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Original Research

A framework for assessment of knowledge management in South African government departments

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Background: This study seeks to evaluate knowledge management (KM) levels in South African government departments and develop a framework for effective assessment and improvement.

Objectives: The study aims to develop a framework for the assessment of KM in three South African government departments: Department of Communication (DOC), Department of Science and Technology (DST) and Government Communication and Information System (GCIS).

Method: A quantitative approach was used to assess the COBIT 5 management processes: *Manage human resource* (COBIT-APO07) to optimise the human resources (HR) capability to ensure that proper HR structures and skills are in place and *manage knowledge* (COBIT-BAI08) to ensure systematic creation, capturing, sharing and application of knowledge is applied. An online closed-ended questionnaire was distributed using Google Forms. A sample of 103 participants was selected using the mixed purposeful sampling technique.

Results: The COBIT 5 Process Capability Assessment reveals different levels of maturity across the departments. GCIS, DOC, and DST indicated predominantly Level 1 maturity, whereas DOC's APO07 and DST's BAI08 processes demonstrated Level 2 maturity.

Conclusion: This study identified areas for improvement and suggests that further government evaluation is necessary for effective resource management.

Contribution: This study developed a comprehensive framework that integrates KM theories with COBIT 5 management, enhancing research validity and providing practical guidelines for improving KM in government departments.

Keywords: knowledge management; COBIT 5; framework; assessment; framework.

Introduction

Knowledge management (KM) is a topic that has been increasingly discussed over the past years and is described as one of the most important components to achieve and stimulate organisational performance and competitiveness (Areed, Salloum & Shaalan 2020). The South African government adopted KM and created a framework in 2003. This framework provides guidelines for implementing KM across all South African government departments. Currently, government departments are at different stages of implementing KM (Nenungwi & Garaba 2022).

Knowledge management plays an important role in accelerating service delivery and government departments in South Africa often fall short of formalised KM practices. Research studies indicate that one of the challenges in KM is a lack of promotion of knowledge sharing (Chua, Thinakaran & Vasudevan 2023). Knowledge is an important asset to any organisation; it fosters competitiveness, and it is therefore important for every organisation to know how to identify and share knowledge (Ayinde et al. 2021) to improve learning and accelerate performance (Ashok et al. 2021). Thus, the assessment of KM is important to government organisations.

Several studies have tried to offer ways to evaluate KM processes. For instance, Kashirskaya et al. (2020) applied the ISO-9000, ISO-12207/ISO-15504. ISO, ISO 9001:2015 and *Sarbanes–Oxley Act* frameworks to analyse KM and enhance the knowledge audit process to prevent KM failures in two Slovenian firms. Bougoulia and Glykas (2022) applied the ISO-9001/2018, ISO-30401/2018 and CEN-CWA-14924–1/2004 frameworks to propose a holistic and integrated KM maturity assessment. Fitriasari, Megasari and Piantari (2019) applied the 3T framework to assess the KM

system maturity level of teacher professional competence. Ejeh and Hall (2018) applied the knowledge evaluation framework and the skills-rule-knowledge framework to evaluate KM in the Nigerian public sector.

This study assessed the level of KM in three South African government framework departments (using the COBIT 5 framework processes: *manage human resource* (APO07) and *manage knowledge* (BAI08). The COBIT 5 framework was developed and designed by the Information Systems Audit and Control Association (ISACA) for IT management and governance (Dikotla 2021; Kashirskaya et al. 2020).

This study proposes a conceptualised framework for integrating KM systems to promote individual knowledge flows and knowledge processes (Liu, Kianto & Tsui 2023), thereby improving efficient service delivery and promoting consistency in the creation, storage and sharing of government knowledge.

Government departments are expected to provide continued service to improve transparency in their services. So far, service delivery is inefficient, a concern that needs to be addressed (Al Yami, Ajmal & Balasubramanian 2022). The KM has been developed and put into practice in various South African government departments. However, the knowledge-sharing processes are not formalised within the departments, leading to ineffective overall KM efforts.

Aladwan, Al-Yakoub and Adaileh (2022) highlight that government institutions face challenges in connecting information silos and overcoming this at all levels will enhance learning effectiveness. Ashok et al. (2021) and Radin Firdaus et al. (2020) emphasise the importance of knowledge collaboration between government departments and private organisations to build trust in government.

Problem statement

The role of the South African government departments is to provide continued, efficient service delivery and to implement policies that improve citizens' quality of life; the government's success depends on the implementation of KM (Aladwan et al. 2022; Negara et al. 2021). However, government departments fail to improve performance and service delivery because of the lack of collaboration and knowledge sharing to accelerate innovation (Negara et al. 2021). The lack of collaboration leads to the failure to KM implementation, which leads to unclear KM strategies that are not clearly defined and lack of commitment from top management (Aladwan et al. 2022; Mabunda & Du Plessis 2022). Delak (2015) also adds that identifying the KM levels and lack of continuous assessment also add to the challenges leading to the failure of KM adaptation in government departments.

Kashirskaya et al. (2020) and Ayinde et al. (2021) assert that performing a knowledge audit is the first stage to assess KM readiness in an organisation. Assessing a knowledge management system's (KMS) maturity level is essential to identify its current state and the desired level of maturity

for future development (Sfenrianto & Firmansyah 2020). A lack of collaboration and knowledge sharing among the departments has led to departments working in silos. Castaneda and Toulson (2021) support the idea that collaborative KM systems enhance department knowledge sharing. Idrees et al. (2023) further add that collaboration among departments can promote access to departmental methods and procedures, can be applied in various contexts and can be incorporated into various settings.

A study conducted by Al Yami et al. (2022) indicates that most literature in KM concentrates on issues and challenges in the private sector, not government departments. Various researchers indicate the gap in the public sector KM research (Aladwan et al. 2022; Al Yami & Ajmal 2019; Dikotla 2021; Kassa & Ning 2023). Therefore, it is important to understand how KM is implemented in government departments.

Based on a study conducted by Radin Firdaus et al. (2020), there is a growing need to assess KM to increase performance and service delivery within the South African government departments. However, there is a general lack of operational efficiency and convenience regarding the government departments' service access, which is a concern that needs to be addressed (Barbier & Tengeh 2022). Therefore, there is a need for more research on KM assessment and case studies, particularly in government departments (Laihonen, Kork & Sinervo 2023).

In order to improve the current state of KM, an assessment must take place (Kashirskaya et al. 2020). This study adapted the COBIT 5 framework to assess KM in three South African government institutions. Although much literature is available on studies that used broader frameworks, studies that applied COBIT 5 to assess KM in the public sector are limited (Ayinde et al. 2021; Delak 2015).

Research objectives

The primary research objective of this study is to develop a framework for assessing KM in South African government departments.

In order to address the primary objective, these secondary objectives are addressed:

1. *RO1*: To identify how to use COBIT 5 to *manage human resources* (COBIT: APO07), *manage knowledge* (COBIT: BAI08), and what criteria can be used for assessing the KM of the South African government departments.
2. *RO2*: To conceptualise a framework for assessing the KM using COBIT 5 to *manage human resources* (COBIT: APO07) and *manage knowledge* (COBIT: BAI08) processes for the South African government departments.

Research methodology
Research approach

This study applied a quantitative approach to assess KM in South African government departments. Furthermore, this

study applied the COBIT-5 framework to assess various KM processes and activities within these government departments. A survey approach was employed to evaluate the KM maturity level. A cross-sectional time horizon was applied to assess the the level of KM in the South African government department.

This study applied a closed-ended questionnaire, which was created using established scales constructed from the COBIT-5 framework to assess the level of KM in South African government departments. The questionnaire consists of fundamental demographic details, including respondents' age, gender, name of the department, component, designation, number of years working for the department and highest qualification completed and a section that included questions pertaining to the COBIT 5 management practice, namely *manage knowledge* (BAI08) and *manage human resources* (APO07), which provide a sufficient foundation for evaluating KM processes. The questionnaire consisted of 97 questions divided into three sections: enabling processes (36 questions in 11 subgroups), assurance (15 questions in eight subgroups) and the process assessment model (PAM) (28 questions). The first section (enabling process) and the second section (assurance) of the COBIT 5 were assessed using a possible answer ranging from 'yes' to 'partially' to 'no'. The third section of the questionnaire covered the PAM questions, which have a wider range of values, as the questionnaire allows for four possible answers based on: fully achieved, largely achieved, partially achieved and not achieved.

Population and sampling techniques

The population targeted in this study consisted of government officials working for a national government department with KM in place in their department.

The total population is 780, and a sample of 103 participants was selected from the three departments. In order to determine the sample size, this study utilised the creative research system's sample size calculator. With a 9% margin of error and a 95% confidence level, 103 responses were collected. There is a 95% confidence interval for the actual meaning. The higher confidence level increases the likelihood of the population's responses falling within the desired range. Notably, a 10% margin of error is acceptable, especially with smaller sample sizes (Conroy 2016).

The researcher distributed 120 questionnaires to government employees to compensate for non-response and received 103 responses across three government departments: departments studied are the Department of Communication (DOC), the Department of Science and Technology (DST) and Government Communication and Information System (GCIS). The samples taken from each department were DOC ($n = 34$), GCIS ($n = 38$) and DST ($n = 31$). Human resources (HR) personnel from each department received a request for permission to conduct this study, and the purpose of this study was outlined. Table 1 presents the responses received across three government departments: DOC, GCIS and DST.

The sampling techniques were applied to determine this study's participants and, as a result, the study's accuracy (Bhardwaj 2019). Mixed purposeful sampling (Patton 1990) was used to selectively target a specific population segment within these departments based on expertise and experience. This non-probability sampling approach allowed the researcher to selectively choose participants from DOC ($n = 252$), GCIS ($n = 260$) and DST ($n = 268$) with relevant experience and knowledge about KM. The sampling strategy relied on the researcher's judgement to identify participants who could provide valuable insights to achieve the study objectives. The members of the target population meet the practical criteria; they have qualities and are qualified to participate in this study based on pertinent experience and knowledge of KM practice in their department (Ebenezer 2023). The participants in this study consisted of senior management (chief directors and directors), middle management (deputy directors and assistant directors) and other staff members (senior administration officer, principal administration officer, etc.). This range of participants was selected to comprehensively understand KM practices across the organisation.

Data collection method

The data were collected in a self-completion questionnaire captured using the Internet-based programme Google Forms. This Internet use was because of coronavirus disease 2019 (COVID-19) pandemic restrictions on the movement of people. The questionnaire link was sent to potential respondents via email in an electronic format. The HR personnel from each department played an important role in sharing the link via email to allow respondents in their respective departments to complete the questionnaire.

Data analysis

The quantitative data were collected using Google Forms and exported to Microsoft Excel and then to the Statistics Package for Social Science (IBM SPSS-27) to perform the required descriptive statistics analysis. The data weres exported from Excel to SPSS for data management, advanced

TABLE 1: Tabulated number of responses across the departments.

Response per department	Department A (DOC)	Department B (GCIS)	Department C (DST)	Total
Senior management (chief directors and directors)	8	7	7	22
Middle management (deputy directors and assistant directors)	9	11	10	30
Junior management (administration officer principal administration officer)	11	13	10	34
Other staff members (e.g. information technology, human resources, research, supply-chain and finance sections)	6	7	4	17
Total number of completed questionnaires per department	34	38	31	103

DOC, Department of Communication; GCIS, Government Communication and Information System; DST, Department of Science and Technology.

analytics, multivariate analysis, business intelligence and criminal investigation. SPSS software was used to analyse the data since it can handle large amounts of data and perform the required analysis.

The responses on COBIT 5 were transformed into numeric values for analysis using IBM SPSS. For each answer, the transition to numeric values was made for the first section (enabling process) and the second section (assurance) of the COBIT 5 questionnaire based on: 'yes' equals 2, 'partially' equals 1 and 'no' equals 0. The third section of the COBIT 5 questionnaire covered the PAM questions. The numeric transformation was based on fully achieved equals 3, largely achieved equals 2, partially achieved equals 1 and not achieved equals 0. The mean score was calculated for the COBIT 5 questionnaire. The responses on measuring the assessment of the KM processes and system were transformed to numeric values based on: agree equals 1, neutral equals 2 and disagree equals 3. The items were analysed using descriptive statistics and presented in the form of frequency distribution and proportions.

The descriptive statistics test was conducted to gather respondents' demographic information and frequency of responses. Descriptive statistics organise data into a concise summary by outlining the connections between variables in a sample or population. Measures of frequency, central tendency, dispersion or variation and location are also included. The categories of variables are nominal, ordinal, interval and ratio. Initial data analysis must incorporate descriptive statistics because these data lay the foundation for inferential statistical tests that compare variables (Kaur et al. 2018).

Gravetter and Wallnau (2017) assert that descriptive statistics can be described as a procedure used to simplify the presentation of numerical data. There are two methods for producing data presentations: graphical and numerical methods. Keller (2018) asserts that the researcher's preference guides the difference between the two techniques. Graphical techniques present the data in a graphical format that facilitates the easier extraction of information such as means, standard deviations and coefficients of variation. Numerical techniques are primarily used to transform raw data into numerical categories to make the data usable through summary statistics.

The descriptive statistics in this study were used to analyse the frequency of the respondents' demographics and the responses on how respondents perceived their department's performance on KM processes and systems. In addition, descriptive statistics were used to calculate the mean score for responses to the COBIT 5 questionnaire.

The descriptive statistics of this study are presented in three sections. The first section describes the demographics of the sample. The second section presents the findings on COBIT 5 management practices to assess two processes: *manage human resources* (APO07) and *manage knowledge* (BAI08).

Each management practice comprises several sub-statements. The responses for the sub-statement for processes to describe enabling process and assurance were coded to numeric values where 'yes' = 2, 'partially' =1 and 'no' = 0. While for the PAM, the numeric transformation was based on fully achieved = 3, largely achieved = 2, partially achieved = 1 and not achieved = 0. The statement to measure the two enabling processes – assurance and the PAM – was computed to calculate the mean scores of each sub-statement under *manage human resources* and *manage knowledge* processes. The sub-statement was further computed to calculate the mean scores for managing HR and managing knowledge processes. Then, the overall mean scores for management practices and department level of KM for both processes were calculated. In addition, the researcher followed ISACA (2012) COBIT-5 PAM to measure the extent to which a given process was achieved based on the percentage achieved for each question, where 0% to 15% means "not achieved" (0), 15% to 50% means "partially achieved" (1), 50% to 85% means'' largely achieved'' (2) and 85% to 100% means ''fully achieved'' (3). Therefore, descriptive statistics were performed to analyse the frequency of each statement of the PAM.

The COBIT 5 further uses the process capability model to continuously measure the KM business operations of organisations. The following six levels of process capability can be achieved:

- Process Level Capability 0 (Incomplete) indicates that the process fails to be implemented or fulfils its intended objective. There is little to no indication of any systematic process-level achievement of the process goal at this level.
- Process Level Capability 1 (Performed). The The process successfully achieves its purpose yielding the desired outcomes and results.
- Process Level Capability 2 (Managed). The process is performed and currently being carried out in a managed manner (planned, monitored and changed), and its outputs are being established, regulated and maintained as necessary.
- Process Level Capability 3 (Established). The managed process is now put into practice by applying an established process that can accomplish its goals.
- Process Level Capability 4 (Predictable). At this point, the established process operates within established limits to produce its intended results.
- Process Level Capability 5 (Optimising). The predictable process is continuously improved to meet current and projected business goals.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Tshwane University of Technology, Faculty Committee for Research Ethics (Ref. FRCE/ICT/2019/10/004).

Results

The presentation of results is a crucial aspect of research reporting. The results are clearly and concisely summarised in Table 4, Table 5 and Table 6 to facilitate understanding and interpretation.

Demographics of respondents

This study received 103 responses from South African government department employees drawn from a sample population of 780. The majority (52.4%) of respondents are between 25 years and 39 years old, while a lesser amount (38.8%) are between 40 years and 54 years old. Just over half (56%) are women and just under half (44%) are men. With regard to qualifications, a third (39.8%) hold a degree, while a quarter (22.3%) have a postgraduate qualification. The respondents represent a mix of junior, middle and senior management levels, with most (56.4%) working in components outside of HR (see Table 2).

Table 3 indicates the number of years that the respondents have worked for the respective departments. Most respondents have been working for the respective departments for significant periods. The most frequently occurring tenure ranges from 4 years to 6 years (30.1%), followed by 10 years and above at (30.1%), and few (1.9%) respondents have been with their departments for less than a year. The tenure distribution varies slightly across departments, with GCIS having the highest proportion of respondents with 7 years to 9 years of service (36.8%).

Assessment of management practice using COBIT 5

Table 4 to Table 6 present the results of an assessment based on COBIT-5 enabling processes, assurance and the PAM. This assessment focused on evaluating two COBIT-5 processes: *manage human resources* (APO07) and *manage knowledge* (BAI08).

Table 4 presents the results based on the enabling process for all the departments. The results show these scores: DOC (1.46), GCIS (1.33) and DST (1.34). The score is based on process level

capability 1 and indicates that the enabling process is successfully implemented and achieving its goal in both the APO07 and BAI08 processes. However, regarding the process APO07, the DOC is effectively implementing the process with a score of 1.55, where the score for process level capability 2 indicates the process is managed, performed and carried out as compared to the GCIS (1.34) and DST (1.42). The scores indicate that KM is successfully implemented in the three departments.

Table 5 presents the results based on an assurance process for all the departments. The results show that the DOC is successfully implementing the process of management practices with the overall score of 1.52. Process level capability 2 indicates that the process is managed, performed and carried out. However, the department is effectively implementing the KM process (1.32) and seems to be successfully doing well in the BAI08 process (1.65). Regarding the other departments sampled, the results indicate some implementation of the management practices, with GCIS overall score of 1.31 and DST score of 1.43. This correlated with their results on the process of BAI08 – GCIS (1.32) and DST (1.44) – and the KM process – GCIS (1.34) and DST (1.47) (see Table 5).

Table 6 presents the results of the PAM for all the departments. The responses were measured using four possible answers, where 0 equals not achieved, 1 equals partially achieved, 2 equals largely achieved and 3 equals fully achieved. The results indicate that the departments – DOC (1.55), GCIS (1.56) and DST (1.50) – have largely achieved the overall organisation level of KM.

However, there is a difference regarding the level of achievement for both processes in all three departments. The DOC has largely achieved the HR process (1.64) and partially achieved the KM process (1.31). The GCIS has partially achieved the HR process (1.32) and largely achieved the KM process (1.54). The DST has largely achieved both the HR process (1.57) and the KM process (1.54).

Proposed framework

The KM frameworks are developed to create, manage and distribute knowledge; to promote openness to knowledge

TABLE 2: Respondents' demographics.

Category	Frequency	%
Respondents' ages (years)		
18 –24	3	2.9
25–39	54	52.4
40–54	40	38.8
55 and older	6	5.8
Gender		
Female	58	56.3
Male	45	43.7
Highest qualifications		
Degree	41	39.8
Diploma	21	20.4
Grade 12	11	10.7
Higher certificate	7	6.8
Postgraduate	23	22.3
Designation		
Junior management	34	33.0
Middle management	30	29.1
Senior management	22	21.4
Other	17	16.5
Component		
HR	45	43.7
Other (IT, SCM, etc.)	58	56.4

HR, human resources; IT, Information technology; SCM, Supply Chain Management.

TABLE 3: Number of years respondents worked for the department.

Number of years	Variable	DOC	GCIS	DST	Overall
1–3	*n*	3	2	4	9
	%	8.8	5.3	12.9	8.7
10 >	*n*	11	13	7	31
	%	32.4	34.2	22.6	30.1
4–6	*n*	15	9	7	31
	%	44.1	23.7	22.6	30.1
7– 9	*n*	4	14	12	30
	%	11.8	36.8	38.7	29.1
< 1	*n*	1	0	1	2
	%	2.9	0.0	3.2	1.9

DOC, Department of Communication; GCIS, Government Communication and Information System; DST, Department of Science and Technology.

TABLE 4: Enabling process at DOC, DST and GCIS.

Variable	KM Questionnaire part 1	DOC	GCIS	DST
Management practices		**1.46**	**1.33**	**1.34**
APO07 Manage human resources		**155**	**1.34**	**1.42**
APO07.01	Maintain adequate and appropriate staffing	1.71	1.46	1.38
APO07.02	Identify key IT personnel	1.20	0.90	0.98
APO07.03	Maintain the skills and competencies of personnel	1.40	1.38	1.46
APO07.04	Evaluate employee job performance	1.72	1.42	1.61
APO07.05	Plan and track the usage of IT and business human resources	1.55	1.45	1.54
APO07.06	Manage contract staff	1.71	1.41	1.63
BAI08 Manage knowledge		**131**	**1.32**	**1.39**
BAI08.01	Nurture and facilitate a knowledge-sharing culture	1.22	1.27	1.41
BAI08.02	Identify and classify sources of information	1.36	1.38	1.45
BAI08.04	Use and share knowledge	1.39	1.42	1.33
BAI08.05	Evaluate and retire information	1.29	1.22	1.35

Source: Delak, B., 2015, 'How to evaluate knowledge and knowledge management in the organisation using COBIT 5', *Isaca Journal* 3, 19–23
Note: Bolded values are the management practice overall score for APO07 Manage Human resource and BAI08 Manage knowledge.
DOC, Department of Communication; DST, Department of Science and Technology; GCIS, Government Communication and Information System; IT, Information technology; KM, Knowledge management.

TABLE 5: Assurance process for all departments.

Variable	KM Questionnaire part 2	DOC	GCIS	DST
Management practices		**1.52**	**1.31**	**1.43**
APO07 Manage human resources		**165**	**1.32**	**1.44**
APO07.01	Maintain adequate and appropriate staffing	1.77	1.40	1.41
APO07.02	Identify key IT personnel	1.66	1.50	1.58
APO07.03	Maintain the skills and competencies of personnel	1.61	1.30	1.58
APO07.04	Evaluate employee job performance	1.55	1.10	1.17
BAI08 Manage knowledge		**132**	**1.34**	**1.47**
BAI08.01	Nurture and facilitate a knowledge-sharing culture	1.25	1.19	1.53
BAI08.02	Identify and classify sources of information	1.27	1.30	1.43
BAI08.04	Use and share knowledge	1.48	1.55	1.43
BAI08.05	Evaluate and retire information	1.27	1.32	1.48

Source: Delak, B., 2015, 'How to evaluate knowledge and knowledge management in the organisation using COBIT 5', *Isaca Journal* 3, 19–2
Note: Bolded values are the management practice overall score for APO07 Manage Human resource and BAI08 Manage knowledge.
DOC, Department of Communication; DST, Department of Science and Technology; GCIS, Government Communication and Information System; IT, Information technology; KM, Knowledge management.

and to promote productivity and effective and efficient service delivery (Fister et al. 2023). The main purpose of this study was to assess the level of KM in three South African government departments. This study proposed a framework to improve government knowledge-sharing and collaboration to prevent knowledge loss and to discourage employees from working in silos. The KM framework contains processes, tools and technology that support organisational knowledge acquisition, collaboration and dissemination. The proposed framework was developed to provide a comprehensive overview of the major components of KM that can be used to assess the overall organisational level of KM. However, the proposed framework was not designed to fit all South African government departments.

This study applied the COBIT 5 governance and evaluation framework to assess KM in South African government departments. The framework included various components that allowed a comprehensive evaluation of KM across the

DOC, GCIS and DST departments (Delak 2015; Villa 2021). The COBIT 5 management practices and processes (enabling processes, assurance and the PAM) provided this study with sufficient components to evaluate KM and processes and activities to manage knowledge (BAI08) and to manage HR (APO07). This study could then also indicate the overall performance of the BAI08 and APO07 management processes.

Enabling process

The DOC overall score for the *enabling process* for processes APO07 and BAI08 combined is 1.46, with a score of 1.31 for BAI08 and 1.55 for APO07. The DOC score of 1.55 for process APO07 indicates that the process is working on level 2 (managed), where KM processes are performed, carried out and managed. The GCIS overall score for the *enabling process* for processes APO07 and BAI08 combined is 1.33, with a score of 1.34 for APO07 and a score of 1.32 for BAI08. The DST overall score for the *enabling process* for processes APO07 and BAI08 combined is 1.34, with a score of 1.42 for APO07 and 1.39 for BAI08.

The DOC, GCIS and DST findings indicate that the departments are on level 1 (performed), indicating the processes are implemented and achieved. The DOC achieved an advanced level 2 in *managing human resources* (APO07), indicating that the processes are organised, monitored and controlled. This achievement indicates that the DOC is committed to managing HR effectively. Literature used to compare the results is scarce. However, the findings from a study by Delak (2015), where enabling processes were assessed, indicate that South African government departments are doing well and have successfully implemented KM, in comparison to the Delak (2015) study's overall score of Company A (1.10) and Company B (0.55).

Assurance

The DOC overall score for *assurance* for processes APO07 and BAI08 combined is 1.52, with a score of 1.65 for APO07 and 1.32 for BAI08. The GCIS overall score for *assurance* for

TABLE 6: Process assessment model.

Variable	KM Questionnaire part 3	DOC	GCIS	DST
Organisation level of knowledge management for both processes		**155**	**1.56**	**1.50**
APO07 Manage human resources		**164**	**1.32**	**1.57**
Outcomes		**175**	**1.40**	**1.64**
APO07.01	IT organisational structure and relationships are flexible and responsive	1	0	1
APO07.02	Human resources are effectively and efficiently managed	1	0	1
Work products		**153**	**1.24**	**1.50**
APO07.WP1	Staffing requirement evaluations	1	0	1
APO07.WP2	Competency and career development plans	1	0	1
APO07.WP3	Personnel sourcing plans	1	0	1
APO07.WP4	Skills and competencies matrix	1	0	1
APO07.WP5	Skills development plans	1	0	1
APO07.WP6	Review reports	1	0	1
APO07.WP7	Personnel goals	1	0	1
APO07.WP8	Performance evaluations	1	1	1
APO07.WP9	Improvement plans	1	0	1
APO07.WP10	Inventory of business and IT human resources	1	0	1
APO07.WP11	Resourcing shortfall analyses	1	0	1
APO07.WP12	Resource utilisation records	1	1	1
APO07.WP13	Contract staff policies	1	0	1
APO07.WP14	Contract agreements	1	0	1
APO07.WP15	Contract agreement reviews	1	0	1
BAI08 Manage knowledge		**131**	**1.54**	**1.54**
Outcomes		**134**	**1.56**	**1.54**
BAI08.01	Sources of information are identified and classified	1	2	2
BAI08.02	Knowledge is used and shared	1	2	1
BAI08.03	Knowledge-sharing is embedded in the culture of the enterprise	1	2	1
BAI08.04	Knowledge is updated and improved to support requirements	1	2	1
Work products		**128**	**1.53**	**1.53**
BAI08.WP1	Classification of information sources	1	2	1
BAI08.WP2	Published knowledge repositories	1	2	1
BAI08.WP3	Knowledge user database	1	2	2
BAI08.WP4	Knowledge awareness and training schemes	1	2	1
BAI08.WP5	Knowledge use evaluation results	1	2	1
BAI08.WP6	Rules for knowledge retirement	1	2	1

Source: Delak, B., 2015, 'How to evaluate knowledge and knowledge management in the organisation using COBIT 5', *Isaca Journal* 3, 19–23

DOC, Department of Communication; GCIS, Government Communication and Information System; DST, Department of Science and Technology; IT, Information technology; KM, Knowledge management.

processes APO07 and BAI08 combined is 1.31, with a score of 1.32 for APO07 and 1.34 for BAI08. The DST overall score for *assurance* for processes APO07 and BAI08 combined is 1.43, with 1.44 for APO07 and 1.47 for BAI08.

Based on the COBIT 5 process level capability, the DOC is on level 2 (managed), which indicates that the processes are established, regulated and maintained. The GCIS and DST are on level 1 (performed), indicating that the processes are implemented and achieved and need to improve. In comparison, for assurance, Delak's (2015) study found overall assurance scores for Company A (0.97) and Company B (0.47) and Company A for each individual process APO07 (0.69), Company B (0.44), Company A BAI08 manage knowledge (1.25) and company B BAI08 manage knowledge (0.50). This score comparison suggests that the South African government departments are implementing KM effectively.

Process assessment model

The DOC KM level for the *PAM* process for APO07 and BAI08 combined scored 1.55, with a score of 1.64 for

APO07 and 1.31 for BAI08, indicating commitment to effective human resource management. The GCIS KM level for the *PAM* for processes APO07 and BAI08 combined scored 1.56, with 1.32 for APO07 and 1.54 for BAI08. The DST KM level for the *PAM* for processes APO07 and BAI08 combined scored 1.50, with 1.57 and 1.54 for APO07.

The results indicate a significant improvement in the *PAM* process, whereas the GCIS management knowledge is on level 1, and the DST level for both processes is on level 2. The overall process level capability indicates that processes are established, regulated and maintained. In comparison to Delak's (2015) study, the KM level on both processes for Company A was (1.76) and Company B was (0.43).

The *PAM* scores for this study indicate that the DOC has achieved less BAI08, and GCIS has achieved less APO07. This study's overall findings indicate that all the departments are successfully putting KM into practice; however, the DOC has progressed in comparison with GCIS and DST.

A study conducted by Credo and Ratnawati (2014) assessed the PAM APO07 processes. The company scored APO07 (3.07). These scores indicate that the company process level capability is level 3. Therefore, the KM processes are managed and implemented. The study conducted by Credo and Ratnawati (2014) recommends that the management subdomain be improved to ensure and maintain competent staff through the selection and recruitment of employees, training and assessment, thus supporting the company's processes.

Research contributions

This study contributed by expanding the KM assessment theory that can be applied to assess KM in South African government departments to enforce knowledge sharing and collaboration among employees, helping the employees to not work in silos and rather to work effectively to improve service delivery and productivity.

This study identified gaps for improvement in fostering service delivery in South African government departments. Therefore, where areas of improvement are identified, this study will serve as a guide based on each department's current strategy.

In addition, this study provided theoretical guidelines on applying the COBIT 5 governance and management framework for assessment to ensure an effective strategy.

This study furthermore made a significant contribution by highlighting the importance of framework adaptation during the assessment of KM. The framework provides practical guidance for KM leadership, highlights the importance of recognising the key influences of KM and identifies key factors that hinder performance in the South African government departments.

Discussions, implications and recommendations for future research

The results of this study proved that COBIT 5 is a comprehensive framework for governance and management that has been developed and is in line with other standards and frameworks. The following recommendations are based on the results of this study and indicate gaps and areas for improvement to ensure effective government service delivery.

The COBIT 5 Enabling processes human resource

The overall assessment for DOC is that *human resources* is working on level 2, GCIS and DST on level 1 and activities are taking place and applied successfully (such as maintaining adequate and appropriate staffing, identifying key IT personnel, evaluation of employee job performance, planning and tracking the usage of IT and business human resources and managing of contract staff). This evaluation indicates that the department is following the right approach to ensure that the best possible placement, structuring, decision-making and human resource capabilities are applied. However, the GCIS and DST need to improve the process of identifying key IT personnel.

The COBIT 5 enabling processes manage knowledge

The overall assessment for DOC is that *manage knowledge* is working on level 1, and the processes are implemented (such as nurturing and facilitating a knowledge-sharing culture, identifying and classifying sources of information, using and sharing knowledge, evaluating and retiring information). The DOC and GSIC process for improving a knowledge-sharing culture works effectively and productively and improves employees' access to organisational knowledge. Outdated knowledge should be evaluated, retired from archives and repositories.

The COBIT 5 assurance human resource

The overall assessment for DOC is that *assurance human resource* is working on level 2, and GCIS and DST are on level 1, and activities are applied successfully (such as maintaining adequate and appropriate staffing, identifying key IT personnel, maintaining the skills and competencies of personnel, evaluating employee job performance). The GCIS and DST need to improve processes to evaluate employee job performance.

The COBIT 5 assurance manage knowledge

The overall assessment for DOC, GCIS and DST is that *manage knowledge* is working on level 1, where the process is implemented to improve the knowledge (such as nurturing and facilitating a knowledge-sharing culture, identifying and classifying sources of information, using and sharing knowledge, evaluating and retiring information). The nurturing process at GCIS and DOC of sharing knowledge gives employees access to organisational knowledge so that they can work effectively and productively. However, the evaluation of retired and outdated knowledge should also be considered to ensure the removal of unused knowledge from archives and repositories. The identification and classification of information sources and the level of protection should be given attention. Furthermore, evaluating outdated knowledge for knowledge retirement needs to be considered.

Process assessment model

The overall assessment for DOC and DST is that *manage human resources* is on level 2 and all activities were applied successfully. However, the GCIS is working on level 1, which indicates the need to consider improvement where human resources are not effectively and efficiently managed (such as IT organisational structure and relationships are not flexible and responsive; the criteria to assess staff is not performed; staffing requirement evaluations and contract agreements and reviews are applied correctly; competency and career development

plans that outline an individual's skills, knowledge and behaviours should be implemented; personnel sourcing plans for qualified candidates to fill vacant positions; skills and competencies and plans to reward employees based on their skills, knowledge and experience; reviewing of reports, setting personnel and improvement plans goals to motivate employees to perform better and measure their performance; inventory of business and IT human resources to capture information of employees, for example, education, experience and skills and resourcing shortfall analyses to help plan ahead and help identify resources needed for future activities).

Conclusion

A government with a well-established KM system improves service delivery. The KM was established as a viable, long-term solution to bridge the knowledge gap between government officials and their actions. The assessment of KM assists with closing the knowledge gaps that hinder the success of KM in the public sector.

This study's methodology developed a framework for the assessment of the level of KM in South African government departments such as DOC, GCIS and DST using COBIT 5 processes such as *manage human resources* (APO07) and *manage knowledge* (BAI08). A quantitative approach was applied using an online closed-ended questionnaire distributed using Google Forms. The 103 participants from three government departments were selected using the mixed purposeful sampling technique to participate in this study.

The results indicate that the enabling process (BAI08 *manage knowledge*) is on level 1 in all three departments while (APO0 *manage human resource*) indicates that GCIS and DST are on level 1 and DOC (APO07) is on level 2. Assurance (BAI08) for GSIC, DOC and DST are on level 1 and GCIS, DST (APO007) are on level 1 while DOC is on level 2. The PAM for GCIS (APO07) is on level 1, while DOC and DST (APO07) are on level 2, GCIS and DOC (BAI08) are on level 1 and DST (BAI08) is on level 2. These results indicate that further government evaluation is necessary for effective resource management.

Acknowledgements

Competing interests

Authors' contributions

M.P.M., A.B.P. and S.P.M. contributed to the concepualisation, methodology, original draft and review and editing of the manuscript.

Funding information

Data availability

The data that support the findings of this study are available from the corresponding author, M.P.M. upon reasonable request.

Disclaimer

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