Knowledge Management System in Official Statistics: An Empirical Investigation on Indonesia Population Census

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Abstract. National statistical offices around the world show a strong interest in producing reliable, objective, and accurate information in compliance with a high level of professional and scientific standards. Such a set of information provided by government agencies is known as the official statistics. To support the potential of knowledge-based business process and deliver high-quality public services, knowledge management systems (KMS) are undoubtedly required. In this work, we study the impact of embracing KMS in one of the most massive scale statistical census in South East Asia, the 2020 Indonesia Population Census (IPC2020). The regression analysis is utilized in this study where the perceived usefulness is the dependent variable and the perceived ease of use become the independent variable. Our findings reveal that KMS utilization gains a positive influence on the perceived ease of use and usefulness among the stakeholders and organizing personnel. This provides an incentive to enlarge the range of implementation and improve the system and infrastructure capability to better support the knowledge-driven collaboration among stakeholders of the statistical office.

1. Introduction

In this study, we aim to investigate the implementation of a knowledge management system (KMS) in supporting population census in Indonesia and to investigate whether the perceived ease of use of KMS influences the perceived usefulness towards the implementation of KMS. The national statistical office of Indonesia, known as Statistics Indonesia (BPS) as the principal actor behind the 2020 Indonesia Population Census (IPC2020), is one of the government institutions responsible for providing official statistics, mainly in basic statistics, but also supporting the dissemination of sectoral statistics and specific purpose statistics. Therefore, as a trustworthy data provider for the government and public, BPS create innovation by implementing KMS on one of its censuses, which is IPC2020. However, BPS has no experience in implementing KMS on its previous census/surveys and is still currently learning how KMS should be implemented in the statistical business process.

As the sole provider of official basic statistics in Indonesia, BPS is aware that the development of technology has been improving quite fast, especially in supporting its statistical business processes. Nowadays, the public sector in government agencies is encouraged to incrementally transition from old-fashioned bureaucratic services into more managerial approaches (Sandhu et al., 2011). Such transition is fundamental to meet the high expectation of national-scale citizens which require the equivalent service standards and levels of government agencies compared with their private sectors counterparts. Massaro highlighted that public sector agencies have been encountering greater challenges in terms of responsiveness, accountability, and representativeness than the private sector

ones (Massaro et al., 2015). Hence, government agencies need to begin institutionalizing careful knowledge management strategies and objectives as potential efforts to deal with these challenges and to avoid unexpected falling in public trust (Young et al., 2013). Overall, the requirement of knowledge management for the government institution is undoubtedly critical. To this end, the remaining question is no longer about whether they need knowledge management, but rather how to achieve all possible benefits from knowledge management in an effective and efficient manner.

The principle of knowledge management is to ensure extensive implementation of knowledge management processes efficiently and effectively. Knowledge management processes, namely, the knowledge creation, capturing, storage, sharing, and application should be widely used to achieve the high level of the institutional key performance indicators (Alavi & Leidner, 2001; Von Krogh, 1998). As opposed to the private sector where the main objective is for maximizing income and profits, the three essential pillars of public sector performance are the service delivery quality, innovation, and operational service efficiency of the organization (Cong & Pandya, 2003). Unfortunately, to the best of our knowledge, there are no recent studies in the literature that have comprehensively discussed the impact of KMS implementation in the public sector, especially related to a statistical activity like census or survey, though there have been few studies in the public sector that looked at the implementation of KMS on human resource-related fields including employee motivation, managerial initiatives, and job assignment. A comprehensive discussion of KMS implementation in statistical activity would enable policymakers to prioritize the KMS implementation in line with BPS performance goals. Moreover, such discussion would provide the ability of BPS to identify the existing knowledge management processes and encourage enhancements to those discovered to be lagging in demonstrating the ideal performance, in terms of the implementation efficiency and effectiveness.

Based on the current situation and challenges, the implementation of KMS in BPS is inevitable. KMS is necessarily needed to support the census or survey. KMS is much believed would make statistical activity run smoothly, especially IPC2020. In this research, we investigate the implementation of KMS in BPS, especially on supporting IPC2020. The acceptance towards KMS implementation will be evaluated using the technology acceptance model (TAM) approach but limited only to analyse the impact of perceived ease of KMS use towards its perceived usefulness.

2. Theoretical Background

2.1. Knowledge Management System (KMS)

Knowledge is hard to be defined precisely, since many scholars have different ways to comprehensively understand its role and benefit according to their perspectives. An earlier study (Nonaka et al., 1996) has provided a definition of knowledge as a useful and meaningful collection of information that consists of a legitimized correct belief and/or a representation of technical ability. Knowledge is the progression of transforming information and earlier practices into a set of relationships which possess meaning that is understandable and applicable by individuals (Debowski, 2005).

Knowledge is one of the most important assets of an organization, yet is often left behind, not well documented, difficult to access, and, even worse, potentially disappear. As the business process of an organization is still running, the knowledge that belongs to the organization will continue to grow. Therefore, the importance of knowledge management is inevitable. Knowledge management can be explained as a mechanism of identification, selection, arrangement, and disseminating essential expertise and information that is part of an institution in an organized form (Lucas, 2008).
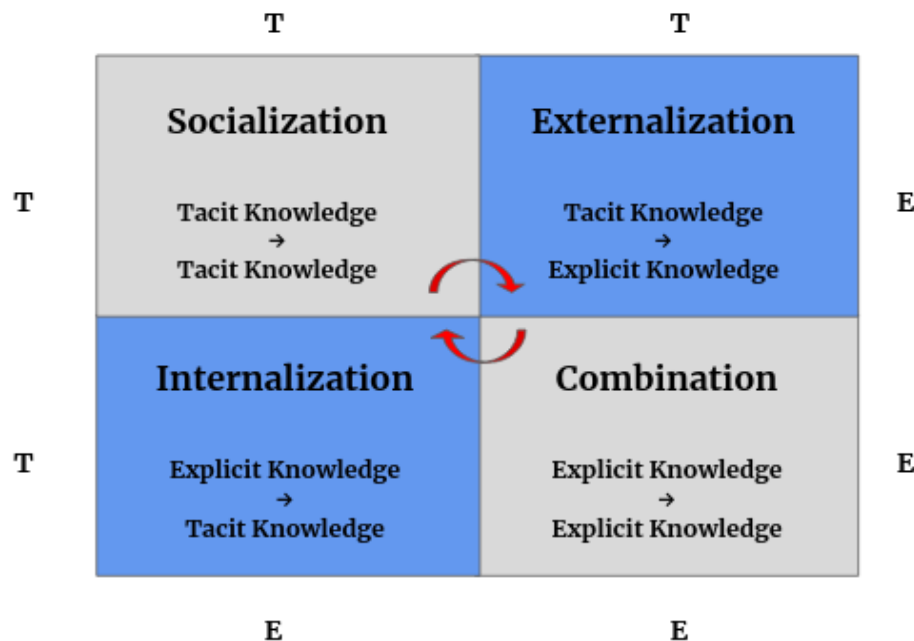
Figure 1. SECI Knowledge Conversion Model (Nonaka & Takeuchi, 1995)

The SECI model is firstly presented by Nonaka & Takeuchi and it has become the establishment of the theory of knowledge creation and transfer. They introduced four different approaches that knowledge types can be consolidated and converted, demonstrating how knowledge can be created and shared in any particular organization (Nonaka & Takeuchi, 1995). The model depends on two different forms of knowledge: tacit and explicit. In the SECI model, the fundamental process for knowledge creation and sharing in the KM process consists of the socialization, combination, externalization, and internalization processes (Becerra-Fernandez & Sabherwal, 2015). Socialization is a knowledge conversion from tacit to tacit. Its sources could be passed on through observation, guidance, and practice. Externalization is an alteration from tacit to explicit knowledge. In other words, it is a codifying process of tacit knowledge into documented forms, such as manuals and books. Meanwhile, combination is a conversion between explicit knowledge. Documents scanning is an example of combination process. Lastly, internalization, the opposite of externalization, is a transformation of explicit to tacit knowledge, such as reading a book and taking a course.

Meanwhile, KMS is a supporting system to manage the organizational knowledge. The knowledge management system is developed using three components of the technology, those are collaboration, communication, and storage & retrieval (Tiwana, 2002). Many organizations have successfully implemented KMS. A US government organization has implemented knowledge management in its human capital strategy by applying the knowledge management pyramid to its framework (Liebowitz, 2003). In the same year, a study in Australia shows that knowledge management was alleged to be more about evolving the culture of knowledge than about managing organizational structure and processes (Zhou & Fink, 2003). KMS is also proven to increase firm performance, it helps to reduce administrative cost and improve productivity (Feng et al., 2005). Higher education in Taiwan sees the implementation of KMS as a reasonable step in order to enhance quality and performance (Chou Yeh, 2005). Another study (Chong & Chong, 2009) proposes that knowledge management implementation could be done with the support of knowledge management preliminary success factors (organizational structure, business strategy, knowledge map, knowledge management team, and knowledge audit) and knowledge management elements (culture, leadership, measurement, and technology). Successful implementation of KMS also needs a knowledge management-oriented culture within the organization as a pre-requisite (Erwee et al., 2012). Meanwhile, research in German shows that numerous existing family firms do not utilize their maximum potential with regards to their knowledge base management (Döring & Witt, 2020).

According to previous study (Nor et al., 2011), KMS is defined as an instrument meant for creating the knowledge repositories, enhancing the access of knowledge, and sharing along with communication through collaboration. KMS improves the environment of knowledge and manages knowledge as an institutional asset. The experts state that for an institution to manage its knowledge properly, it highly needs a KMS. Such system encourages users to collaborate regardless of place and time, even more so, using different platforms. In other words, it is a tool for organizational collaboration internally and externally with the aim to create, store, share, and implement the knowledge.

2.2. Official Statistics
Official statistics, based on (Law of The Republic of Indonesia on Statistics, Number 16, 1997), are a compilation of data and information, also called as statistics, officially disseminated by government agencies or other public sector entities. Official statistics can be divided into three types, basic statistics, sectoral statistics, and specific statistics. Basic statistics are statistics intended for broad purposes, whether for the government or the community. Basic statistics can only be provided by the government agency, which is BPS. IPC2020 is one of the censuses carried out by BPS in order to provide basic statistics.

2.3. Technology Acceptance Model (TAM)
Many researchers, especially in the information system, use the technology acceptance model (TAM) as the framework to defining the acceptance level of an information system. TAM, presented by F.D. Davis in the previous study (Davis, 1989), is the modification from the Theory of Reasoned Action (TRA), which is constructed particularly to model user acceptance of any specific information systems. The purpose of this technique is to give an explanation of the acceptance determinants of the computers utilization in general, ready to explain the user behaviors for all populations and ranges of users of computer system and technology, which matchs in parsimonious and hypothetically.

TAM proposes two things are accepted as the true realities: perceived usefulness and perceived ease of use, as the principal association to the behavior of computer acceptance (Davis, 1993). The first principle, perceived usefulness, is defined as how much an individual accepts that using a specific system can improve its performance. While the second principle, perceive ease of use, is defined as how much an individual accepts that using the system is not needed any effort (effortless). Perceive ease of use likewise influences the perceived usefulness which may imply that if an individual feels the system is not difficult to utilize, the system is valuable for them.

2.4. TAM Approach in KMS
In previous research (Money & George, 2005), TAM was used to investigate user behavior in accepting. They highlighted that the accomplishment of KMS is begun unquestionably with individual acceptance. The study attempts to widen understanding of the connection between two significant research themes of Information Technology (IT): user acceptance of IT and knowledge management organization. TAM model is utilized in the study because it has been broadly embraced among IT researchers and seems to be growing rapidly, has the reliability, and build legitimacy were set up.

3. Methodology
The focus of this study is mainly to describe the implementation of KMS in supporting census activity, especially IPC2020. Technically, this is the first time of KMS implementation on supporting census/survey activity held by BPS in Indonesia. Therefore, as the basic data provider in Indonesia, BPS is still currently learning how KMS should be implemented inline to the standard statistical business process. However, this research will focus on demonstrating the influence of perceived ease of use towards perceived usefulness as suggested in previous research (Davis 1989). This is due to KMS will still be used as part of the employee's daily activity despite are still being developed.

A survey was established using a questionnaire based on TAM for investigating an employee's acceptance of KMS. The questionnaire was made with the Integrated Collection System (ICS) and distributed through Microsoft Kaizala. Respondents were all of BPS employees involved in IPC2020

with collection's period in late October 2020. The respondents are asked whether they have experienced in accessing KMS, and if they respond in the affirmative, they are invited to take part in the survey. Respondents are requested to choose the response which best portrays the level of agreement on a 7-point Likert scale, from "strongly disagree" (encoded as 1) to "strongly agree" (encoded as 7).

Variables and questions which were used in the questionnaire are explained on Table 1. "Perceived Usefulness" is the dependent variable in this research. Meanwhile, the independent variable is "Perceived Ease of Use".

Table 1. Measured Variables and Questions

Variables	Questions
Perceived Ease of Use	1. Learning the operation of KMS is easy for me. 2. Using KMS makes it easier for me to access the knowledge I need. 3. The use of KMS is clear and understandable. 4. The use of KMS is very flexible. 5. To master and be skilled in using KMS is very easy for me. 6. Overall, KMS is easy to use.
Perceived Usefulness	1. Using KMS allows me to complete daily tasks more quickly. 2. The use of KMS improves my work performance. 3. The use of KMS increases productivity in my work. 4. The use of KMS increases effectiveness in my work. 5. Using KMS makes my job easier to do. 6. Overall, KMS is very useful for my work.

As the data were all collected, each individuals score will be converted to t-score. The formula of conversion is shown below. Regression analysis were conducted to the converted data subsequently.

$$tscore = (zscore \times 10) + 50 \tag{1}$$

Until the end of the survey period, 4,948 responses were successfully collected. Descriptive analyses were used to describe the characteristics of the sample. We build a regression model using SPSS 26 to determine the influence of perceived ease of use towards the perceived usefulness of KMS in BPS.

4. Results and Discussions

4.1. Results

The knowledge capturing process is developed through virtual discussions on Microsoft Kaizala. These discussions are carried out by utilizing the 'Ask Question' feature implemented on Microsoft Kaizala which is installed on employee's cell phones. The number of recorded questions during the IPC2020 period is 980 questions. As shown in Figure 2, out of a total of 980 questions, 665 questions are successfully answered.

From the collected and answered questions, the questions are grouped based on categories and subcategories to make it easier in arranging candidate knowledge content. The next step is to summarize the questions and answers which have a similar topic. The summarizing process is done manually with the help of the Questions and Answers (QnA) management application.
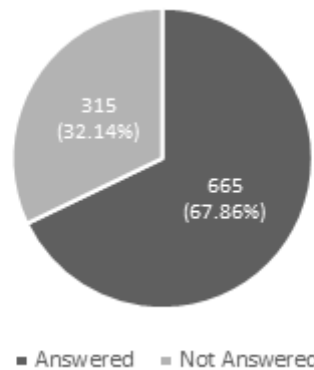
Figure 2. Percentage of questions based on responses related to IPC2020.

The summarizing process produced 122 knowledge contents related to IPC2020. In comparison to the collected and answered questions, only 12.44% of which is made into knowledge contents. This was due to the large of similar questions so that one knowledge content could have been created from several questions. The total views of knowledge contents related to IPC2020 are 7,209 views. Thus, the average views per content are 60 views.

Out of 4,948 responses, only 967 respondents have accessed KMS as described in Figure 3. This happens because the KMS utilization has not been widely echoed by BPS employees. The socialization process is an important phase in the knowledge lifecycle. Therefore, BPS has to take it seriously for the success of KMS implementation.
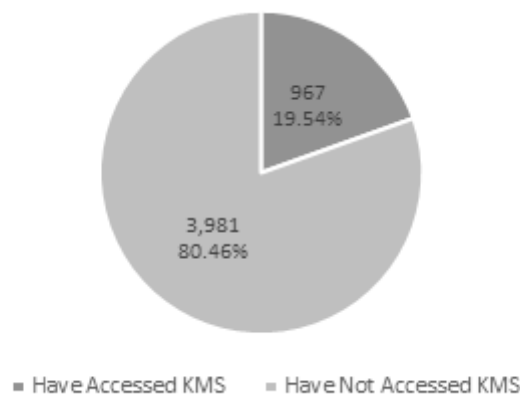

Figure 3. Percentage of respondents who have accessed KMS.

Table 2. Regression Analysis Between the Perceived Ease of Use and the Perceived Usefulness *(alpha = 0,05)*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	7.762	.878		8.837	.000
Perceived Ease of Use	.845	.017	.845	49.036	.000
a. Dependent Variable: Perceived Usefulness					

In this study, the influence of the perceived ease of use on perceived usefulness is also being investigated. Simple regression analysis is conducted and the result is described in Table 2. Based on Table 2, the significant value of perceived ease of use is under 0.05, which means it is proven that perceived ease of use significantly influences perceived usefulness. Table 2 also explains the positive relationship between perceived ease of use and perceived usefulness which indicates by non-negative coefficient of perceived ease of use. It can be inferred that the easier to use KMS will increase the perception of its usefulness.

4.2. Discussion

According to Figure 2, over 30% of the questions were not answered. It occurred due to the large number of questions submitted almost at the same time. This causes several questions were left unanswered. The other problem was network issues. Sometimes, when the question responder entered a poor network area, the question was not fully loaded. Therefore, the question remained unanswered.

In fact, this KMS implementation is firstly undergone to support census/survey activities in BPS, the results are quite encouraging. The number of views shows that employees welcomed KMS quite well. It seems promising for future implementation since knowledge is a precious and useful asset to an institution. It is easier to find solutions to problems encountered during the census/survey period. This also shows that the internalization process, as described in the SECI model, is going pretty well.

5. Conclusion

In this study, we examine the impact of knowledge management system utilization in the 2020 Indonesia Population Census (IPC2020). Based on the results and discussion of this study, there is a positive influence between perceived ease of use and perceived usefulness of KMS implementation. Therefore, in order to make KMS more useful to all BPS employees, the developer of KMS in BPS has to make KMS easier to use in future expansion. The stakeholders of KMS have also to consider its infrastructure for more practical use. Since KMS will be accessed by all BPS employees, the KMS has to run flawlessly. Hence, bigger bandwidth and larger capacity server are undoubtedly required.

Further investigation on the alignment evaluation of KMS in BPS to comply the standard Generic Statistical Business Process Model (GSBPM) and its implementation maturity level according to the Strategic Alignment Maturity (SAM) model are parts of our future works.

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