higher education (Ramjeawon & Rowley, 2017), explaining the impact of the KM process on the performance of higher education organizations (Sahibzada et al., 2020).

Based on the results of the author's search of previous studies, it can be seen that there have been many studies that have examined the influence of KM on organizational performance, but those that have examined the impact of KM on research productivity are relatively limited. Therefore, based on the description that has been submitted, this study aims to identify the effect of KM on research productivity in higher education. The results of the study are expected to have implications for efforts to improve the quality of higher education in the face of the dynamics of global competition.

The contribution of this research is to produce an explanation of the development of the KM process that is focused on increasing research productivity in higher education which has implications for efforts to improve the quality of university management so that they can face global competition. The analysis in this study is divided into two stages. The first stage is

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quantitative analysis through a statistical approach sourced from questionnaire data and Scopus. The second stage is a qualitative analysis using data sourced from document studies, interviews, and FGDs.

2. LITERATURE REVIEW

2.1. Knowledge Management

Knowledge Management (KM) is defined as coordination that is carried out intentionally and systematically within an organization which includes the interaction of individuals, technology, processes, and organizational structures to increase added value through the use of knowledge assets and innovation (Manab & Aziz, 2019). KM can help organizations acquire, interpret and use all available knowledge resources to create new knowledge (Hussinki et al., 2017). KM is a process where various activities are formed to carry out the important elements of an organization's knowledge management strategy and operations, the goal is to encourage employees to share knowledge (Koohang et al., 2017).

Researchers' perspectives on the KM process vary depending on their respective perceptions and scientific disciplines. For example, the KM process includes knowledge acquisition, conversion, application, and protection (Tseng & Lee, 2014); identification, creation and acquisition, storage and retrieval, dissemination, and application (Kurniawati et al., 2016); acquisition, sharing, and utilization (Obeidat et al., 2016); acquisitions, sharing, and utilization (Alaarj et al., 2016); creation, accumulation, sharing, utilization, and internalization (Koohang et al., 2017); acquisition, documentation, transfer, and application (Sivakumar, 2018). Overall, the KM process is a systematic effort starting from acquisition to utilization by utilizing a variety of knowledge sourced from internal and external to the organization. For this study, these processes will be mentioned as knowledge acquisition, sharing, and utilization.

2.2. Research Productivity

Measurement of research productivity is not an easy problem because it requires comprehensive measurements, not only measuring the quantity aspect but also having to consider the quality aspect (Aulawi, 2021). Research productivity is a component of research performance, which in previous studies mostly focused on the output produced per researcher (Daraio, 2019).

Research productivity can be measured based on the number of published articles, the number of participants in proceedings in scientific forums, the number of intellectual property rights, and the number of patents (Darmalaksana, 2017). In the context of research organizations, bibliometrics have become accustomed to defining research productivity as the number of publications per researcher, distinguishing it from impact, which is measured by citations (Abramo & D'Angelo, 2014). Several other researchers use H-index scores as the basis for measuring research productivity, the size of which is based on the number of indexed papers and the number of citations from all papers (Fauzi et al., 2019; Morales et al., 2017). This study measures research productivity using H-index scores.

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3. RESEARCH MODEL AND HYPOTHESES

3.1. Research Model

The research model is presented in Figure.1. The research model was developed based on the preceding literature. In this study, the independent variable is the KM process, which is described as knowledge acquisition, knowledge sharing, and knowledge utilization. Next, we place research productivity as the dependent variable.

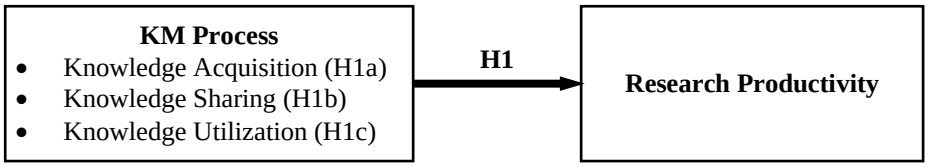

Figure 1: Research Model

3.2. Hypotheses

Several research results have found that the KM process has a significant effect on organizational performance (Abbas & Sağsan, 2019; Abualoush et al., 2018; Cabrilo & Dahms, 2018). In addition, the application of KM has proven to be an effective way to intensify collaboration and improve research performance in universities (Ceballos et al., 2017). By adapting the results of these studies, in this study, it is assumed that:

H1: KM process positively and significantly contributes to research productivity.

Knowledge acquisition is a process to increase the knowledge stock of the organization. These can be done by hiring new personnel, buying/renting from other organizations, and establishing a research and development unit (Obeidat et al., 2016). The process of acquiring knowledge sourced from internal and external organizations (Alaarj et al., 2016). The results of previous studies show that knowledge acquisition has a positive effect on innovation performance (Papa et al., 2018). In higher education, the manifestation of innovation is research productivity (Y.-H. Lee, 2020). By adapting the results of these studies, in this study, it is assumed that:

H1a: Knowledge acquisition positively and significantly contributes to research productivity.

Knowledge sharing is a knowledge exchange process carried out by individuals or organizations to create new ones (Q. Li & Kang, 2019). Knowledge sharing can be defined as a voluntary interaction between people within the organization or between organizations, including the exchange of ideas, experiences, expert insights, documents, and reports (Aulawi, 2018). Employees must share and apply knowledge in practice to develop the organization's sustainability and competitiveness (Ahmad & Karim, 2019). Previous research has emphasized the benefits of knowledge sharing in the form of increasing innovation, and improving organizational performance (Abdelwhab Ali et al., 2019; Castaneda & Cuellar, 2020; Rumanti et al., 2019; Singh et al., 2021). On the other hand, there are also previous research results that show that knowledge sharing affects research productivity (Aulawi, 2021; Dhillon et al., 2015; Fauzi et al., 2019). Based on the results of these studies, in this study, it is assumed that:

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H1b: Knowledge sharing positively and significantly contributes to research productivity.

Knowledge utilization aims to adopt the best practices from other parties, find knowledge to solve problems, and then apply them (Zaim et al., 2018). The findings of previous studies show that knowledge utilization has a significant effect on organizational performance (Alaarj et al., 2016; Obeidat et al., 2016). By adapting the results of these studies, in this study it is assumed that:

H1c: Knowledge utilization positively and significantly contributes to research productivity.

4. METHODS

The method used in this research is mix method using a sequential explanatory design. This research design combines quantitative and qualitative analysis to complete the study (Creswell, 2014). The first stage is to conduct a quantitative analysis sourced from the questionnaire data and Scopus. Data analysis using multiple regression. Research respondents are lecturers at several private higher education in Indonesia. The number of respondents is 112 people with teaching experience in higher education ranging from 4-20 years.

The second stage is qualitative analysis, the aim is to obtain a more in-depth explanation of the results of testing quantitative analysis. Sources of data used are document studies, interviews, and FGDs. Document analysis focuses on reports relevant to KM implementation and research performance. Interviews were conducted with six people, representing senior and junior lecturers. Furthermore, the FGD involved six people who represented the managers of the research institutes from the research institutions. The purpose of these activities is to obtain an explanation of the implementation of KM and its implications for research productivity at the institution under study.

In this study, knowledge acquisition has been measured by seven questions, which is the result of the adaptation of the research (Obeidat et al., 2016; Sivakumar, 2018). Measurement of knowledge sharing uses five questions adapted from (Aulawi, 2021; Fauzi et al., 2019). Measurement of knowledge utilization uses four questions adapted from (Obeidat et al., 2016; Zaim et al., 2018).

Furthermore, research productivity is measured based on the H-Index score. The indicators are the number of indexed papers and the number of citations for the entire paper. The H-Index score for all respondents was obtained through a search based on the name of each respondent in Scopus. Scopus was chosen because it can provide a reliable H-Index score, has been widely accepted, and has been used in previous studies to measure research productivity in higher education. (Morales et al., 2017).

Measurement of knowledge acquisition, knowledge sharing, and knowledge utilization use a semantic scale of 1-7 (strongly disagree-strongly agree). Meanwhile, the measurement of research productivity uses a ratio scale. Therefore, so that the scale used is the same, the data from the research productivity items are converted to a frequency distribution using the Sturgess formula. (Hidayati et al., 2019).

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5. RESULT AND DISCUSSION

5.1. Quantitative Analysis

5.1.1. Validity and Reliability

Validity testing aims to assess whether the instrument can measure accurately represent the construct (Hair, 2010). Table 1 presents the results of testing the validity of the measurement items for a total sample of 112. The result is that all items are declared valid because they have a Pearson Correlation Value > r table (0.184), or a sig. < 0.05.

Item	Pearson Correlation	Sig. (2-tailed)
a1	.903**	.000
a2	.844**	.000
a3	.756**	.000
a4	.511**	.000
a5	.596**	.000
a6	.637**	.000
a7	.619**	.000
s1	.586**	.000
s2	.646**	.000
s3	.592**	.000
s4	.612**	.000
s5	.543**	.000
u1	.578**	.000
u2	.567**	.000
u3	.607**	.000
u4	.691**	.000
r1	.586**	.000
r2	.543**	.000
**. Correlation is significant at the 0.01 level (2-tailed).		

Table 1: Validity Test

A reliability test is used to determine the consistency of the measuring instrument, to assess whether the instrument used is reliable, and remains consistent if repeated measurements are made (Hair, 2010). Table 2 presents the results of reliability testing using Cronbach's Alfa with a significance level of 5%. The result is that the instrument is considered reliable because it has a Cronbach's Alpha value > 0.

Cronbach's Alpha	N of Items
.975	18

Table 2: Reliability Test

5.1.2. Classic Assumption Test

The classical assumption test in this study used the residual normality test, heteroscedasticity test, and autocorrelation test. In Table 3, the results of the residual normality test are presented.

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The results show that Sig. > 0.05, so it can be stated that the standard residual value is normally distributed.

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for H1	.290	112	.000	.791	112	.142
a. Lilliefors Significance Correction						

Table 3: Residual Normality Test

In Table 4, the results of the heteroscedasticity test are presented, the results show that Sig > 0.05, so it can be stated that there is no heteroscedasticity symptom in the regression model.

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.160	1.063		3.915	.000		
	H1a	-.183	.103	-.524	-1.788	.077	.096	10.410
	H1b	-.014	.128	-.033	-.110	.913	.094	10.674
	H1c	.245	.207	.271	1.185	.239	.157	6.359
a. Dependent Variable: Abs_RES								

Table 4: Heteroscedasticity Test

In Table 5, the results of the autocorrelation test are presented, the results show that the Durbin Watson value is 2,292 > du and < from 4-du, so it is stated that there are no problems or symptoms of autocorrelation.

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. The error of the Estimate	Durbin-Watson
1	.988[a]	.976	.976	1.51119	2.292
a. Predictors: (Constant), H1c, H1a, H1b					
b. Dependent Variable: H1 Durbin Watson table values dl = 1,65568 dan du 1,70982					

Table 5: Autocorrelation Test

5.1.3. Hypothesis testing

Hypothesis testing in this study uses multiple linear analysis. In Table 6, the results of the H1 test are presented, the results show that the F value > F table value, which is 1486.934 > 2.46, so it can be concluded that the KM process positively and significantly contributes to research productivity.

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ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10187.137	3	3395.712	1486.934	.000b
	Residual	246.640	108	2.284		
	Total	10433.777	111			
a. Dependent Variable: H1						
b. Predictors: (Constant), H1c, H1a, H1b						

Table 6: F-test

In Table 7, the results of the H1a, H1b, and H1c tests are presented using the T-test, the results show that for each test the t count > t table and all of them have sig < 0.05. Therefore, it is concluded that all hypotheses have a positive and significant effect.

Coefficients[a]							
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Label
		B	Std. Error	Beta			
1	(Constant)	5.355	1.685		3.177	.002	
	H1a	1.572	.163	.461	9.660	.000	Significant
	H1b	1.823	.203	.433	8.962	.000	Significant
	H1c	1.011	.329	.115	3.078	.003	Significant
a. Dependent Variable: H1							
$t_{0,05}$ (98) = 1,98447							

Table 7: T-test

5.2. Qualitative Analysis

The purpose of this study was to identify the effect of the KM process (knowledge acquisition, knowledge sharing, and knowledge utilization) on research productivity in higher education. The results show that the KM process is proven to positively and significantly contribute to research productivity. This result is in line with (Ceballos et al., 2017) who found that KM contributes to the improvement of scientific quantity and quality through collaborative development. The process of internal and external collaboration has encouraged the growth of joint research and research publication networks. The resulting synergies in turn have implications for an increase in the number of publications and the rate of citations. In addition, the results of this study strengthen (Iqbal et al., 2018) who found that an effective KM process can lead to improved university performance.

Furthermore, the results of the H1a test show that knowledge acquisition has a significant positive effect on research productivity. These results support research (Obeidat et al., 2016) who found that continuous gathering of information and knowledge from internal and external, contributed to the improvement of organizational innovation. The development of knowledge acquisition can encourage knowledge creation (Sivakumar, 2018), which in turn will enhance research capabilities. The interview results provide information that the institution has provided the sources of knowledge needed for scientific development. This knowledge can be accessed easily and quickly because it is structured in a structured manner, and presented in digital and hardcopy forms. The provision of such knowledge includes the form of library room facilities,

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e-library, and access to online journals. The availability of this knowledge in turn makes it easier for lecturers to obtain the references needed to conduct research.

On the other hand, based on the results of document studies and FGDs, several institutions have provided adequate budgetary support to support the participation of lecturers in scientific forums, training programs, and professional associations. The budget support is seen as contributing to the research ability of researchers.

Furthermore, the results of the H1b test show that knowledge sharing has a significant positive effect on research productivity. These results support research (Aulawi, 2021) who found that the existence of expertise groups and routine knowledge-sharing agendas boosted the ability of lecturers to conduct research.

The interview results provide information that the activity of sharing experiences and expertise from senior lecturers to junior lecturers which is held regularly can improve the ability of juniors to express ideas in the form of research. These results are relevant to (Morales et al., 2017) who found that mentoring from senior to junior researchers proved to help improve the skills of juniors in conducting research. On the other hand, (Muschallik & Pull, 2016) stated that formal assistance from seniors was proven to positively affect research productivity.

In addition, the results of the interviews also inform that the provision of research incentives, either in the form of a research fund stimulant or in the form of financial rewards for publication results, has proven effective in encouraging lecturers' interest in conducting research. The results are in line with (Larivière & Costas, 2016) who states that incentives have a significant effect on the number of publications and the proportion of widely cited papers.

On the other hand, the results of the FGD provide information that the development of research culture is not an easy matter, it takes perseverance from organizational managers to develop it. One of the efforts that have proven effective is to make regular discussion agendas, whether held internally or by inviting research experts from outside the organization. Furthermore, the results of the document study provide information that the knowledge sharing agenda which is held regularly in collaboration with external partners, especially international partners, is considered very helpful in improving the quality of research publications. This collaboration is manifested in the form of organizing seminars, proceedings, and joint research. These results support (Albert et al., 2016) who found that international cooperation was one of the most favorable determinants of the number of academic publications.

Furthermore, the results of the H1c test show that knowledge utilization has a significant positive effect on research productivity. These results are in line with research (Alaarj et al., 2016; Koohang et al., 2017) which shows that knowledge utilization enhances organizational performance.

The results of the interviews provide information that collaboration between personnel with different scientific backgrounds has been able to increase productivity and the scope of benefits from research results. These results support (Liang et al., 2018) that convey collaboration across disciplines has the potential to produce scientific development that is more useful, and

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in line with (Igbinovia, 2017) who found that cross-disciplinary collaboration was proven to be able to increase contributions to solving various problems faced by the wider community.

6. CONCLUSION

The results showed that the KM process had a significant positive effect on research productivity. Further findings, facilitation of access to knowledge, support for research budgets, routine agendas of sharing knowledge, and cross-disciplinary collaboration are the main factors driving research productivity.

In general, the application of KM can be viewed from the KM process and infrastructure knowledge. To produce a more comprehensive picture of implementation, it is recommended that further research be conducted on empirical studies to test the influence of infrastructure knowledge on research productivity.

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