

The System Feature Identification for Accelerating Government Human Capital Knowledge Improvement

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Abstract—The knowledge management system is information technology to support knowledge management activities in an organization. Defining KMS features in government institutions can be conducted by identifying the KM process is represented by some indicators. Many studies have been done in developing the KM system in various sectors. However, research on the KM system in human capital management has not yet been much published. This research aims to define a priority order of knowledge management process and identify knowledge management system features for Government Human Capital Management. Data collection has been done by distributing questionnaires (253 respondents) and interviewing stakeholders (9 experts) of the institution for human capital management in Indonesia (KemenPAN&RB, BKN, and LAN). We used three analysis methods: the Analytical Hierarchy Process (AHP), Pearson Correlation (Pearson's R), and the Expert Judgment method. As a result, we found major features of KM system for HCM in Indonesia, including electronic group discussion (best practice and lesson learn), work performance evaluation (daily activities and profile), communication tools (e-mail, chat and video conference), document management (digital document and physical document) and expertise management (decision support, expertise locator and expert knowledge). The limitation of this study is the topic of research specific to the KM system for government human capital management in Indonesia. The object research only three government ministries appointed to be government human capital management managers. Recommendation KM system in the government institution must be implemented to facilitate KM process align with the organizational strategy and objectives.

Keywords— Knowledge management; analytical hierarchy process; human capital; Pearson correlation; government.

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I. INTRODUCTION

Knowledge management (KM) currently emerges as strategic management for an organization. Generally, KM can enhance the competitive advantages of an organization through its intellectual capital, innovations, and services [1]–[3]. It can occur when organizational knowledge is well managed by organization management. There are many research has been done in developing KM system in various sector, for example military [4], education [5]–[7], business [8]–[13], agriculture [14], health [15]–[17], entertainment [18], government: [19], [20] and research [21], [22]. The KM system is important to implement all sectors, including the government sector, especially regarding public services for human capital management (HCM).

However, the studies of the KM system for human capital management have not yet been much published. Whereas KM should manage government institution knowledge well because it is an intellectual capital asset of an organization. Moreover, by combining KM and HCM, government institutions can reach the competitive advantages of an organization.

Human capital management (HCM) is activities in retaining, developing, motivating, and attracting employees. It also manages the career, training, reward, and recruitment process to support organizational function and performance. Otherwise, HCM can enhance the competitive advantages through its retention, management of talent, employee commitment, learning and development, capability, transformation, leadership, engagement of employee, management, and organizational learning [23]–[26].

In Indonesia, there are three government institutions for Human capital management including Ministry for Administrative and Bureaucracy Reform or *Kementrian Pendayagunaan Aparatur Negara dan Reformasi Birokrasi* (KemenPAN&RB), National Institute for Administration or *Lembaga Administrasi Negara* (LAN) and National Civil Service Agency or *Badan Kepegawaian Negara* (BKN). KemenPAN&RB, LAN, and BKN to manage human capital in government. The role of those institutions is to support the bureaucratic reform program, which one of the objectives is developing the professionalism of human capital management. Based on the regulation in Indonesia, the process management of human capital relied on competence, performance, and merit system [27], [28].

BKN duties and function are to arrange and evolve government human capital management. BKN also has a responsibility to do a management process in human capital management. Hence, the responsibilities of LAN are performing in arranging the programs of research and development for public capital. Otherwise, the responsibilities of KemenPAN&RB is related to supervise government capital management [27], [28].

BKN, LAN, and KemenPAN&RB have specific core knowledge and expertise in managing the government's human capital. Three government institutions mentioned above should conduct coordination, cooperation, and collaboration to enhance their duties and function performance based on their knowledge and responsibility. In this case, information technology is important to simplify and accelerate coordination, cooperation, and collaboration through the knowledge-sharing process [27], [28].

Mostly, defining a suitable KM system for a government institution is challenging. Some organizational challenges in KM implementation such as hierarchical corporate culture, human resources, IT infrastructure and government regulation commonly occur. To tackle organizational challenges in knowledge management system development, this study proposed three methods to define knowledge management system features based on the identified process of knowledge management in managing government human capital [1], [28].

Based on the research background above, these research purposes are to define KM process and KM technology to support the KM system feature identification of government human capital management in Indonesia through analysis of Pearson Correlation Analysis (Pearson's R), Analytical Hierarchy Process (AHP) and Expert Judgment.

II. MATERIAL AND METHOD

The research method consists of seven phases. The phases are literature review, research instrument development, data collection, data analysis (using Analytical Hierarchy Process, Pearson Correlation, and Expert Judgment), mandatory feature identification, and conclusion. All the phases are described in Figure 1.

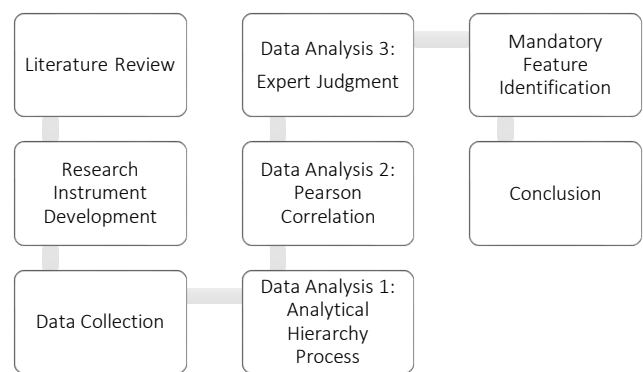


Fig. 1 Research method

A. Literature Review

Several previous studies have been done related to knowledge management system in various sectors, including military [4], education [5]–[7], business [8]–[13], agriculture [14], health [15]–[17], entertainment [18], government: [19], [20] and research [21], [22].

Especially in the government or public sector, the research has been completed by researchers in some countries [19], [20], [29], [30]. Edwards et al. promote the exchange of knowledge based on the KM process within a region and central organization. They identify the technologies that support KM in tackling organizational problems as related information and knowledge [29].

Jia et al. [30] combine artificial intelligence based on knowledge resources and efficiency of knowledge management activities to evolve the KMS framework to solve the tourism crisis. Albassam et al. [19] proposed the knowledge management system to support the good governance principles in Saudi Arabia.

B. Research Instrument

The research instrument was developed based on the prior study relevant to this study. Development of each instrument criteria is done by outlining concept mapping. The concept mapping determines the classification of KM process, KM Sub Process, KM Systems, KM Mechanism, and KM Technologies, which take on from Becerra et al. research [1].

Refers to the prior studies, KM process are related to knowledge capture (C), knowledge discovery (D), knowledge application (A), and knowledge sharing (S) [1], [31]–[33]. This process is incorporated into KM mechanism, KM sub-process and KM technologies. KM sub-process consists of seven processes including socialization, combination, socialization, externalization, exchange, routines and directions [1], [34], [35].

The research instrument consists of thirty-seven instrument items. Each item represents some groups of KMS features and components of the KM process and sub-process. The result of the pilot study showed that each variable is accepted (valid) because of the score of Cronbach's Alpha greater than 0.7. According to [36], [37], Cronbach's Alpha with score from 0.7 until 0.9 is classified into high reliability. Hence, each answer of research questionnaire items is presented into alphabetical SS for Strongly Agree, S for Agree, N for Neutral, TS for Disagree, STS for Strongly Disagree).

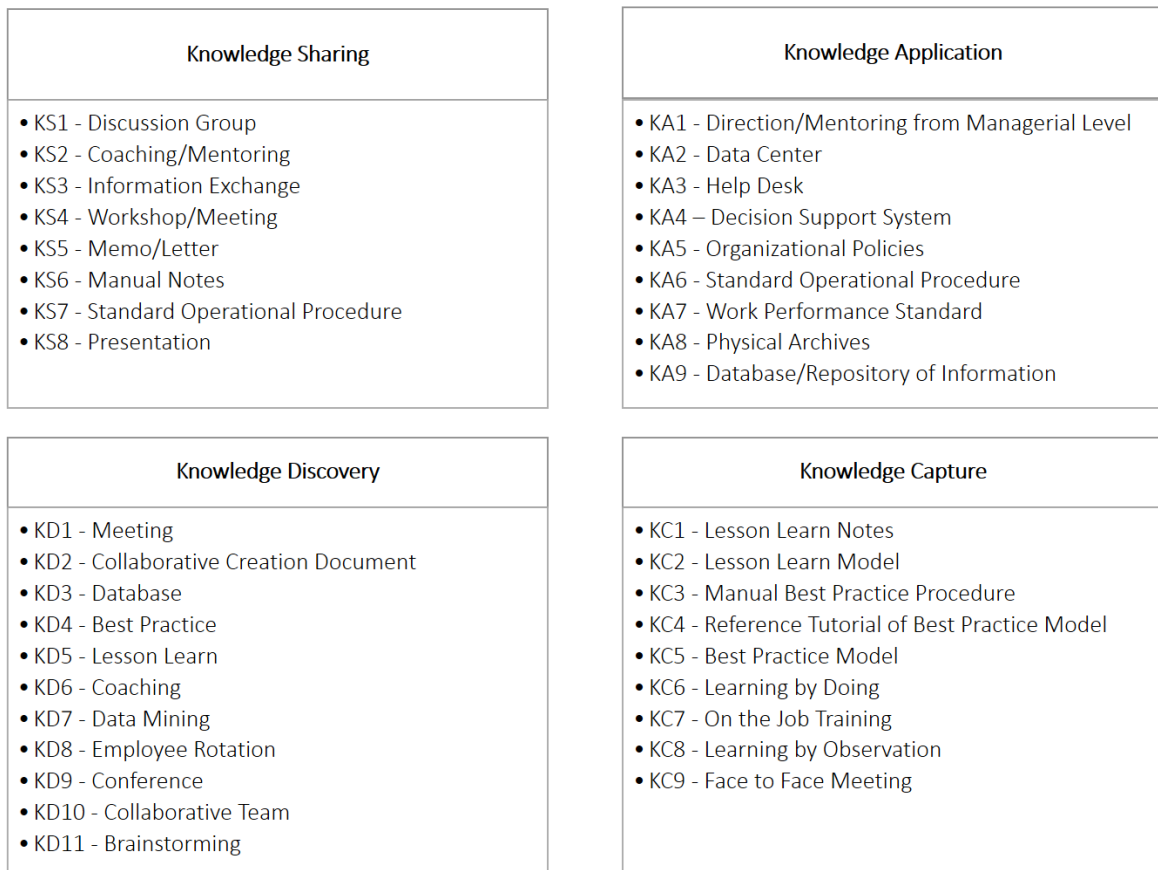


Fig. 2 Research instrument of the knowledge management process

C. Data Collection

Data collection using a questionnaire was distributed to the top management teams of government human capital in KemenPAN&RB, LAN, BKN. The number of respondents is 253 persons who are consists of 113 data is structural, 127 data is non-structural, and 13 data is not identified. The collected data of this questionnaire was analyzed using AHP and Pearson's R. Moreover, to complete the expert judgment analysis, we interviewed nine experts with topic discussion related to KM system features.

D. Analytical Hierarchy Process (AHP)

AHP is a method to consolidate subjective judgments from the expert into the mode of an objective. It used a structured hierarchy to resolve normal problems into extremely complex issues. AHP described was multi-level, including factor level, criteria, and sub-criteria up to alternative. AHP consist of several phases, including identifying the problem, developing a hierarchical structure, forming the comparison of a pairwise matrix from the criteria, normalizing the data, calculating Eigenvalue, and conducting a consistency test. This phase is a repetitive step at every level of the hierarchy. The Eigenvalue vector calculation is conducted for each pairwise comparison matrix. For consistency testing of the hierarchy, the result must be in the range of CR score < 0.1 [38]–[40].

AHP also can increase the accuracy level of the best alternative solution of variables. Moreover, AHP is a method for decision-making by representing the decision alternative. The AHP process is started by capturing and converting

individual preferences into a rational scale that describes each decision alternative's weight. Generally, AHP is an approach to select the best alternative solution by sorting the weight value of each option based on the priority of variables [41]–[44].

Research related to the AHP method [45] determines the web service feature by prioritizing it using AHP method. Other research using AHP in photovoltaic power plants project [46]. At the same time, some previous work used Pearson correlation analysis to analyze student obesity [47]. This method also used to analyze vehicle suspension behavior in the Macpherson suspension system project [48].

E. Pearson Correlation Analysis (Pearson's R)

Pearson Correlation Analysis or Pearson's R used to measure linear dependence among variables. This coefficient can measure the extent of two factors for predicting each other. The coefficient of variables relation is acceptable if the variables score smaller than score 1 and greater than score -1 with a significant level is 0.05. It represents the correlation of variables, intensity, direction, and relativity. Pearson's R also describes the similarity of variables to approximate a prediction and alternative accurately. Generally, Pearson's R is utilized to reflect relation among variables by show the rank of variable value to estimate the best recommendation of an alternative variable [49]–[53].

F. Expert Judgment

Expert judgment is mostly utilized in technical and social areas to solve problems and estimate information based on

specialist knowledge. Measurement result from the expert represents the knowledge which is used for problem-solving. Expert knowledge also can reduce uncertainty decisions. Usually, expert judgment is utilized as a resource of scientific information from an expert. This information and knowledge are used for decision-making. The expert judgment was done if we did not have any historical data related to the problem encountered. Therefore, expert knowledge and experiences are used to predict problem-solving. This method also can be used to estimate the probability and decided the policy to be taken. Expert judgment is the key in analyzing if the expert knowledge and experience are appropriate to the validated topic or problem [54]–[56].

III. RESULT AND DISCUSSION

In this section, we elaborate research results through four sections, including the result of the analytical hierarchy process, Pearson correlation, expert judgment, and feature identification.

A. Result of Analytical Hierarchy Process (AHP)

AHP analysis result presented all criteria have a consistency ratio is ranging from 0.02 to 0.05. This result indicated that the criteria are accepted because the consistency ratio (CR) score must be smaller than 0.1, as mentioned before. The result of KMS features analysis is shown in Figure 3 as follows.

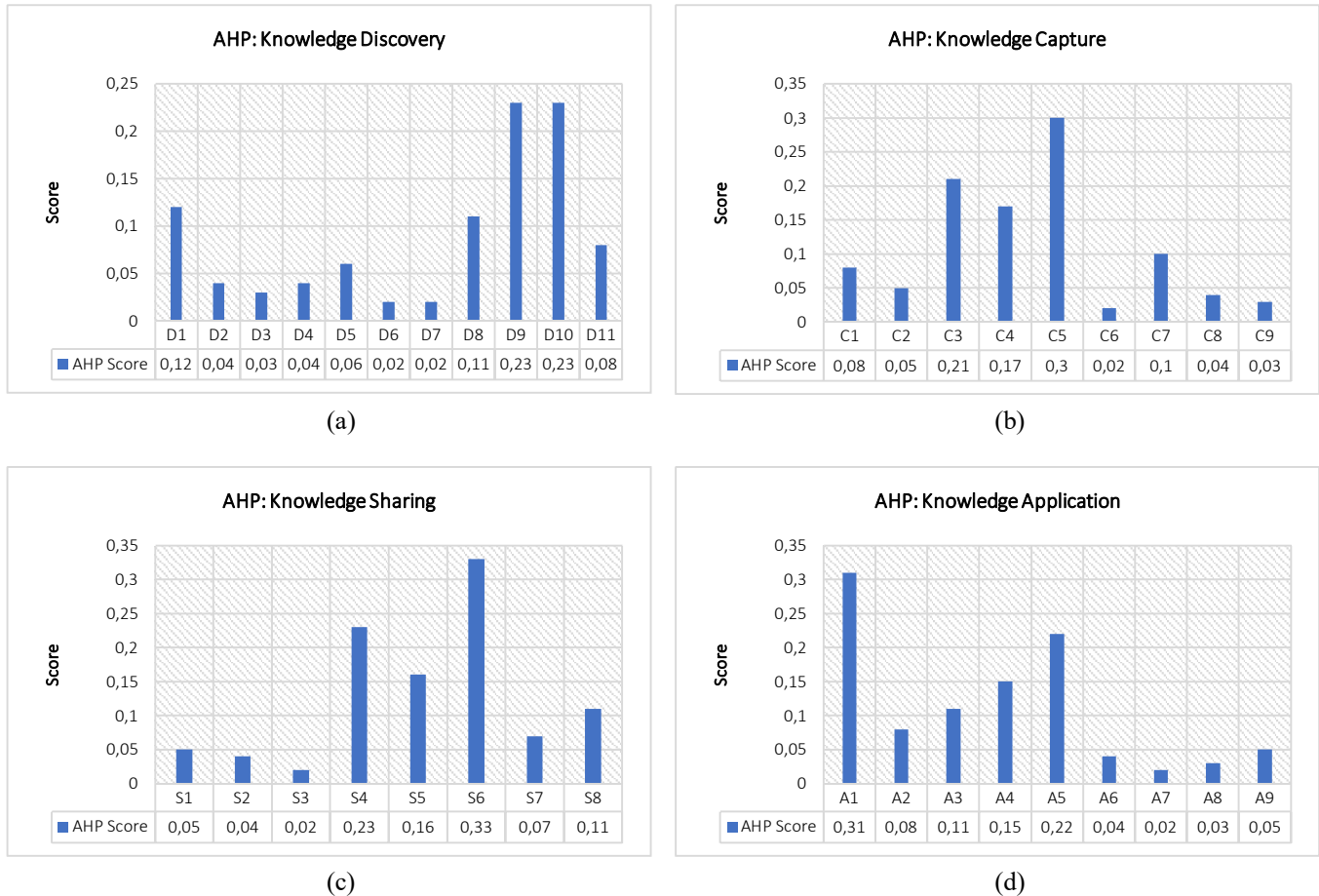


Fig. 3 Result of data analysis using analytical hierarchy process

Based on Figure 3, the priority order of the process in Government Human Capital Management (GHCM) (=the most important first) using AHP is defined as follows:

- Knowledge discovery (Figure 3.a): KD (AHP) = ‘D9’, ‘D10’ < ‘D1’ < ‘D8’ < ‘D11’ < ‘D5’ < ‘D2’ < ‘D4’ < ‘D3’ < ‘D6’, ‘D7’.
- Knowledge capture (Figure 3.b): KC (AHP) = ‘C5’ < ‘C3’ < ‘C4’ < ‘C7’ < ‘C1’ < ‘C2’ < ‘C8’ < ‘C9’ < ‘C6’.
- Knowledge sharing (Figure 3.c): KS (AHP) = ‘S6’ < ‘S4’ < ‘S5’ < ‘S8’ < ‘S7’ < ‘S1’ < ‘S2’ < ‘S3’.
- Knowledge application (Figure 3.d): KA (AHP) = ‘A1’ < ‘A5’ < ‘A4’ < ‘A3’ < ‘A2’ < ‘A9’ < ‘A6’ < ‘A8’ < ‘A7’.

Based on the priority order of process using AHP, we identified main KM processes of GHCM for KM system are Conference (D9), Collaborative Team (D10), Best Practice Model (C5), Manual Notes (S6), Direction/Mentoring from Managerial Level (A1).

B. Result of Pearson Correlation (Pearson’s R)

To validate the result of Pearson Correlation (Pearson’s R) analysis can be seen from the value of indicator that has a value greater than value -1 and smaller than value 1. The analysis result from Pearson’s R analysis is shown in Figure 4 below.

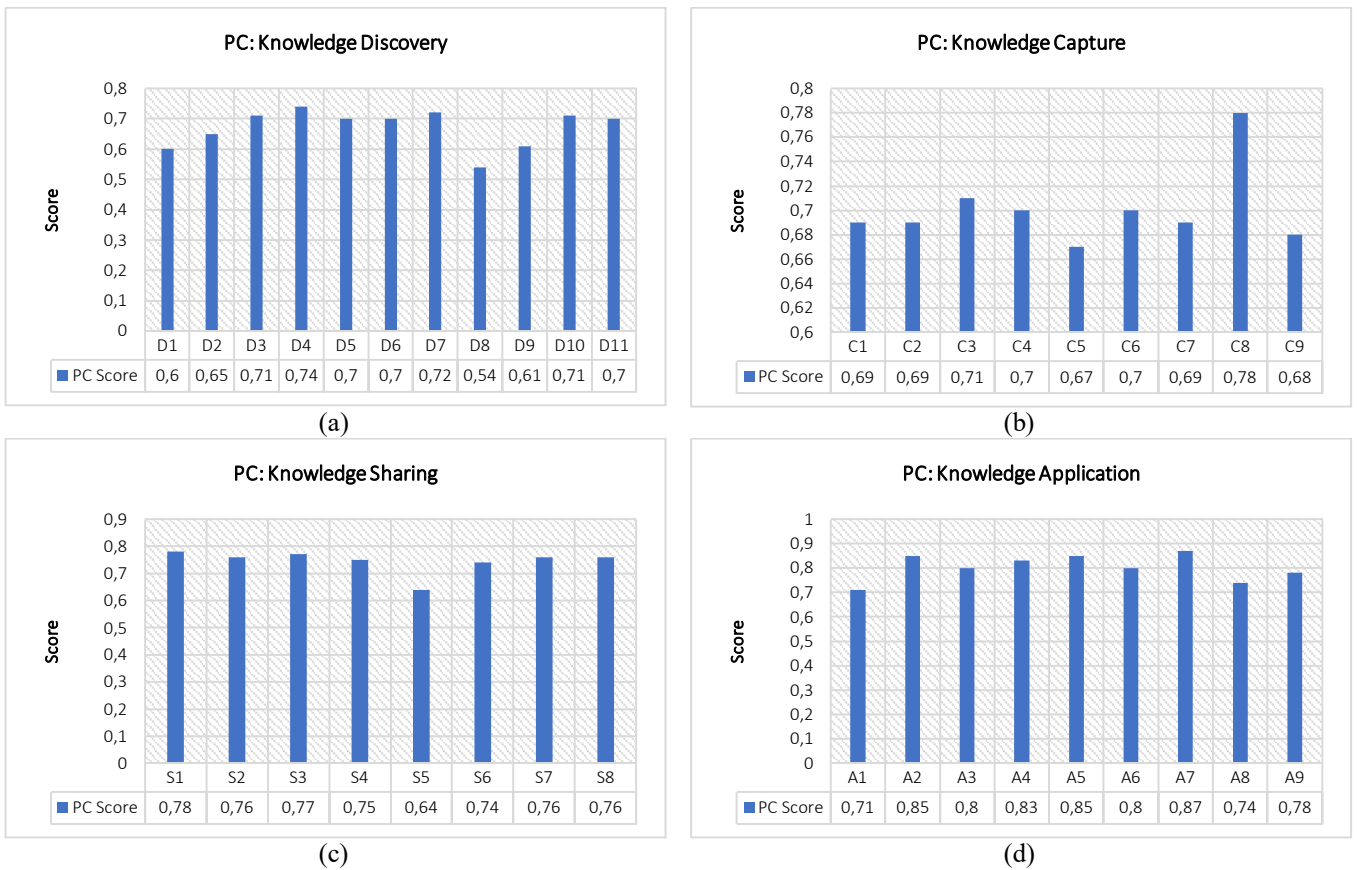


Fig. 4 Result of data analysis using Pearson correlation

Figure 4 shows the priority order of process using Pearson's R in Government Human Capital Management (GHCM) (=the most important first) is defined as follow:

1. Knowledge discovery (Figure 4.a): KD (Pearson's R) = 'D4' < 'D7' < 'D10' < 'D3' < 'D11' < 'D5' < 'D6' < 'D2' < 'D9' < 'D1' < 'D8'.
2. Knowledge capture (Figure 4.b): KC (Pearson's R) = 'C8' < 'C3' < 'C4' < 'C6' < 'C1' < 'C2' < 'C7' < 'C9' < 'C5'.
3. Knowledge sharing (Figure 4.c): KS (Pearson's R) = 'S1' < 'S3' < 'S2' < 'S7' < 'S8' < 'S4' < 'S6' < 'S5'.
4. Knowledge application (Figure 4.d): KA (Pearson's R) = 'A7' < 'A2' < 'A5' < 'A4' < 'A3' < 'A6' < 'A9' < 'A8' < 'A1'.

Based on the priority order of process using Pearson's R, we identified main KM processes of GHCM for KM system are Best Practice (D4), Learning by Observation (C8), Discussion Group (S1), and Work Performance Standard (A7).

G. Result of Expert Judgment

After we found the score of AHP and Pearson's R, we conducted an expert interview to define the feature of KMS that support identified KM process. Based on the analysis result using AHP and Pearson's R analysis, it can be concluded that all the KM process is accepted. It can be proved by the consistency ratio of AHP result, which shows all KMS feature have CR smaller than value 0.1. While, from the Pearson's R analysis result presented all KM process value is more significant amount -1 and smaller than value 1, so all features are accepted.

Those KM processes from both AHP and Pearson's R methods were compared to get the best priority of KMS features. The validation of the KM system features was done by using expert judgment. Nine experts in government institutions (KemenPAN&RB, LAN, BKN) were interviewed. They are top management level in the organization. Those experts also have knowledge and experiences related to the process of human capital management in their organization. In the interview session, we defined a mandatory feature and optional feature of the KM system. The statistical data of expert judgment for a mandatory feature is depicted in Figure 5 below.

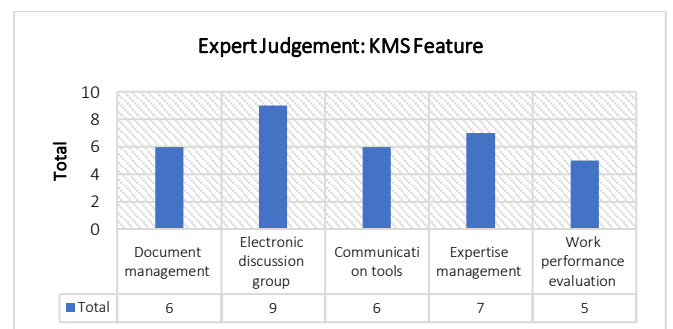


Fig. 5 Result of data analysis using expert judgment

Figure 5 shows the judgment result of the KM system features, i.e., document management, electronic discussion group, communication tools, expertise management, and work performance evaluation.

Document management can be used for storing the document in a structured format. A document can be classified into a physical and digital document. The management of documents usually using metadata for searching the document easily [1], [57]–[61]

Electronic discussion group, for example, the group contained best practice knowledge. It can be a resource of best tutorial for the benchmark model and similar task to assess the future task. It provides references for several legal proceedings and human resource problem-solving. The best practice is usually has criticized, evaluated, and validated by organizational expertise so it can be a guideline for the next project or task [1], [62], [63].

Communication tools, for example, e-mail usually used to exchange information related to jobs and tasks. It disseminates information or knowledge among organization members. The e-mail also provides several document types that organizational members can share, such as text, picture, video, audio, etc. The e-mail also simplifies and speeds up information and knowledge exchange in a long distance.

Expertise management can be used to share up-to-date knowledge from other people (individual) or organizations

(teams). These facilities can disseminate knowledge in real-time and unlimited distances [1], [30], [64]–[66].

Work performance evaluation tools generally can be used for employee profiles and logbook activity. It captures and records individual knowledge in daily activities, which the managerial level can monitor and evaluate. Work performance also provides people with performance related to the knowledge management activities in the organization [1], [67]–[69].

H. Result of Feature Identification

The five identified mandatory have optional features to implement to KM system. The complete representation of A mandatory feature and optional feature of KMS is depicted in Figure 6 below. According to some experts, KM process has already been implemented in their government institution. Align with their duties in public services such as a technical manager of human resource process and information system, organizers and coaches for development program and supervisors of all government institution based on the civil servant regulation and policy [70].

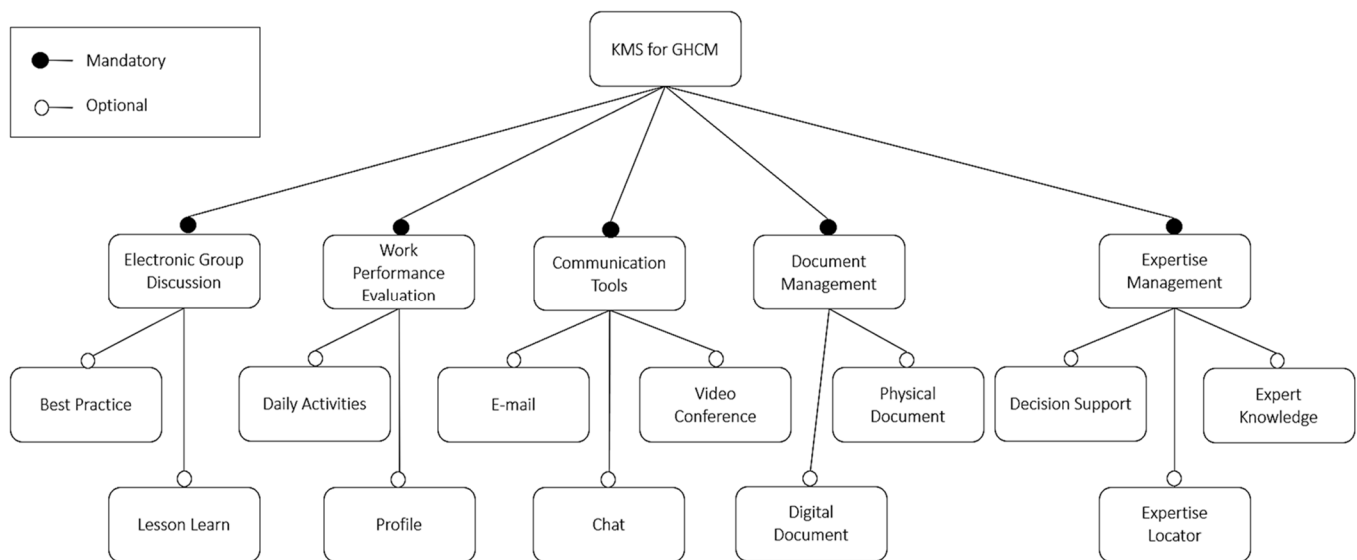


Fig. 6 Feature modeling of knowledge management for government human capital management

IV. CONCLUSION

KM system is needed to support its management activities in the present. The KM mechanisms are transformed into KM technologies for supporting the KM system. The KM system features is a problem solution for the government KM process. In this research, the KM system features were determined from Analytical Hierarchy Process (AHP) and Pearson Correlation (Pearson's R) analysis, validated using the Expert Judgment method. We found the main features of KM system for HCM in Indonesia, including electronic group discussion, work performance evaluation, communication tools, document management, and expertise management.

The limitation of this study is the topic of research specific to the KM system for government human capital management in Indonesia. The object research only three government

ministries appointed to be government human capital management managers. Recommendation KM system in the government institution must be implemented to facilitate KM process align with the organizational strategy and objectives.

The future work of this study is developing each priority KM system features using information system development methodology. At the same time, the other features can be developed based on the requirement development timelines. Furthermore, the KM system can be developed for whole government ministries in Indonesia to support the government's human capital management activities.

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