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Knowledge Management Foundation and Solutions Implementation in Indonesian Government Higher Educational Institution

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Abstract

The performance of XYZ, a Government Higher Educational Institution (GHEI) in Indonesia is assessed through two unintegrated applications. The 2023 target performance was missed due to miscalculations outside applications while transforming large data amounts. Thus, business intelligence (BI) serves as a knowledge management (KM) tool to integrate those applications to achieve XYZ's target. Because BI is costly and 70% failure rate of development plans, a research model was evaluated to look at current XYZ innovation capability for successful BI adoption from the KM foundation and KM solutions implementation. This study used a quantitative method, employing a questionnaire for 94 civil servants and the partial least squares-structural equation model (PLS-SEM) for data analysis. Results indicate in the KM foundation, organizational (O) negatively influences KM process application (KMP) (β = -0.292, Pv = 0.010) while KM infrastructure (I) and process (P) positively influence KMP, but KM technology (T) does not. In KM solutions, KMP is proven linked to innovation capability when KM systems are lacking. Hence, several activities are suggested to activate T through T, O, P, and I. The model validated 80% of the hypotheses, laying the groundwork for future studies into which aspects of T strengthen innovation capabilities in GHEI.

Keywords: *business intelligence; foundation; government higher educational institution; knowledge management; partial least squares-structural equation model; solutions*

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1. Introduction

Performance allowances are paid to civil servants according to a monthly percentage of their performance assessments that will be multiplied by their last grade allowances. The performance assessments consider two aspects: work productivity and work discipline [1]. XYZ is a government higher educational institution (GHEI) in Indonesia that assesses the performance of its civil servants using two applications, which are the work productivity application (application A) and the work discipline application (application B).

Application A is used to measure performance based on job analysis and workload analysis instruments, which determine 50% of the performance allowance, focusing on the aspect of work productivity. Application B is used to measure performance based on attendance at the start and end of the workday, it forms the foundation for the computation of 50% of the performance allowance for work discipline. These two applications work in a siloed way because no integration yet among them, which would allow the calculation of the performance assessment percentages for all civil servants to be done within the system [2]. In addition, the result of that calculation is aggregated to obtain the performance assessment percentage of XYZ [3].

The processing of A and B data at XYZ is managed by 3 administrators in the Personnel Affairs Coordinator. The first person processes the data from A, the second person processes the data from B, and the third person compiles the final data by integrating the previous two data in Microsoft Excel. The responsible officer would utilize the final data as a guide to create a report that included analysis and visualizations of performance assessment percentage data. The report would be sent to

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top-level management within 7 working days of the following month. Then, all the monthly performance percentages over the year are averaged to obtain the annual performance assessment percentage of XYZ [4].

The Personnel Affairs Coordinator data in 2023, shown in Figure 1, indicates the highest monthly performance assessment percentage achieved was 97.97% in December, and the annual performance assessment percentage was 96.62%. Those results then generate an issue, which is despite the use of the two applications, the percentage of monthly and yearly performance assessments in 2023 remains below the target of 100% [5], if this incident is repeated in subsequent years, it could negatively impact XYZ's budget performance evaluation, potentially resulting in legal sanctions, financial and non-financial to XYZ [6].

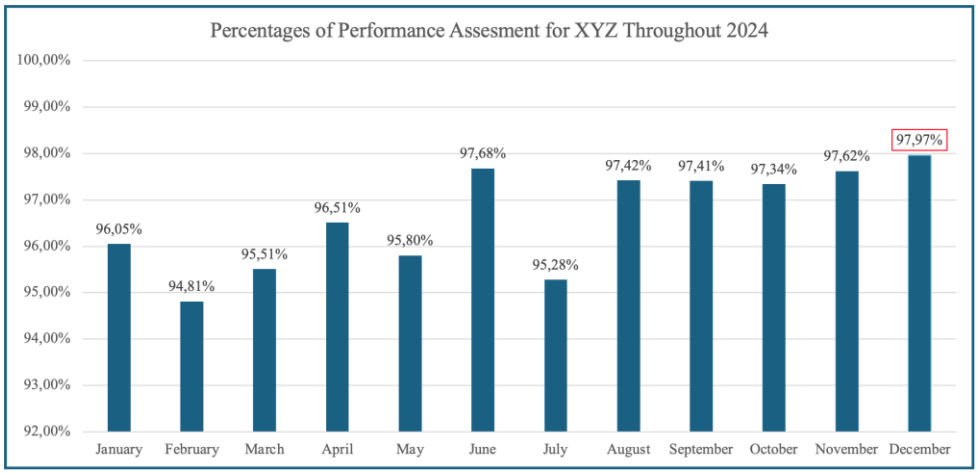

Figure 1. Percentages of Performance Assessment for XYZ Throughout 2023

An interview with 3 administrators was conducted to find the root causes of why the performance assessment percentages of XYZ were below the target. Based on the result of the interview, 3 potential areas that should be scrutinized are technologies, mechanisms, and infrastructure which come from components of the knowledge management (KM) foundation [7]. Additionally, 3 previous studies relevant to the KM foundation were analyzed to look at how each area was treated.

The technologies inspect the need for integration between A and B. The administrators found some cases where the position decrees for a civil servant in A and B were different. That causes the last grade allowance from work productivity and work discipline dissimilar and generates miscalculation of the performance assessment percentage. This becomes the key issue since A and B are unintegrated. A previous study by Zhao in 2020 utilized a statistical package for the social sciences (SPSS) and found that technologies have a positive effect on KM competence and innovation strategy. Also, the innovation strategy is favorably connected to the capacity for knowledge integration [8].

The mechanisms in XYZ encompass organization and process [7]. This reflects the employee rotation policy, notably for the 3 administrators, which may pose an issue because their full knowledge is tacit. Furthermore, the lack of a knowledge transfer allocation time forces the hands-on learning approach by 3 administrators while processing data. A previous study by Zia et al. (2023) worked with their model using the partial least squares-structural equation model (PLS-SEM) method and concluded the process of tacit knowledge sharing is a more appealing method of improving innovation capability which enhances organizational performance compared to tacit knowledge acquisition and tacit knowledge application [9].

The infrastructure stems from the organizational culture and the organizational structure. The organizational culture captures the propensity of all civil servants in XYZ to employ A and B in recording work productivity and work discipline on schedule. The administrators found some cases where a civil servant forgot to enter the performance assessment data into A and B because some fill-in points were the same, they just complied either on A or B. The organizational structure shows how the top-down organizational hierarchy in XYZ and reporting creation outside the system in XYZ influence the flow of data and information. The administrators experienced delays in providing final data due to waiting for revisions that had to be approved by leaders who were out of town. A conceptual model of KM by Smaradhani et al. (2023) evaluated with PLS-SEM, showed that KM enablers such as infrastructure (the organizational culture and the organizational structure) influenced KM process application to create innovation that is supported by technology and knowledge in achieving organizational performance [10].

Once the foundation of KM is ready to be observed, it is essential to capture and transform the tacit knowledge possessed by 3 administrators into a system. This aligned with the findings of Jalil et al. (2023) who proposed a preliminary insight into the knowledge retention strategy for a faculty [11]. This study enriches that previous study by expanding preliminary insight into innovation capability from KM foundation and KM

solutions [8]-[10] in an institution. That is consistent with a paper by Lam et al. (2021) who indicated that the ability to innovate was highly associated with the application of KM [12].

Given that analysis and visualization of performance assessment percentage data must be reported to top-level management monthly, business intelligence (BI) is a beneficial KM tool that could be applied as a KM solution to address the issue [13]. That enables the organization to process large amounts of data from the daily accumulation of civil servants in XYZ, extract information, and transform it into knowledge for decision-making [14].

Due to the high cost of BI adoption and the fact that more than 70% of development plans fail to produce the desired outcomes [15], the objective of this study is to evaluate the current XYZ innovation capability for successful BI adoption from the KM foundation and KM solutions implementation to achieve XYZ target performance. This makes a unique contribution since the innovation capability is added to KM solutions because XYZ has no KM systems yet. That is sketched in a model using KM technologies, organizational, process, and KM infrastructure (TOPI) [8]-[10] as the KM foundation and KM process application to innovation capability as the KM solutions [12], [13].

To achieve its objective, this study is guided by two research questions (RQ). The first research question (RQ1) investigates which part of TOPI can operate as the enabler of KM process application. The second research question (RQ2) examines whether any causal relationship between KM process application and innovation capability.

This study is conducted through 4 sections. The first section is the introduction, which provides background, objectives, and research questions. The second section is research methods that cover all the important ideas and terminology that support this study. The study findings are presented in the results and reviewed in the discussions, which is the third section. Finally, the fourth section contains the conclusion of this study, including limitations, future work, and implications.

2. Research Methods

The research methods for this study refer to an overview of the KM foundation and solutions that are shown in Figure 2. KM foundation includes KM technology, KM infrastructure, and KM mechanisms that support KM solutions consist of KM processes and KM systems. Yet, there is an adjustment to the KM mechanisms used for this study which focuses on organization and process [7] that aligned with interview results.

2.1 KM Technologies

The information technologies that facilitate the way knowledge is managed refer to technologies in KM. Thus, the technologies are fundamentally the same as the KM technologies. The distinction is that KM technologies focus on the KM rather than processing information. KM technologies directly assist KM systems while indirectly supporting the KM process [7].

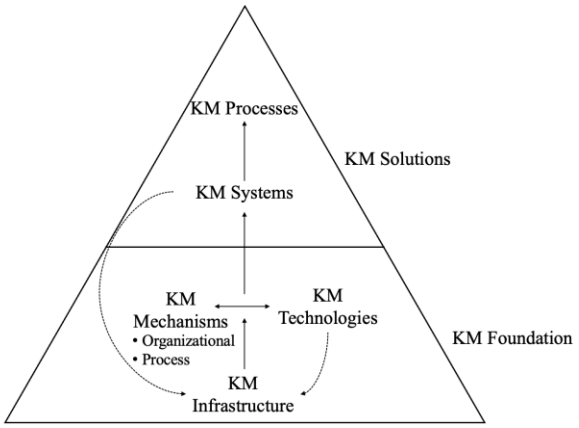

Figure 2. KM Foundation and KM Solutions

In terms of BI adoption, it is essential to have a technological architecture that is adaptable, scalable, and customer-driven to prevent failures while also maintaining data quality and integrity in the generated information. System quality, information quality, and user satisfaction constitute the three main criterion categories that define and support the technical viewpoint of technology [16].

This study leverages technologies as one of the enablers for the KM process application to elevate the innovation capability to adopt BI. The technologies area focuses on the advancement and trend prediction of technology, the utilization of technology, system security, system reliability, and user satisfaction.

2.2 KM Mechanisms - Organizational

Organizational is involved in KM mechanisms to facilitate KM so that individuals and groups within an organization identify, acquire, create, store, share, and use knowledge [7]. Those actions may be used to capture an individual's tacit knowledge and store it in a repository so that everyone can resort to it when encountering the same situation. That considered being necessary for an organization's preconditions for a successful KM plan to boost innovation capability.[12].

Leadership support, the willingness to collaborate for either individual or coordinator, regulation, and individual capability are the parts of the organization that can raise the likelihood that BI will be effectively adopted. Hence, to optimize the potential benefits of BI and achieve the desired results, higher education institutions (HEI) must ensure that they are adequately prepared to handle its deployment. [16].

2.3 KM Mechanisms - Process

The process in KM mechanisms consists of experiential learning and observation. Continuous KM mechanisms involve collaborative projects across coordinators, conventional hierarchical structures, and organizational

policies [7]. The process captures tacit knowledge that can be a great advantage for businesses. Tacit knowledge is the ability to think, perceive, and form ideas based on circumstances. The process talks about how tacit knowledge sharing, tacit knowledge acquisition, and tacit knowledge application connect to KM process application to bring innovation and organizational success [9].

The process for this study will be focused on tacit knowledge sharing. This is because the current process of learning by doing is done by the 3 administrators to process and compile the data from A and B. Tacit knowledge sharing is about sharing the relevant knowledge with coworkers to drive creativity at the individual, team, and corporate levels. This study uses process as the factor that inspects some indicators like how knowledge can be obtained, shared, and utilized. [7].

2.4 KM Infrastructure

The long-term basis of KM is apparent in the KM infrastructure. Organizational culture, organizational structure, information technology (IT) infrastructure, common knowledge, and physical environment are the main elements that prop up KM infrastructure within an organization [7].

All or some of the KM infrastructure elements can be implemented to analyze how KM infrastructure affects organizational performance. The elements like the organizational structure and the organizational culture are proven to affect the KM process for developing an innovation like BI in increasing the performance of the organization [10]. Hence, this study used those two elements to become the indicators for the KM infrastructure.

2.5 KM Processes: Application

KM processes can be depicted by 4 kinds of knowledge which are knowledge application, knowledge sharing, knowledge capture, and knowledge discovery systems. KM process application utilizes two processes which are direction and routines. Direction refers to the method by which the knowledgeable person commands the behavior of another person without imparting the information that underlies the direction to that person. Routines entail applying the information ingrained in protocols, laws, and standards to direct conduct in the future [7].

Because there are no KM systems yet in XYZ, this study focuses on KM process application that is seen from the direction where the civil servants are commanded to input A and B as well as routines that integrate tacit knowledge from the 3 administrators in procedures or technology. Additionally, KM process application elevates the performance organization using knowledge inside it through evaluation of the innovation capability of adopting an application [12].

2.6 Innovation Capability

Innovation capability is the innovative and unique performance of a process that enhances its efficacy, efficiency, and impact. Organizations may gradually rely on the knowledge provided personally to find new solutions to problems and establish more creative organizational processes [7].

Innovation is critical for the organization to survive and grow in the current competitive business world. KM improves the dynamic capabilities of an organization which include actions such as strategic thinking and generating products that offer solutions for changing contexts [12]. The instance of a product generated by KM is BI which becomes a vital instrument since the set of coordinated actions of research, treatment, and dissemination of information may assist support the organization's competitiveness [13]. Consequently, this study assesses the innovation capability of XYZ before the adoption of BI. It is analyzed from the plan of improvement, bureaucracy within the organization, and the organizational performance report creation.

2.7 Proposed Research Model

The proposed research model for this study is depicted in Figure 3. The suggested research model captures two fundamental components of KM which are foundation and solutions. This model is mirrored in the KM foundation and solutions shown in Figure 2.

The proposed research model in Figure 3 generates 5 hypotheses. Four hypotheses explain the causal relationship between 4 components in KM foundation (TOPI) with 1 component in KM solutions (KM process application). One hypothesis explains the causal relationship between 2 components in KM solutions which are KM process application and innovation capability.

The causal relationship between KM technologies and KM process application has been evaluated and showed a positive effect not least [8]. Refers to that, hypothesis 1 (H1) is made as follows: KM technologies influence the KM process application.

The causal relationship between organizational and the KM process application was evaluated and showed a significant association among them [12]. Hypothesis 2 (H2) was generated based on that result as follows: organizational influences the KM process application.

The causal relationship between the process and the KM process application has been evaluated, resulting in the finding that tacit knowledge sharing is a more appealing method in the process under KM mechanisms [9]. Hypothesis 3 (H3) was then generated based on that as follows: process influences the KM process application.

A causal connection between KM infrastructure and KM process application was evaluated, revealing that KM infrastructure (the organizational structure and the organizational culture) significantly impacts the KM

process application [10]. Based on that, hypothesis 4 (H4) is formulated as follows: KM infrastructure influences the KM process application.

An analysis of the causal link between KM process application and innovation capability revealed a substantial correlation, indicating that the capacity for innovation depends extensively on the proper implementation of the KM process application [12]. Therefore, hypothesis 5 (H5) is followed as follows: KM process application influences the innovation capability.

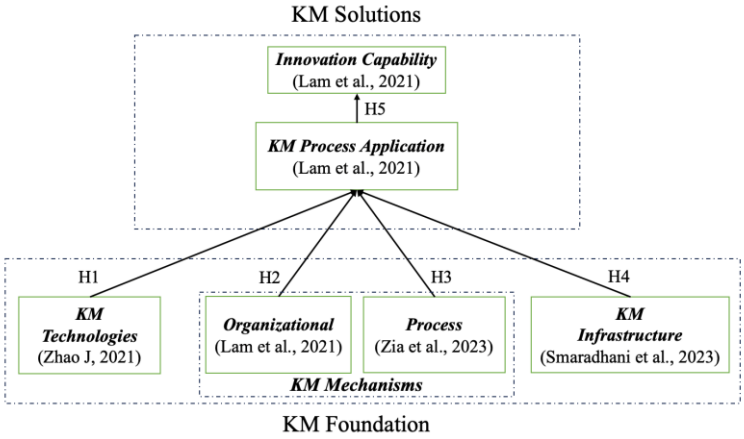

Figure 3. Proposed Research Model

2.8 Data Collection

This study utilized a quantitative method. Quantitative tries to address reasonable problems that occur while examining study factors. The primary objective is to obtain explanations and forecasts that may be applied to other individuals, events, and locations. The procedure begins by outlining the problem and contains specific hypotheses based on the study objectives. Survey research like questionnaires is a methodological tool that researchers might use to analyze the relationship between the factors specified in the proposed research model [17].

A questionnaire was made and then validated by the supervisor to be deployed to the respondents. The intended respondents in this study included 117 civil servants in XYZ who have ever used A and B. They come from leadership roles, 13 affairs coordinators consisting of general section, and functional units like academics, linguists, and IT [18]. They were officially given access to fill in the online questionnaire. Since some of the intended participants of this study were in leadership roles, it would be difficult to obtain the desired sample size of 117 people. Hence, the minimum sample was calculated following the standard rule by Slovin as shown in Equation 1.

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

Since the number of the population of civil servants in XYZ is 117, the N in the formula is 117, as N represents the population. A margin of error (e) of 5% was used because it is representative enough to describe the population as a whole [19]. The result of the calculation from the formula suggests that the minimum required sample size (n) is 90.52, which is rounded up to 91 respondents.

2.9 Data Analysis

Two of 3 previous studies [9], [10] used PLS-SEM to analyze their defined reflective models. PLS-SEM is a part of the structural equation modeling (SEM) family with an emphasis on variance analysis. This technique has the advantage of not making assumptions about data distribution. The algorithm of PLS-SEM possibly estimates models at small samples and generates findings with high levels of statistical power [20]. These backgrounds cause PLS-SEM to be used in this study.

Two models are processed for data analysis: the outer and inner models. The outer model has indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. The inner model includes a statistically significant path coefficient (β), effect size (f^2), and explained variance (R^2). The (β) denotes the linkages between constructs that vary from -1 to +1 (close to 0 reflects weaker links) and its statistical significance is determined by a p-value (Pv) less than 0.050. The f^2 explains the impact level of the exogenous construct on the endogenous construct. The R^2 investigates the combined influence of the exogenous constructs on their endogenous construct [20].

In terms of indicator reliability, the factor loading of each indicator should be more than 0.708, if not it would be discarded. To guarantee internal consistency, reliability measurements like Cronbach's alpha, rho_A, and composite reliability (CR) must be greater than 0.800. Convergent validity is evaluated by the average variance extracted (AVE) with a threshold of ≥ 0.500 [20], [21]. Discriminant validity can be assessed by using the Fornell and Larcker criteria or the Heterotrait-Monotrait Ratio (HTMT) to look at the degree to which a construct differs from others. The common variance of all constructs should not exceed their own AVE on

the Fornell and Larcker. When the factor loadings on constructs change little or in the range of 0.65 to 0.85, the HTMT can replace the Fornell and Larcker criteria with a threshold value equal to 0.85 or 0.90 [22].

Following the data collection, the process of data analysis includes examining the 5 hypotheses and evaluating the theoretical fit of the data using the PLS-SEM. Before this, the data obtained from the Likert-scale survey were processed using Microsoft Excel. The PLS-SEM method then was applied using the SMART PLS 4 application, the latest version of SMART PLS instead of SPSS which works worse on PLS-SEM [23].

3. Results and Discussions

3.1 Results of the Questionnaire

The questionnaire is made up of two parts which are demographic and questionnaire constructs [12]. Table 1 shows the demographic characteristics of 94 people who participated in the survey. The data to be utilized is sufficient because that number met the Slovin formula's minimum necessary sample size of 91. Table 2 shows how the questions are constructed.

Table 1. Demographic characteristic

Items	Description	Sample	Percentage
Age Groups	< 26 years	49	52%
	26-45 years	33	35%
	46-65 years	11	12%
	> 65 years	1	1%
Gender	Male	51	54%
	Female	43	46%
Last Education	Senior High School	43	46%
	Diploma	9	10%
	Undergraduate	22	23%
	Postgraduate	16	17%
	Doctorate	4	4%
Coordinator Affairs (CA)	CA Administration	3	3.19%
	CA Financial	3	3.19%
	CA State Property	3	3.19%
	CA Program and Reporting	5	5.32%
	CA Academic	8	8.51%
	CA Nurturing	3	3.19%
	CA Personnel	3	3.19%
	CA Library	2	2.13%
	CA Polyclinic	3	3.19%
	CA Information Technology	2	2.13%
	CA Facilities & Infrastructure	5	5.32%
	CA Food Affairs	5	5.32%
	CA Internal Security	3	3.19%
	Functional Unit - Academics	39	41.48%
	Functional Unit - Linguist	2	0.21%
	Functional Unit - IT	5	0.05%
Have been involved in IT Project	Yes	46	49%
	No	48	51%

Every item was used following the findings of the earlier study [19] and modified to fit the XYZ environment. Referring to Table 1, the dominant age group comprised civil servants less than 26 years old. That means the length of work experience that they have is less than 3 years. Nonetheless, the introduction of applications A and B was done during basic training for prospective civil servants as well as government science engineering technology has been taught during the education period at XYZ [24].

The gender distribution shows that there are 8% more males than females. Most of the participants had completed their education at the senior high school level. This happened because many of them put their last education as a senior high school while the undergraduate certificates have not been awarded yet. The distribution of respondents from the 13 coordinator affairs (CA) is 2.12% higher than the functional unit, indicating that respondents represent the whole XYZ except the leadership roles. Lastly, the number of respondents who have never been involved in IT projects is 2 people more than those who have been involved in IT projects.

Table 2. Questionnaire structures and components

Constructs	Indicator	Observed Items
KM Technologies (T)	T1	Technological advancements that support organizational service needs [8].
	T2	Organizations are expected to be able to predict future technology trends [8].
	T3	Organizations update services through the use of technology [8].
	T4	A and B have a security system so that critical knowledge is not leaked outside the organization.
	T5	A and B can be accessed 24 hours 7 days without any obstacles.
Organizational (O)	O1	Leaders actively participate in setting the vision and formulating the organization's strategy.
	O2	Leaders make decisions by considering the input of their subordinates [12].
	O3	Leaders treat all employees equally [12].
	O4	It is easy to work with employees in the organization [12].
	O5	All organizational units are willing to collaborate [12].
	O6	You are confident in your colleagues' ability to achieve organizational goals [12].
	O7	The organization provides various training programs for employees according to their main tasks and functions [12].
	O8	The organization has a policy that employees must make innovations [12].
	O9	The organization has a dependency on making policies related to knowledge sharing.
	O10	The overall goals of the organization are clearly stated [12].
	O11	Everyone in strategic positions has an intellectual and emotional intelligence that supports organizational goals [12].
Process (P)	P1	Knowledge can be gained from partners (external) [9].
	P2	Knowledge can be obtained from all employees in the organization [9].
	P3	You do not hesitate to share information and knowledge

Constructs	Indicator	Observed Items
		needed in performing your main tasks and functions [9].
	P4	The knowledge in the organization can be used to improve the efficiency of my work [9].
	P5	You use information systems, such as intranet or web, to share information and knowledge [9].
	P6	Research and education programs are in place.
	P7	Workflow diagrams are required and used in carrying out tasks [9].
	P8	There is an incentive policy for new ideas from utilizing existing knowledge [9].
KM Infrastructure (I)	I1	Organizational leaders need to participate in capturing and transferring knowledge [10].
	I2	Employees are supported to explore and experiment [10].
	I3	Training and learning are highly valued in the organization [10].
	I4	Individual expertise is highly valued in the organization [10].
	I5	The organization encourages employees to seek help from other employees when necessary [10].
	I6	The organization encourages employees to interact with other coordinator's affairs.
	I7	Leadership supports the role of knowledge in organizational success [10].
	I8	The organization has a standardized system of rewards for knowledge sharing [10].
	I9	There is active participation of all employees in the organization's strategic activities [10].
	I10	Organizational policies facilitate the discovery or creation of new knowledge [10].
	I11	The organization designs processes to facilitate knowledge exchange across units [10].
	I12	The organization has strategic ties or cooperative relationships with other organizations [10].
	I13	The organization allows employees to go where they need to go to gain knowledge regardless of position level [10].
	I14	Managers look for mistakes or errors and correct them based on knowledge standards [10].
	I15	Employees at different levels can be easily contacted or met to share knowledge [10].
KM Process (KMP)	KMP1	You understand the importance of knowledge for organizational success.
	KMP2	The organization creates new knowledge for cross-unit applications [12].
	KMP3	Every piece of knowledge in the organization is used for service [12].
	KMP4	Every complaint is resolved using existing knowledge [12].
	KMP5	The organization engages in a process of integrating different knowledge sources across unit and organizational boundaries [12].
	KMP6	Every new employee is mentored for a 3-month adaptation period [12].
Innovation Capability (IN)	IN1	The organization introduces newer (or improved) methods and procedures compared to three years ago [12].
	IN2	The organization modifies and/or improves existing services [12].
	IN3	Bureaucracy within the organization is clear and supports employee and organizational performance in terms of work discipline and work productivity.
	IN4	Organizational performance reports can be obtained through the system at any time [12].
	IN5	Performance allowance calculation is fast and precise.
	IN6	Organizational performance is improved because the performance allowance calculation process is done in the system [12].

This study utilized a questionnaire that comprised 51 expected indicators to capture the expectations of respondents, detailed in Table 2. Of the total, 42 indicators were adapted from previous studies [8] [9] [10] [12] and 9 were developed through interviews with three administrators.

The expected indicators would be filled in using a Likert rating scale from 1 to 5. A response rate of 1 suggests that the predicted indicator is strongly disagreed by the respondent. A value of 2 implies that the predicted indicator disagreed with the respondent. A value of 3 indicates that the respondent believes the predicted indicator is neutral. A value of 4 shows that the predicted indicator agreed by the respondent. A value of 5 implies that the predicted indicator is strongly agreed by the respondent [19].

3.2 Measurement Validity Evaluation

After the questionnaire has been completed by the 94 respondents, it is then reviewed for any missing data. Because all 94 respondents filled out the questionnaire completely, their data is utilized to develop the model by undertaking measurement validity and structural validity evaluations. That was run in the SMART PLS 4 application using the PLS-SEM method.

Ghasemy et al. (2021) created measurement validity evaluation guidelines by measuring indicator reliability, internal consistency reliability, convergent validity, and discriminant validity which are part of the outer model [20] [21]. To obtain proper results following those guidelines, the indicators and constructs were adjusted. As a result, there are 6 constructs (blue circles) and 43 indicators (yellow boxes) depicted in Figure 4.

The examination of indicator reliability was done by inspecting the value of factor loadings. The result showed that all the indicators were above 0.708 (shown in Figure 4) means all 43 indicators can be brought to the assessment of internal consistency reliability.

The assessment of internal consistency reliability was conducted by measuring the value of Cronbach's alpha (α), rho_A, and composite reliability (CR) are greater than 0.800. The result of this study revealed that the 6 constructs exceed 0.900 (shown in Table 3) indicating a high level of internal consistency.

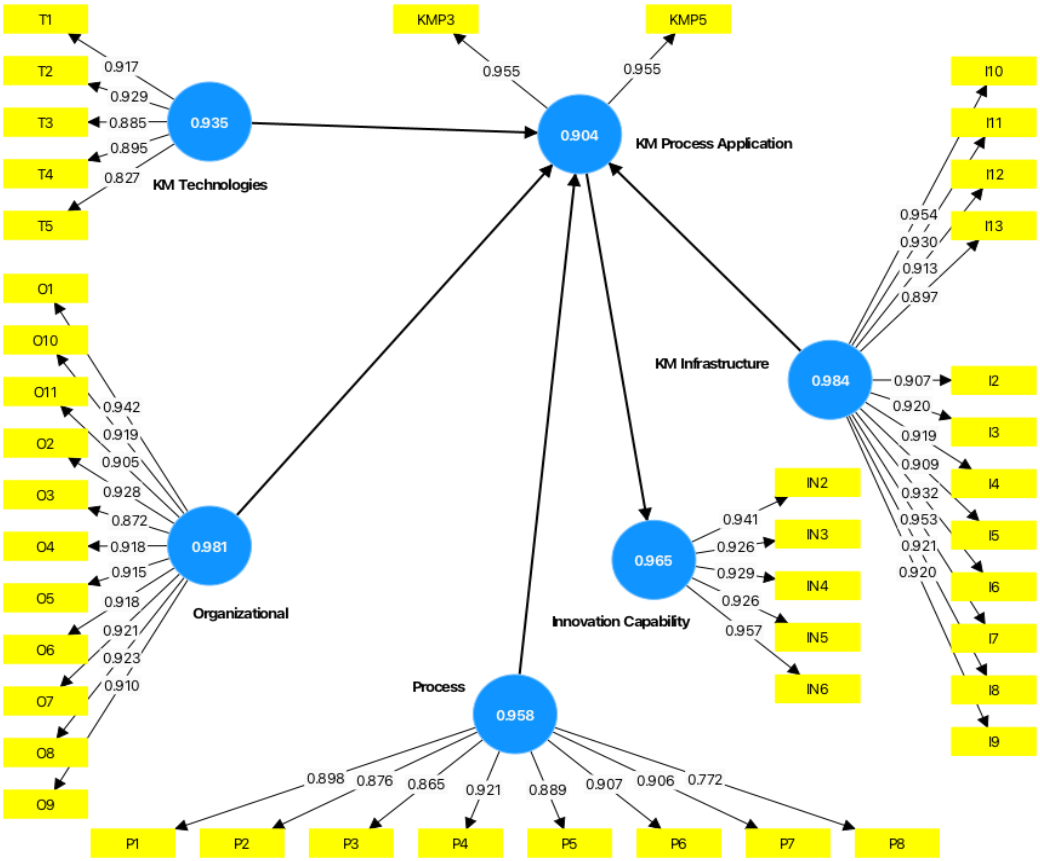

Figure 4. Measurement Model Evaluation

The convergent validity was assessed using the AVE measure. The estimated AVE values for each indicator were examined, and all values surpassed the 0.500 criterion as shown in Table 3. These findings revealed that convergent validity is well established.

Table 3. Internal consistency reliability and convergent validity

Dimension	α	CR		AVE
		rho_A	rho_C	
KM Technologies	0.935	0.936	0.951	0.794
Organizational	0.981	0.981	0.983	0.839
Process	0.958	0.960	0.965	0.775
KM Infrastructure	0.984	0.984	0.986	0.852
KM Process Application	0.904	0.904	0.954	0.912
Innovation Capability	0.965	0.965	0.973	0.876

Before assessing the discriminant validity, the result of the factor loading values in Figure 4 is inspected. Since all of them are above 0.85, the Fornell Larcker is used as the criterion. The result of the Fornell Larcker for the first run in the SMART PLS 4 application is outlined in Table 4.

The requirement for the discriminant validity is fulfilled as shown in Table 4. The findings indicate that all the square root of the AVE for every construct is larger than its associations with other constructs. Those bolded values represent the square root of AVE and plain values (off-diagonal) showing correlations among constructs. Because the steps of measurement validity evaluation have been done and the thresholds were met, the model as shown in Figure 4 would proceed to the evaluation of the structural model.

Table 4. The fornell larcker criterion of discriminant validity

	I	IN	KMP	O	P	T
I	**0.923**					
IN	0.907	**0.936**				
KMP	0.917	0.925	**0.955**			
O	0.849	0.767	0.757	**0.916**		
P	0.868	0.868	0.872	0.873	**0.880**	
T	0.802	0.740	0.745	0.846	0.845	**0.891**

3.3 Evaluation of The Structural Model

The structural model evaluation in this study included analyzing the inner model from the statistically significant β for 5 hypotheses, the f^2, and the R^2. Using the calculation of the two-tailed bootstrapping in the SMART PLS 4 application, the result is elaborated in Table 5. Two-tailed bootstrapping impacts the β that represents the proposed connections between constructs vary from -1 to +1 (close to 0 reflects weaker links).

Table 5 shows 4 of 5 hypotheses are supported in this study or 80% accepted. The significant influence of KMP on IN (H5) with (β = 0.925, Pv = 0.000) has the highest estimated value followed by I on KMP (H4) with (β = 0.769, Pv = 0.000), P on KMP (H3) with (β =

0.498, Pv = 0.005), and O on KMP (H2) with (β = -0.292, Pv = 0.010). On the other hand, there is no significant effect of T on KMP shown by Pv is greater than 0.05 (β = -0.045, Pv = 0.596). The positive value of βs explains if P or I or all of them are improving, the KMP and IN will be impacted to be improved too (as well as if they get worse). The negative value of β explains if O influences KMP with a negative effect which means KMP will be improved if O is improved, but currently, O is not properly fulfilled in XYZ.

Table 5. Estimation result for proposed hypotheses

Hypothesis	β	f^2	Tv	Pv	Result
T → KMP (H1)	-0.045	0.004	0.530	0.596	Not Supported
O → KMP (H2)	-0.292	0.132	2.586	0.010	Supported
P → KMP (H3)	0.498	0.348	2.798	0.005	Supported
I → KMP (H4)	0.769	1.069	7.455	0.000	Supported
KMP → IN (H5)	0.925	5.910	49.610	0.000	Supported

The results of β and Pv show that the causal relationship between T and KMP (H1) is not established. This might arise since the demography of the respondents reveals only 5% of them work in the technology sector directly as their main job and even though there is a shortage of IT people in XYZ, 52% of the respondents were below 25 years old implies the possibility for resource development. They became the references to activate T from some activities linked to T indicators in supporting KMP and IN at XYZ. Included all the civil servants through a seminar that discusses advanced technology implementation (T1), technology prediction (T2), security systems to protect critical knowledge (T4), and how to deliver high-reliability systems (T5) is one of the activities. In addition, adding electronic government in the XYZ curriculum to broaden the scope of the government science engineering technology [24] may obtain the next civil servants fulfilled with IT literacy.

Considering that I positively influences the KMP, this might activate T by applying the indicators of I. Pareto analysis with an 80/20 rule was used to decide which indicators transformed into some activities. The Pareto 80/20 rule inspected 20% of the total indicators representing the other 80% [25]. Hence from the I, since its total indicators is 12, only 20% from 12 or 2.4 ≈ 2 activities with the highest factor loading (Figure 4) would be proposed. First, assuring that the discovery or creation of knowledge is facilitated through XYZ organizational policies (I10). Second, leadership delivers XYZ success by reinforcing the role of knowledge (I7).

Some activities from P indicators can also be utilized to activate T since P positively influences the KMP. Using the Pareto 80/20 rule, obtained 20% from 8 indicators or 1.6 ≈ 2 activities with top 2-factor loadings value (Figure 4). Two activities come through making the knowledge of IT projects from 49% of the respondents who have been involved in an IT project accessible by another 51% who have not previously participated in an IT project (P4) and making research as an educational initiative from the collaboration among them (P6).

There are two activities proposed in activating T using the Pareto 80/20 rule from 20% of 11 indicators of O. Since O influences the KMP negatively, those two activities need to be fulfilled properly by increasing the active role of leadership to set the vision and formulate the organization's strategy (O1) and the decisions making is conducted by considering the input of leaderships subordinates (O2).

Because the number of respondents shows that 23 people did not participate consisting of leadership roles, they can be invited to validate the recommended activities from TOPI to activate T and formulate the strategy to run KMP. That is because sufficient IN of adopting BI is influenced by the KMP of XYZ (H5) has the highest estimated value from all the hypotheses. There are 2 activities of KMP to support IN. First, using every piece of knowledge for service in XYZ (KMP3). Second, XYZ engages in a process of integrating different knowledge sources across coordinator affairs and XYZ boundaries (KMP5).

The f^2 explains the level of impact from the exogenous construct to the endogenous construct. H5 and H4 have a strong effect since their f^2 are greater than 0.350, H3 has a moderate effect because its f^2 over 0.150 but not greater than 0.350, H2 has a weak effect as its f^2 over 0.020 but not bigger than 0.150, and H1 has no effect among its constructs since the f^2 below 0.020 [20].

The R^2 value is widely used to measure the prediction capability of the structural model with a minimum value is 0.300. This technique investigates the coefficient of the exogenous constructs and their combined influence on the endogenous construct [20]. The result of R^2 in this study is shown in Table 6.

Table 6. The result of the explained variance

Endogenous Constructs	R^2
KMP	0.884
IN	0.855

The R^2 value of KMP is 0.884, indicating that T, O, P, and I as the exogenous constructs account for 88.4% of the variance in KMP as their endogenous construct. The R^2 value of IN is 0.855 means that KMP demonstrates 85.5% of the variance in IN as its endogenous construct. Since all the R^2 values are over 0.300, the model evaluated in the data sample of this study is judged relevant because of adequate predictive power.

There are 2 expected significant contributions of this study based on the results. First, it will provide practical insights for XYZ in addressing the missing target percentage of performance in 2023 by understanding the causality relationships among T, O, P, and I with KMP and KMP with innovation capability for BI adoption. Since T is not supported for being an enabler, there are some activities to activate T through TOPI that can be used to form a strategy to run KMP, so that innovation capability supports successful BI adoption in XYZ.

Second, because the model in this study validated 80% of the hypotheses, this study can be used as a reference when the implementation of KM foundation and KM solutions is evaluated to look at the IN of an organization, especially when the innovation is done by linking KMP to IN or modification in KM solutions.

However, the limitation of this study is some activities proposed to activate T from TOPI lack validation and approval from leadership roles in XYZ. Future work may analyze which aspects of T strengthen the IN in GHEI where KM systems are lacking.

4. Conclusions

After conducting this study, the results are linked with the existing condition in XYZ to find some information to answer which part of TOPI enables KMP (RQ1) and find out whether any causal relationship between KMP and IN (RQ2). Information obtained from the results that O, P, and I are the enablers of KMP to elevate IN in BI adoption at XYZ. Hence, the answer to RQ1 is O, P, and I are part of TOPI that enables the KMP in a GHEI in Indonesia with P and I positively influencing KMP, but O negatively influencing KMP. The answer to RQ2 is the causal relationship between KMP and IN is proved by having the highest estimated value of β from all the hypotheses and R^2 equal to 0.855 or 85.5%. This means that the KMP needs to be ready to boost XYZ's innovation capability for a successful BI adoption. This study offers some activities that can be used to activate T from TOPI to run KMP in supporting IN prior to BI adoption at XYZ since the hypothesis of T influencing the KMP (H1) was not supported. As a limitation of this study, those activities have not been validated and approved by the leadership roles. Overall, the model suggested in this study was deemed satisfactory depicted by 80% hypotheses are supported. This laid the groundwork for future studies into which aspects of T strengthen innovation capabilities in GHEI especially when KM systems are lacking.

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References

[1] "Undang-Undang Republik Indonesia Nomor 5 Tahun 2014 Tentang Aparatur Sipil Negara." Accessed: Feb. 25, 2024. [Online]. Available: https://peraturan.bpk.go.id/Details/38580/uu-no-5-tahun-2014

[2] V. Biagi, R. Patriarca, and G. Di Gravio, "Business Intelligence for IT Governance of a Technology Company," *Data (Basel)*, vol. 7, no. 1, Jan. 2022, doi: 10.3390/data7010002.

[3] "Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 80 Tahun 2022 Tentang Statuta Institut Pemerintahan Dalam Negeri," 2022.

[4] "Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 132 Tahun 2018 Tentang Tunjangan Kinerja Pegawai Dalam Negeri," 2018.

[5] IPDN Kampus Jakarta, "Laporan Kinerja Triwulan IV 2023 IPDN Kampus Jakarta," 2023.

[6] "Peraturan Menteri Keuangan Republik Indonesia Nomor 22/PMK.02/2021 Tentang Pengukuran Dan Evaluasi Kinerja Anggaran Atas Pelaksanaan Rencana Kerja Dan Anggaran Kementerian Negara/Lembaga," 2021. [Online]. Available: www.jdih.kemenkeu.go.id

[7] Becerra-Fernandez, Irma, Sabherwal, and Rajiv, "Knowledge Management," 2015.

[8] J. Zhao, "Knowledge management capability and technology uncertainty: driving factors of dual innovation," *Technol Anal Strateg Manag*, vol. 33, no. 7, pp. 783–796, 2021, doi: 10.1080/09537325.2020.1841896.

[9] U. Zia, J. Zhang, and S. Alam, "Role of tacit knowledge management process and innovation capability for stimulating organizational performance: empirical analysis, PLS-SEM approach," *Kybernetes*, 2023, doi: 10.1108/K-03-2023-0444.

[10] I. I. Smaradhani, A. V. S. Hubeis, and F. S. Hidayatulloh, "Knowledge Management Infrastructure on Organizational Performance in Indonesian Science Institutions (LIPI): Mediation Effects of Knowledge Management Process," *Jurnal Aplikasi Bisnis dan Manajemen*, May 2023, doi: 10.17358/jabm.9.2.397.

[11] A. Jalil, M. Arif, A. Ghani, H. Wahab, A. ' Dillah Mustafa, and A. S. Shibghatullah, "A Preliminary Study on Knowledge Retention Strategy in Faculty of Information Management of UiTM," 2023.

[12] L. Lam, P. Nguyen, N. Le, and K. Tran, "The relation among organizational culture, knowledge management, and innovation capability: Its implication for open innovation," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 7, no. 1, pp. 1–16, Mar. 2021, doi: 10.3390/joitmc7010066.

[13] W. Bouaoula, F. Belgoum, A. Shaikh, M. Taleb-Berrouane, and C. Bazan, "The impact of business intelligence through knowledge management," *Business Information Review*, vol. 36, no. 3, pp. 130–140, Sep. 2019, doi: 10.1177/0266382119868082.

[14] H. Hmoud, A. S. Al-Adwan, O. Horani, H. Yaseen, and J. Z. Al Zoubi, "Factors influencing business intelligence adoption by higher education institutions," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 9, no. 3, Sep. 2023, doi: 10.1016/j.joitmc.2023.100111.

[15] I. Salisu, M. Bin Mohd Sappri, and M. F. Bin Omar, "The adoption of business intelligence systems in small and medium enterprises in the healthcare sector: A systematic literature review," *Cogent Business and Management*, vol. 8, no. 1, 2021, doi: 10.1080/23311975.2021.1935663.

[16] R. A. Williams, G. M. Duman, E. Kongar, and D. Tenney, "Understanding Business Intelligence Implementation Failure from Technology, Organization, and Process Perspectives," *IEEE Engineering Management Review*, 2023, doi: 10.1109/EMR.2023.3331247.

[17] H. Taherdoost, "What are Different Research Approaches? Comprehensive Review of Qualitative, Quantitative, and Mixed Method Research, Their Applications, Types, and Limitations," *Journal of Management Science & Engineering Research*, vol. 5, no. 1, pp. 53–63, Apr. 2022, doi: 10.30564/jmser.v5i1.4538.

[18] IPDN kampus Jakarta, "Institut Pemerintahan Dalam Negeri - Jakarta." Accessed: Apr. 27, 2024. [Online]. Available: https://jakarta.ipdn.ac.id/?page_id=616

[19] Wibowo Wahyu Setiawan, "Dari Kertas ke Digital: Memahami Penerimaan Pencacah Pada Adopsi Aplikasi Computer-Assisted Personal Interviewing Dalam Pengumpulan Data Di Badan Pusat Statistik," 2023.

[20] J. C. Acosta-Prado, O. H. López-Montoya, C. Sanchís-Pedregosa, and U. J. Vázquez-Martínez, "Sustainable

Orientation of Management Capability and Innovative Performance: The Mediating Effect of Knowledge Management," *Sustainability*, vol. 12, no. 4, p. 1366, Feb. 2020, doi: 10.3390/su12041366.

[21] M. Ghasemy, I. M. Rosa-Díaz, and J. E. Gaskin, "The Roles of Supervisory Support and Involvement in Influencing Scientists' Job Satisfaction to Ensure the Achievement of SDGs in Academic Organizations," *Sage Open*, vol. 11, no. 3, 2021, doi: 10.1177/21582440211030611.

[22] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "When to use and how to report the results of PLS-SEM," Jan. 14, 2019, *Emerald Group Publishing Ltd.* doi: 10.1108/EBR-11-2018-0203.

[23] G. Dash and J. Paul, "CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting," *Technol Forecast Soc Change*, vol. 173, Dec. 2021, doi: 10.1016/j.techfore.2021.121092.

[24] K. dan H. M. Kepala Biro Adm. Hukum, "Keputusan Rektor Nomor 800.2.3-270 Tahun 2024 Tentang Penunjukan Dosen dan Pelatih Mata Praktikum Semester Ganjil Program Sarjana Terapan Fakultas Manajemen Pemerintahan," 2024.

[25] R. Kumar, K. Singh, and S. K. Jain, "Agile manufacturing: a literature review and Pareto analysis," Jan. 14, 2020, *Emerald Group Holdings Ltd.* doi: 10.1108/IJQRM-12-2018-0349.

