Innovation of Government Research and Development Institution Based on Knowledge Management and Information Technology (Case Study on the Government Policy-Making Research and Development Institution)

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Abstract

This study investigates and analyzes knowledge-management-based innovation in developing knowledge sharing and absorbing and the role of Information-Technology-based innovation in supporting knowledge management. It is now a demand that institutions prioritize on creating innovation. Organizations that are able to compete can learn and be creative, which is only possible if the knowledge sharing within the institution is carried out properly. This is also the case for R&D institutions that must make innova-tions based on knowledge management and information technology. This is a single case study qualitative analysis. Based on criteria, four in-formants were selected as sources. They were interviewed guided by a list of open-ended questions. The results of this case study provide information on the aspects that are needed to support innovation in government R&D institutions. They also fill the gap in research on knowledge management. Inovation based on knowledge management processes in developing activ-ities to share and absorb knowledge in government R&D institutions has been running and has produced several innovations. IT has been utilized to share and absorb knowledge and it is a requirement for a functional official researcher, but there is still limited availability of computers.

I. Introduction

Innovation is to introduce new concepts, goods, services, and methods. Innovation is defined as related to creativity, which comes from the word to innovate which means making changes or in-troducing something new. Innovation occurs in many fields, such as technology, knowledge, economy, social, education, and many more. It may also be categorized into major innovations and small innovations and they are abundant. Innovation does not have to be expensive. Any person can innovate, whenever and wherever. Even our forefathers were innovators or else we would still be living in dark caves.

Law Number 23 of 2014 in the Chapter on Regional Innovation manifested in Government Reg-ulation Number 38 of 2017 on Regional Innovation defined innovation. Article 1 stated that Re-gional Innovation is reform in all fields in implementing governance in a region. In article 3, Re-gional Innovation is carried out under the principles of improving efficiency, effectiveness, and service quality, being public interest oriented (not personal interest)and free of conflict of interest, being open, and maintaining value of fit and accountability of results.

In Law 11 of 2019 concerning the National Science and Technology System in article 1 paragraph (13), innovation is produced from thought, investigation, improvement, assessment, and/or appli-cation, which contains elements of novelty and has been applied and provides economic and or social benefits. Article 7 Paragraph (2) states that Science and Technology Application are carried out to encourage innovation as an effort to increase the development productivity, independence, and national competitiveness.

At the brink of the free market economy where competition and globalization are the main char-acteristics, there is a high demand for the availability of Human Resources (HR) with high compet-itiveness. The basis for competitive advantage has changed from a conventional approach to a contemporary approach, namely knowledge-based intellectual capital, such as creativity, innovation, organizational learning, and strategic capabilities. According to Affandi (2009, p. 1), this paradigm shift has given birth to knowledge management which is seen as more powerful as an important resource which is a prerequisite for creating competitive advantage for individuals, units, depart-ments, and organizations.

Effective knowledge management requires a multidimensional perspective, namely a combination of people, technology, and processes. Technological advances greatly affect many aspects of the management, structure, and activities of organizational tasks. Rockart (1988, as cited in Elita, 2005) stated that Information Technology (IT) is a strategic weapon and utilizing IT is very important. The development and influence of IT on organizations has encouraged organizations to be able to apply technology so that they can better improve their performance, endurance, and organiza-tional response. The use of IT demands an adequate planning that ensures strategic objectives and demands organizational changes that allow system integration.

IT has changed all human life aspects, from communication methods to governance. Communi-cation and governance can now be real-time, digitally, efficiently, and across borders with the exist-ence of IT such as the internet. According to Njoka et al (2020) the critical need for institutions and enterprises in the digital era to embrace and institutionalize use of Information communication technology in the execution of their functions cannot be overemphasized. Information communication technology (ICT) is increasingly playing an instrumental role in infusing efficiency and effectiveness in service delivery in public and private enterprises.

Barney (1996) stated that an organization must prioritize to innovate. An organization must learn and be creative so that it can compete. This can be achieved if the organization carries out knowledge sharing activities properly. In government Research and Development (R&D) institu-tions, as organizations, interactions occur among the functional official researchers, R&D staff, structural officials, functional official researchers, users, and other stakeholders. These interactions improve performance that is beneficial so that the institution can be competitive.

In this study, the research problem is limited to the following matters:

- Innovation based on knowledge management in government R&D institutions is defined as a breakthrough in the procedures for managing research and development organiza-tions/institutions starting from identifying the knowledge of structural officials and staff as well as the functional official researchers to storing and sharing knowledge within the research team and fellow researchers so that innovation is resulted from sharing knowledge through communication (conversations/discussions).

- Information Technology (IT) innovation referred to in this study is a breakthrough in the implementation of technology which greatly influences many aspects in ensuring the structure and activities of the organizational tasks of R&D institutions, in applying tech-

nology to improve performance, resilience, and responsiveness of the R&D organizations/institutions in providing added value or competitive advantage as well as increasing the interest of research and development organizations/institutions in knowledge man-agement.

II. Review of Literature

2.1 Knowledge Management

Knowledge management is to comprehensively organize of the processes of creating and devel-oping knowledge, storing knowledge, sharing knowledge, implementing knowledge in an effort to exploit the organizations tacit and explicit knowledge assets to gain a competitive advantage (Kucza, 2001; Nonaka & Takeuchi, 1995; Zhou & Fink, 2003). Knowledge management is a process to find, select, organize, filter, and present information sys-tematically in a way that increases knowledge mastery in a particular field of study. Overall, knowledge management in an organization is one of the techniques to manage knowledge to gen-erate value and increase advantage in competitions. Sitanggang et al (2020) stated that earnings management practices that are often carried out by management can reduce the quality of a company's financial statements, besides this action can harm investors because they will get inappropriate information about the company's financial position.

2.2 Absorptive Capacity

Cohen and Levinthal (1990) introduced the initial concept of absorptive capacity or the ability to absorb knowledge using the term "learning". The concept consists of three dimensions, namely the ability of the organization in identifying, assimilating, and exploiting knowledge that can pro-duce innovation. Furthermore, Cohen and Levinthal (1990) stated that the learning level and the knowledge of the members of an organization determine the organization's ability to expand their base of knowledge and to increase their capability to gain more knowledge. The model of ab-sorbing knowledge from Cohen and Levinthal (1990) is presented in Figure 1.
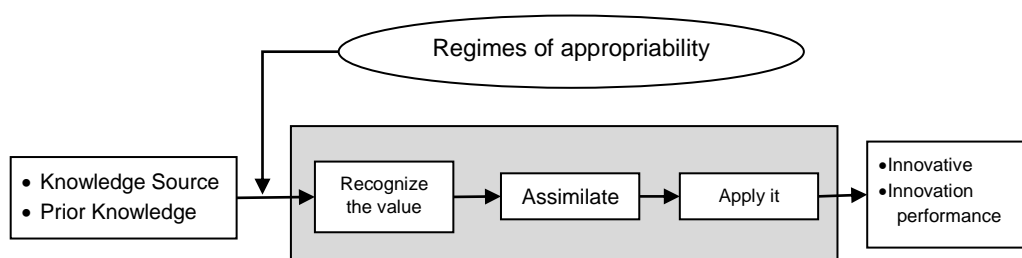

Figure 1. *Model of Absorptive Capacity (Cohen & Levinthal, 1990)*

Zahra and George (2002) re-conceptualized Cohen and Levinthal's (1990) absorptive capacity by introducing an additional component, namely the transformation of knowledge as an organiza-tional capability in developing activities which combines present knowledge with new knowledge and integrated knowledge. Cohen and Levinthal's concept which has three dimensions was re-conceptualized into four dimensions, namely acquisition, assimilation, transformation, and exploi-tation.

2.3 Information Technology (IT)

Information Communication Technology (ICT) is a combination of technologies in information, telecommunication, and multimedia. It has encouraged the progress of a nation's economy. Ad-vances in ICT have generated prospects and challenges in the development of the economy. Wescott (2005) stated that ICT is used by an e-Governments to be more efficient, to facilitate ser-vice provision, and to give information access for the people, and to have higher accountability to the community.

2.4 Research Framework

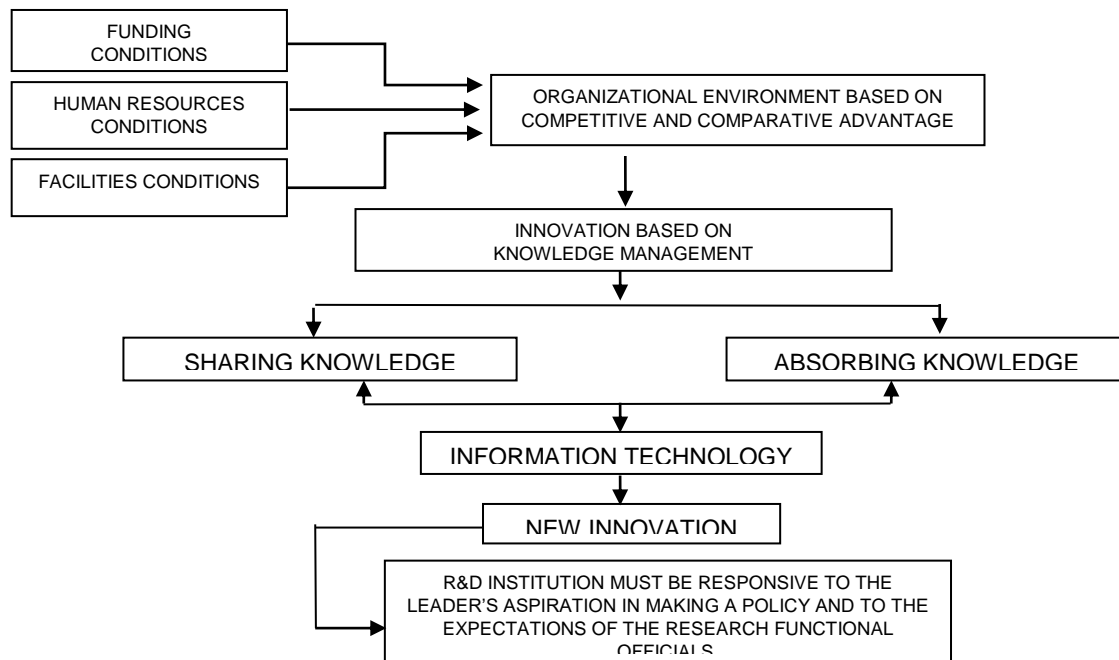Figure 2 presents the research framework of this case study.

***Figure 2.** Research framework*

III. Research Methods

In this study, a single case study was conducted, which was a critical test for information technology-based knowledge management theory. Focus Group Discussion (FGD) was conducted to interview a group that emphasized on how the group interact and behave, when the members were given a certain topic to discuss.

3.1 Research Design

Research design is a tool that guides researchers in conducting research. In this research design, there are guidelines or directions in collecting, analyzing, and interpreting or translating the data collected and then making conclusions. The research design began with a focus on problems that arise in the process of sharing and absorbing knowledge. Then, the results of the identification were compiled and related to the problems of IT-based knowledge management in a Government R&D institution, especially through observation, documentation and interviews.

3.2 Reseach Propositions

This study suggests the following propositions.

1. The process of knowledge-management-based innovation in developing activities of knowledge sharing and absorbing in government R&D institutions.
2. The role of IT innovation to support the process of knowledge management in developing activities of knowledge sharing and absorption.

Table 1 shows the relevant data and how the data are related to the study propositions.

Table 1. The relation between data and proposition

No.	Proposition	Relevant Data	Information
1.	The knowledge-management-based innovation process in R&D institutions is able to increase the innovative ability	1. Data on the condition of research functional official researchers (composition, competence/skills, and formal education) 2. The condition of human resources in adopting changes. 3. Data on management of knowledge and technology transfer. 4. The ability to absorb knowledge 5. The innovation power of functional researchers 6. Strategic environment (provision of facilities and infrastructure, a workplace, and work relations).	To create competitive advantage for individuals and government R&D institutions. Through increased innovation based on mastery of knowledge in a specific field of study/competitive advantage.
2.	IT Infrastructure in innovation has a major role in supporting the knowledge management process.	1. The available facilities and infrastructure support innovation 2. IT applications in support of innovations that have been and will be planned. 3. Preparation of the human resources in utilizing IT. 4. Funding support for the development of IT applications.	The use of IT innovations can simplify and accelerate the process of knowledge sharing and absorbing.

A case study can use six sources of evidence, namely interviews, documents, archives, observations (direct and participant), and physical devices.

3.3 Analysis Technique

A case study refers to an explanatory study; thus, the analysis technique also leads to an explanatory study, in which plenty of analysis, explanation, and data presentation are carried out. Different perspectives regarding the use of IT-based knowledge management are discernable from the structural officials, staff, and functional researchers. Then best solution to the problem in discussion can be found. Finally, an evidence chain is presented by having analyzed the relationship between the collected data.

IV. Results and Discussion

The global economy in 2017 was predicted to improve at 3.5%. The improvement was primarily encouraged by the developing countries. The growth was estimated at 4.6%, larger than in 2016 (4.3%). Developed countries expected recovery in the economy as a result of pro-economic growth policies issued by the United States and Brexit in Europe. This global economy improvement was hoped to encourage an increase in the world trade volume, so that it would improve better than the global growth (about 4% in 2017) (International Monetary Fund, 2017).

The fund or budget for R&D is shown in R&D spending percentage to the Gross Domestic Product (GDP). The Gross Expenditures on R&D of the United States and the largest Asian countries are presented in Figure 3.
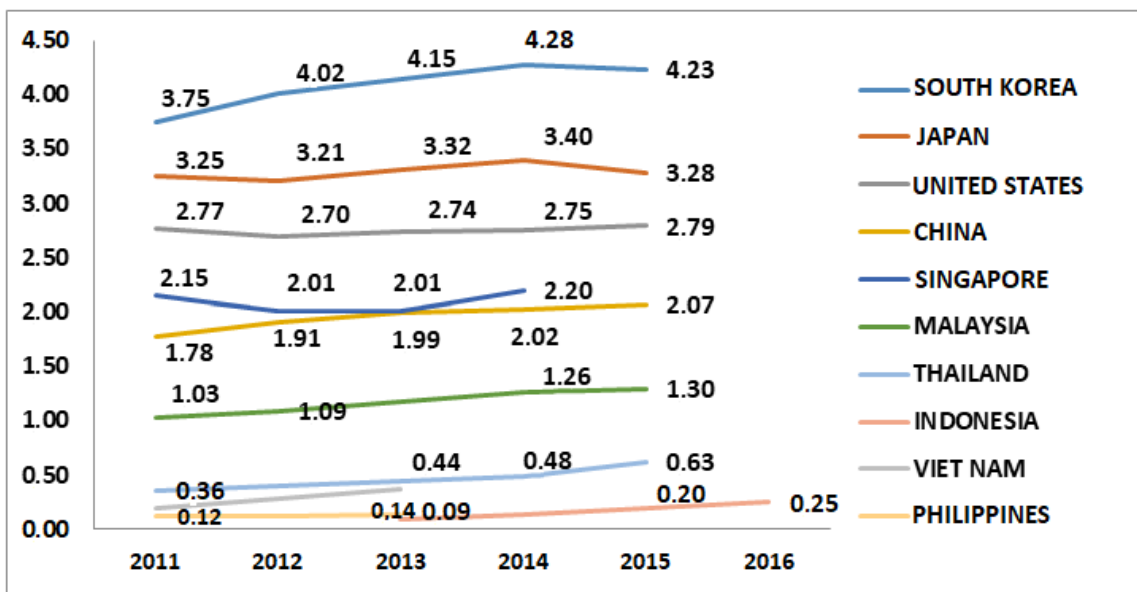
Source: Gross Expenditure on Research & Development (GERD) 2016
Figure 3. *Gross Expenditure on Research & Development*

From the figure, Indonesia ranks lowest in the research budget at 0.25. Vietnam is second place with 0.20; Thailand is in third place with 0.63; fourth is Malaysia with 1.30; China is fifth place with 2.07; Singapore is sixth with 2.20; the United States is seventh with 2.79; Japan is eighth with 3.28; and South Korea is ninth with 4.23.

Table 2. R&D SWOT Strategy Matrix

	Strength (S)	Weakness (W)
	• Existence of R&D institutions in each ministry and non-ministry. • The existence of clear main duties and functions • There is a policy formulation mechanism that must be based on research • Regular mechanism and frequency of discussions.	• The quantity and quality of functional research officers are low • The institutional structure does not reflect the structure of the R&D institution • Institutions are predominantly structural • Low funding support • Low level of welfare compared to responsibilities

		and workloads of the staff • Functional researchers have not been considered as an intellectual sources • Lack of facilities, infrastructure, and information for the functional researchers • Rewards for motivation are low
Opportunity (O) • There has been an appeal from the President of the Republic of Indonesia to regard the existence of functional researchers and their welfare • There has been a proposal to increase the allowance for the functional researchers • There has been sufficiently clear laws and regulations for the career development of the functional researchers • The existence of laws and regulations governing multiple positions for functional researchers	**SO** • The leadership needs to commit in involving R&D institutions in the policy making process • Take advantage of the momentum of the Indonesian president's appeal to increase the attractiveness of the functional researchers (both material and non-material) • Implement main tasks and functions and improve career development to realize the dual position	**WO** • Increase the quantity by recruiting new functional researchers and staff within the R&D instutution. • Increase the capacity and empowerment of the functional researchers • Take advantage of the momentum of the president's support to improve the welfare of the functional researchers • Adding the facilities and infrastructure needed by the functional researchers, including the information network and its equipment.
Threat (T) • There is a negative image of the R&D agency as a place of disposal or milestone for structural officials • No optimal realization of career development • R&D results are underutilized by the users • Research and study activities carried out by the technical unit (the users themselves)	**ST** • Emulate the negative image of R&D institutions by implementing clear main tasks and functions • Market R&D results to user units • Provide services for the research required by users at the time needed • Increase partnerships with user units in improving the quality of research results	**WT** • Change the structure of the R&D institutions into functional-based • Set special requirements for structural officials in R&D institutions (eliminating the image of the place of disposal) • Increase partnerships with user units in increasing respect for the functional researchers as resource persons and/or experts.

Table 3. Weighting of Internal and External Aspects

Internal Aspect	Value	Score	Existing Performance (SW)	Weight	Highest Score
Certainty of the existence of R&D with clear tasks and functions	Strong	3	+	20 %	+0.6
Policy formulation mechanism based on the results of R&D.	Medium	2	+	20 %	+0.4
Quality and quantity are non-optimal	Strong	3	+	20 %	+0.6
Institutional structure, welfare and rewards are not appropriate	Weak	1	-	20 %	-0.2
Funding for R&D activities is low	Medium	2	-	10 %	-0.2
Inadequate facilities and infrastructure	Medium	2	-	10 %	-0.2
					Total 1.00

Table 4. Knowledge Management SWOT Strategy Matrix

	Strength (S) • The existence of functional researcher officials of various levels in every government R&D institution • Researchers are used to utilizing IT advances • The existence of communication forums and meetings facilities for functional researchers, resource persons, and users • Easily accessible sources of knowledge	Weakness (W) • Lack of *utama* and *ahli* researchers as well as research professors in government R&D agencies • Low formal education and lack of skills to absorb knowledge • Lack of hardware to share and absorb knowledge. • Inadequate library support.
Opportunity (O) • The recruitment of civil servant candidates for functional research positions • The benefits of sharing and absorbing knowledge in carrying out research activities are felt • Internet facilities are available in every work room and meeting room, although the hardware is not yet provided adequately • • There are opportunities to attend formal and non-formal education	**SO** • Take advantage of the civil servants recruitment to grow a community for sharing and absorbing knowledge. • Maintain the habit of sharing and absorbing knowledge through various facilities, both direct and indirect • • Increase thinking power through formal and informal education	**WO** • Improve the quality of functional research officials through formal education, especially doctorate degree • Provide facilities and conveniences to increase and maintain the credit score of functional researchers. • Utilize various sources of knowledge for the knowledge sharing and absorbing process. • Maintain a culture of reading, listening, writing, and speaking.

Threat (T)	TS	TW
• There is a chance for transfer outside the R&D agency. • Unfavorable image of R & D institutions. • The absence of a proper reward system.	• Eliminating functional officer transfers, especially for functional officials of levels *pertama* and *muda* • Eliminate the negative image of R&D institutions by holding quality meeting forums with good resource persons • Implementing a reward system not just a certificate	• Provide facilities for formal education • There is a prohibition on the transfer of functional first and young researchers • Appreciation to the funtional researchers for being a resource or expert

Table 5. Weighting of Internal and External Aspects

Internal Aspect	Value	Score	Existing Performance (SW)	Weight	Highest Score
The existence of functional researchers from various levels	Strong	3	+	20 %	+0.60
It is customary for the functional researchers to take advantage of the progress of information technology	Medium	2	+	15 %	+0.30
The availability of facilities for internal and external meeting forums and other sources	Strong	3	+	20 %	+0.60
Formal education and the ability to share and absorb knowledge are inadequate	Medium	2	-	20 %	-0.40
Kurangnya professor rset atau penet utama Lack of research professor or *utama* researcher	Strong	3	-	15 %	-0.30
Library facilities and infrastructure	Medium	2	-	10 %	-0.20
					Total 0.60

4.1 Open-Ended Interview

In this case study, interviews were conducted with several key informants. The descriptions of the key informants who participated in this study are based on four categories of functional researchers who are in the Ministry of Manpower and Transmigration and outside the Ministry as well as its structural officials (as users).

4.2 Analyzing Case Study Data

In case study research, there are four data analysis technique that are often used, namely pattern modeling, explanation building, time series analysis, and logic model programs. The four techniques can be used in a single or multiple case study strategies.

4.3 Data Analysis Techique

The data analysis consists of descriptions of data test, categorization, tabulation, or evidence recombination to refer to the initial proposition of the research:
1. Based on theoretical propositions.
2. Develop a description of the case.

Proposition 1: Knowledge-management-based innovation process in R&D institution can improve innovation ability. Perception of knowledge management process in government R&D institution

Knowledge-management-based innovation process in government R&D institution began with the knowledge that the institution has which is identified from the conditions of the functional researcher officials, namely their educational level, official level, and experience. Interviews with the key informants showed that the functional researchers in government R&D institutions were relatively unable to compete with foreign researchers. The number of researchers who were at professor level is very low, even though main researchers are available.

The results of the study used for mapping, or the pre-case study, showed that the informants generally agreed that the knowledge management process in R&D institutions can increase innovative ability through a process of various abilities in exploring innovation skills. The knowledge management described in this study is in line with the key informants' opinion. This indicated conformity with the point of view on knowledge management process in increasing the functional researchers' innovation.

The attitude of knowledge sharing categorized as very good. Functional researchers conducted many knowledge-sharing activities and shared expertise, ideas, and conceptual information among researchers and became resource persons in and out of the R&D institutions. This condition had an impact on functional levels but did not have an impact on career structural positions (for concurrent positions).

The different conditions of the R&D environment, especially of the frequency of meetings held in the work environment of the technical unit or directorate general, affected this knowledge sharing attitude. With a high frequency, it could produce various innovations resulting from the research activities carried out and many recommendations that have been submitted to technical units; however, not all of the recommendations produced have been used as policy materials.

The informants' responses showed support to the view that knowledge management can increase innovation. As meeting forums in and out of the R&D institutions were conducted more frequently, they could obtain ideas and manifest them in recommendations from research results. Some of the informant responses indicated a high category, yet the researchers had a tendency to be reluctant in distributing ideas outside the research team which are shown with a low category. On the other hand, the reluctance was lesser at formal meetings, which is in the high category.

Proposition 2: IT innovation plays a major role to support the knowledge management process

The IT facilities and infrastructure in R&D available were internet channels, although and some had not installed an intranet channels. With those facilities, the functional research officials were able to obtain online knowledge that they needed, so that even though the computers available were still limited, many functional researchers had their own laptops. The condition was indicated by a high category value for obtaining various sources of data and information online. In another case, the advances in the

technology of data and information storage were generally not used by the functional researchers as it was in the medium category.

The technological advances in communicating between or fellow functional researchers at R&D institutions showed a moderate category. This was indicated by the frequent direct communication conducted by the functional researchers, such as regular meetings of research teams, routine meetings of R&D Communication Forum (*Forum Komunikasi Kelitbangan*/FKK) and Regional R&D Communication Forum (*Forum Komunikasi Penelitian dan Pengembangan Daerah*/FKPPD), regular meetings between functional researchers, and other meetings.

The informant responses also showed answers regarding IT infrastructure which have a major role in the knowledge management process. The available IT systems were still limited to the internet and intranet networks. The systems were used to obtain explicit knowledge. However, storage facilities of the research activity materials had not been used effectively. To effectively use this information system, it is necessary to consider a container which could handle the explicit knowledge storage.

The knowledge sharing and absorbing is related to the communication and collaboration using the IT advances. Nearly all government R&D institution had an information system via the internet. However, it had not been maximally utilized as well as the intranet. By utilizing these technological advances, there will be no more obstacles in obtaining new knowledge. Although the computers provided are lacking, functional researchers have had laptops, so laptops were the primary need for functional researchers.

To effectively and efficiently use IT, online-based training learning tools are still necessary, although some functional researchers already have e-mail addresses for communicating. This condition showed that the current progress of IT has been relied on in sharing knowledge, which is indicated by many functional researchers who used IT. From the data collection and information from interviews, FGDs, questionnaires, and discussions, descriptions are presented based on the propositions.

Proposition 1: Knowledge-Management-Based Innovation in Developing Knowledge Sharing and Absorbing in R&D Institutions

Table 6. Description of Proposition 1

No	Data	Measurement	Condition	Analysis
1.	Data on the condition of functional researchers (composition, competence / skills and formal education)	Competence composition	It was sufficient; however, R&D institutions in the ministry need to recruit new civil servant candidates. Seen from the scientific discipline, the teams were solid but needs improvement, especially for researchers with doctoral education.	R&D institutions have implemented knowledge management with an indication of the researcher's ability to provide the knowledge that they have and the ability to gather knowledge from other researchers, structural officials, or other sources.
2.	The condition of human resources in adopting any changes that occur	Interest and attitude in sharing activities	High reluctance to share knowledge based on attitudes towards knowledge sharing	With various stages of discussion, various ideas from internal and external

No	Data	Measurement	Condition	Analysis
			activities and interest in sharing knowledge	teams can be obtained in solving a problem through a research recommendation (creating a competitive advantage for individuals and government R&D institutions)
3.	Knowledge and technology transfer management data.	Availability of various references and researchers' experiences	Transfer of knowledge could be obtained from internal and external meeting forums.	
4.	Ability to absorb knowledge.	Feedback and suggestions.	Internal and external team discussions could absorb knowledge and provide mutual input.	
5.	The innovation power of functional researchers	The availability of various policy recommendations	Intensive discussion could generate ideas in solving problems by providing recommendation policies and improvements	
6.	Strategic environment (provision of facilities and infrastructure, workplaces, and work relations).	Availability of internet and discussion room as well as division of authorit of the functional and structural officials, as well as the main duties and functions of the research team.	In every research room, an internet channel was available but not all of it was equipped with a computer. In the meeting room, internet can be accessed. This condition accelerates the emergence of new innovations.	

R&D institutions have implemented knowledge management with an indication of the researcher's ability to provide the knowledge they have and the ability to gather knowledge from other researchers, structural officials, or other sources. With various stages of discussion, various ideas or ideas from internal and external teams can be obtained in solving a problem through a research recommendation (creating a competitive advantage for individuals and government R&D institutions).

Proposition 2: It Innovation Plays A Major Role in Supporting the Knowledge Management Process

Table 7. Description of Proposition 1

No	Data	Measurement	Condition	Analysis
1.	Facilities and infrastructure available and provided	Availability of internet and hardware facilities (computers and laptops) anywhere and anytime	Internet was available both in the work room and in the meeting room, but the hardware (computer or laptop) was not available. Currently, researchers can	The researchers have felt the need of using IT to increase performance and provide added value or competitive advantage. Therefore, online-based training

				learning tools are still needed. Although IT has been used, regular forums for regular meetings were still needed.
2.	Information technology applications that have been and will be planned	Establishment of research results and online discussions as well as online journals	TheInternet is a necessity but has not yet been used to disseminate research recommendations and studies.	
3.	Preparation of human resources in utilizing information technology	Researchers' mastery of various computer software in conducting research	Almost all researchers were able to use computers but not all softwares, such as SPSS, etc.	
4.	Funding support for the development of information technology applications	Procurement of computers and laptops annually	The procurement of hardware devices increases every year. However, outdated hardware had not been retracted, so that they seemed to be adequate. There was also a policy that made an impression that structural officials were given more facilities than researchers.	

Researchers had felt that they needed to use IT to improve performance and provide added value or competitive advantage. Therefore, online-based training learning tools are still needed. Although IT had been used, regular forums for regular meetings were still needed.

V. Conclusion

The following points are the conclusions and suggestions based on the study results.
1. The perception of knowledge-management-based innovation process in R&D institutions to increase innovative ability:
   a. The knowledge-management-based innovation process was found in R&D institutions. The process started with the innovation of policies from government R&D institutions in forming research teams. The composition of the research team supported knowledge sharing and absorbing activities. The process occurred in the preparation of proposals, designs, instruments, data collection, data processing, data analysis, and the dissemination.
   b. The environmental conditions of R&D institutions with the quantity and quality of meeting forums held are inseparable from innovation based on knowledge management. This will increase the research result quality and the bargaining position of

func-tional researchers. Innovations obtained from the knowledge management process are indicated to be in the high category

   c. The implementation of knowledge-management-based innovation was found in government R&D institutions as an effort to increase the functional researchers, competence in producing recommendations; however, their product were not taken into con-sideration policy-making. As a result, the user (the technical directorate general or the technical unit) carried out their own research activities which are actually the main task and function of R&D. This condition is also used to avoid harsh constructive criticism and is categorized in the high category.

2. Description of IT Innovations which have a major role in supporting the knowledge management process:

   a. Advances in IT have not been maximally utilized. This was due to the lack of available standard computers, even though the functional researchers had already relied on the current technological advances in sharing knowledge. The use of internet and the in-frastructure to gain explicit knowledge is in the high category.

   b. The internet had been available; however, supporting facilities and infrastructure had not been provided.

References

Affandi, A. (2009). Peran Knowledge Management Dalam Menciptakan Keunggulan Bersaing Berkelanjutan (Sustainable Competitive Advantage) Pada Institusi Pendidikan Tinggi. Unpublished. Orasi Ilmiah Jabatan Guru Besar Fakultas Ekonomi. Universitas Pasudan.

Barney, J. B. (1996). The resource-based theory of the firm. Organization Science, 7(5), 469–469. https://doi.org/10.1287/orsc.7.5.469

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35(1), 128–152. https://doi.org/10.2307/2393553

Elita, R. F. M. (2005). Kajian Tentang Manajemen Pengetahuan. Universitas Padjadjaran. https://pustaka.unpad.ac.id/wp-content/uploads/2009/01/kajian_tentang_manajemen_pengetahuan.pdf

International Monetary Fund. (2017). World Economic Outlook Update. https://www.imf.org/-/media/Files/Publications/WEO/2017/April/pdf/text/ashx

Kucza, T. (2001). Knowledge Management Process Model. VTT Technical Research Centre of Finland. VTT Publication No. 455. http://www.vtt.fi/inf/pdf/publications/2001/P455.pdf

Nonaka, I., & Takeuchi, H. (1995). The Knowledge-Creating Company. Oxford University Press.

Njoka, J.N., et al. (2020). Analysis of Challenges Facing ICT integration in Managing Public Secondary Schools: A Comparative Study of Day and Boarding Secondary Schools in the South Rift Region, Kenya. Budapest International Research and Critics Institute-Journal (BIRCI-Journal). P. 58-66.

Sitanggang, S.N., et al. (2020). Analysis ofthe Influence ofManagerial Ownership, Audit Quality and Audit Committee on Income Management (Study on Manufacturing Companies in the Consumer Goods Sector Listed on the Indonesia Stock Exchange 2014-2018). Budapest International Research and Critics Institute-Journal (BIRCI-Journal). P. 2521-2533.

Wescott, C. G. (2005). E-government in the Asia-Pacific region: Progress and Challenges. Systemics, Cybernetics, and Informaics, 3(6), 37–42. http://www.researchgate.net/publication/265618189-E-Government_in_the_Asia-Pacific_Region_Progress_and_Challenges

Zahra, S. A., & George, G. (2002). Absorptive Capacity: A review, reconceptualization, and extension. The Academy of Management Review, 27(2), 185–203. https://doi.org/10.2307/4134351

Zhou, A. Z., & Fink, D. (2003). Knowledge management and intellectual capital: An empirical examination on current practice in Australia. Knowledge Management Research & Practice, 1(2), 86–94. https://doi.org/10.1057/palgrave.kmrp.8500009