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Review Research

A Systematic Review of Knowledge Audit Models during the Period 2016 to 2020

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Abstract

Considering the essential role of knowledge management in organizations and the importance of knowledge auditing as one of its most vital processes, the purpose of this paper is to reveal the insights and thoughts of authors about knowledge auditing in the articles published during the period 2016-2020 by using the systematic review method. In these articles, the progress and differences in the proposed models and frameworks of knowledge auditing are examined. In this review, 20 out of 50 retrieved articles related to knowledge auditing were reviewed and analyzed. The study of the obtained results shows the progress and changes in authors' attitudes toward knowledge auditing and their attention and focus on the knowledge management process, suggestions, and continuous re-auditing in organizations.

Keywords: Knowledge Audit, Knowledge Audit Framework, Knowledge Audit Model, Knowledge Audit Methodology, Systematic Review.

Introduction

At present, information plays a vital role in the survival of organizations through its translation into the industrial economy (LaFayette, Curtis, Bedford & Iyer, 2019). As such, organizations pay more attention to collecting new and maintaining existing information. Knowledge also plays a significant role in the success of any organization, and as the flow of knowledge becomes more intensive day by day, the need to understand it increases as a means to develop productivity and increase the value of knowledge. Despite a large amount of information, organizations face different challenges in optimizing their information. Knowledge Audit (KA) has emerged as a scientific method in response to these challenges and is one of the reliable methods to increase the quality of the information in organizations (Bukhsh & Nurlatifah, 2019). Organizations need to manage their identity and knowledge, and if knowledge management is meant to be implemented in an organization, KA will be one of the key steps in conducting it (Choy, Lee & Cheung, 2004). KA supports the leaders of the organization by providing accurate information and prevents the risks of making inappropriate decisions. It can also ensure that the organization's knowledge management activities are

managed in the right direction and under modern management (Wu & Li, 2008). This process is performed in the KA department as a vital step in the knowledge management process of the organization. The term information audit is often used interchangeably with KA. However, the audit considers actual knowledge to include tacit knowledge as well as information (explicit knowledge) (Skyrme, 2013).

Knowledge is the main input needed to provide for innovation in organizations, and management is highly critical (Temel & Vanhaverbeke, 2020). KA is a part of knowledge management activities that aims to define, analyze and review the knowledge status of the organization, and, in this regard, it reports the knowledge gap of the organization (Wu & Li, 2008). Lee, Shek and cheung (2007) defined KA as a method that includes a thorough analysis of the firm in terms of whether required knowledge exists in the company, where it is, who owns it, and how it was created. Another body of literature (Debenham & Clark, 1994) describes KA as a well-defined, highly technical, structural report that includes a general and high-level description of a limited part of organizational knowledge resources and explanations of "fragments" of individually-identified knowledge. Recently, less emphasis has been placed on KA efficiency and more on related activities (Ragsdell, Probets, Ahmed & Murray, 2013). In another definition, KA is introduced as the main tool for creating an attitude of "what is" from a knowledge perspective (Harries, 2012). Therefore, according to the existing definitions, it can be concluded that KA is a process, which in certain stages identifying the knowledge and intellectual assets of the organization, enables the organization to make better decisions to achieve its goals with optimal time and cost savings by the reporting its current situation. KA is the key to achieving knowledge management goals, and its main activity is knowledge identification (Abdul Rahman & Shukor, 2011). It is an important process through which the organization can understand required knowledge and existing knowledge. KA can also determine what knowledge does not exist and what activities of the organization are limited because of the lack of this knowledge. Thus, KA can create initiatives to improve the knowledge management processes of organizations and, in turn, help to improve its efficiency and effectiveness (Ragsdell et al. 2013). The process of knowledge audit is a means of increasing the competitiveness of an enterprise in the face of uncertainty and accelerating integration processes. Many experts point out that, in today's companies, knowledge audit plays a key role in making cost or investment decisions as well as in developing new knowledge management projects, showing how effectively the organization's knowledge is used and what improvements are needed (Lytvynenko, 2019).

To prepare the organization for the implementation of knowledge management and identify the challenges thereof, KA has an important role in determining the quality of intellectual property value and the health of knowledge in the organization (Navidi, Mansoorian & Hassanzadeh, 2017). KA frameworks and methods are applied differently in the organizations; that is because of the variety of organizations' needs. A knowledge audit is an essential tool for extracting, processing, and nurturing knowledge as an organizational asset (Ayinde, Orekoya, Adepeju & Shomoye, 2021). KA helps organizations to identify their knowledge-based assets including the knowledge needed to achieve organizational goals, evaluate the effect of the knowledge created on the performance of the organization, and develop strategies to manage it (Serrat, 2017). In the absence of KA in the organization, the knowledge collected in the organizational repositories will not have the expected effect and efficiency, and the organization may face difficulties in achieving its goals.

The more KA improves, the higher the efficiency organizations have to achieve their goals (Takami, 2021). There are different goals in KA, but one of the most common goals is to identify knowledge in the organization. A common KA answers the following questions:

- What are the knowledge needs of the organization?
- What tacit and explicit knowledge assets exist in the organization, and where are they located?
- How does knowledge in the organization, formally and informally, flow between the client and the relevant organizations?
- How is knowledge identified, created, stored, shared, and used?
- What are the barriers to the flow of knowledge? For example, to what extent do individuals, business processes, and technology currently support or hinder the effective movement of knowledge within the organization?
- What gaps and repetitions are there in the organization's knowledge (Serrat, 2017)?

Different models have been introduced to perform KA, each of which has some common elements. But, like other knowledge management processes that have changed with the advancement of technology, the KA process is no exception. Each of the KA models has features that make it possible to be chosen by organizations as a better model for implementation. This article aimed to analyze the KA models from 2016 to 2020 to have a better understanding of the elements of each in comparison with others. This comparison and identification of components, that have become increasingly important in the KA process, lead to the right choice and successful implementation of KA in the organization and prevent wasting time and choosing the wrong path.

Literature Review

Since 1994, various models, frameworks, and methodologies have been proposed to conduct KA in different countries (Debenham & Clark, , 1994; Buchanan & Gibb, 1998; Orna, 1999; Liebowitz, Rubenstein-Montano, McCaw, Buchwalter & Browning, 2000; Lauer & Tanniru, 2001; Henczel, 2000, 2001; Hylton, 2002; Reinhardt, 2003; Choy et al., 2004; Burnett, Williams & Grinnall, 2013; Schwikkard & Toit, 2004; Cheung, Ko, Chu & Lee, 2005; Tong, 2005; Perez-Soltero, Barcelo-Valenzuela, Sanchez- Schmitz, Martin-Rubio, Palma-Mendez & Vanti, 2006; Dattero, Galup & Quan, 2007; Lee et al., 2007; Sharma & Chowdhury, 2007; Mearns & Du Toit, 2008; Roberts, 2008; Wu & Li, 2008; Ganasan & Dominic, 2009; Wang & Xiao, 2009; Gourova, Antonova, & Todorova, 2009; Suo, Wang, Dong & Zhao, 2008; Sukiam, Abdul Rahman & Zainal Abidin, 2009; Sharma, Chia, Choo & Samuel, 2010; Levy, Hadar, Aviv, 2010; Mohd Drus, Salbiah & Othman, 2017; Stable Rodríguez, 2012; Abdul Rahman & Shukor, 2011; Gourova, Titeva & Todorova, 2012; Jafari & Payani, 2013; Burnett et al., 2013; Steiger, Hammou & Galib, 2014; Salas García & Ponjuán Dante, 2014; Chowdhury, 2015).

Several audit models and frameworks address the three main stages of KA: pre-audit, audit process and post-audit (Choy et al. 2004; Gourova et al., 2009). On the other hand, some articles present models of the KA approach in 8 stages; For example, in a model, these eight steps include identifying and studying the context, assessing knowledge management readiness, conducting surveys and interviews to gather evidence, providing knowledge inventory, preparing knowledge maps, analyzing audit results, reporting audit reports, and re-auditing the

continuous knowledge (Cheung et al., 2005). Another 8-step audit model can be delineated as follows: 1. Organizational analysis; 2. Determining the audit for project objectives; 3. Knowledge process; 4. Data collection; 5. Determining the knowledge process; 6. Ranking the result Audit; 7. Knowledge Capital Coding; 8. Confirmation of Results (Alwan, Hassan & Saleem, 2015). Besides, some models have been introduced that consider the role of knowledge analysis in the KA process (Sharma et al., 2007) or the importance of the organization's need for information (Jurinjak & Klicek, 2008).

In particular, other review studies have identified the elements of knowledge audit models that provide the reader with information on the process of selecting and comparing models in a particular period (Jaber Ansari, 2018; Medina Nogueira, Nogueira Rivera, León, Medina Nogueira, Assafiri & Zúñiga, 2017; Ahmad Shukor, Abdul Rahman & Iahad, 2013). In his study, Ahmad Shukor et al. (2013) examined the KA process in 20 articles from 1994 to 2010 and classified them in terms of data collection methods, output, and KA process. Among these articles, 5 articles included all three classifications (Sukiam et al. 2009; Perez-Soltero et al., 2007; Gourova et al., 2009; Liebowitz et al., 2000). The reviewed articles showed that questionnaires, interviews, document reviews, and observations are often used to collect data; Output is mainly used to generate knowledge assets or inventory and identify the flow of knowledge through the knowledge exchange path, and finally, it is used to identify the specialists of the organization and the skills the persons have.

Medina Nogueira et al. (2017) reviewed 28 articles from 1994 to 2014 intending to propose a methodology for KA. By dividing these articles into 4 groups, she pointed out 5 main components in the KA process, which include knowledge inventory (79%), key processes (68%), knowledge flow (68%), mission, vision, and objectives (64%), and knowledge map (57%). Jaber Ansari (2018), by examining the audit models from 2010 to 2015, identified the common elements of the studies in preparing an audit model. These include seven steps and 25 components: 1. Identify the mission, vision, goals and objectives, definition, success factors, SWOT analysis, and the core business process of the organization; 2. Support management system, organizing the KA team; Determining KA methodology; 3. Focus on knowledge management process, information technology system, and culture evaluation; 4. A knowledge repository, knowledge flow, knowledge resources, and knowledge map; 5. Gap analysis, social network analysis, and knowledge network analysis; 6. Identify the problem, report the results of the KA, inform the result, provide priorities and solutions, make suggestions, provide appropriate knowledge audit strategies, design a practical knowledge management plan, and implement new strategies; and 7. Continuous audit.

A review of the literature shows that several models and frameworks have been introduced since 1994 in which the scope and method of KA have been slightly different. Given the importance of knowledge in the successful management of organizations and the importance of time in this area, problem-solving and optimal decisions depend to a large extent on access to knowledge. A good, systematic and appropriate knowledge management strategy can help organizations achieve these goals. In this regard, by examining the elements in each of the models, it is easy to determine its suitability for the organization. Therefore, we will review the articles during the period 2016-2020 in this article to identify these elements, compare them, and understand the process of changing important elements of KA over time.

Materials and Methods

The method of the present study is a systematic review. The systematic review is defined as "coordinated action to systematically identify the available sample, critically evaluate the studied research, and analyze the study data with a standard and systematic method" (Siamian, Hassanzadeh, Nooshin Fard and Hariri, 2014). The purpose of a systematic review of literature is to identify questions and studies related to identifying research gaps, evaluating their innovations concerning questions, and research gaps for conclusions in the phenomenon, the subject area, or fundamental question (Dehghani Champiri, Shahmiri, & Salimi, 2015). In the present study, the systematic review framework was used (Kitchenham & Charters, 2007), which is defined in three stages:

1. Planning the review (First step)

At this stage, based on the purpose of the research, the following steps were taken:

1-1. Identification of the need for review research

Given the importance of knowledge in organizations, knowledge auditing is a topic in knowledge management that requires constant study and review of new components in this process. Therefore, according to Jaber Ansari's (2018) research on KA frameworks among articles published from 2010 to 2015, we have tried to explore new components in KA processes in the articles published during the period 2016-2020 to find out the new significant components for researchers in KA process during the time.

2. Specifying the research questions

According to the purpose of the research, the following questions were asked:

2-1. what are the components of knowledge auditing research in recent papers?

2-2. what are the differences between the components studied in the articles of the last 5 years and the articles of the earlier period (Jaber Ansari's Research, 2018)?

2-3. developing a review protocol

To identify articles, Persian (such as sid.ir, ensani.ir, noormags.com, irandoc.ac.ir) and English databases (Google scholar, Emerald, Science Direct, Ebsco, etc.) were searched. The time limit for searching for articles was between 2016 and 2020. Articles other than Persian and English and articles whose text or abstracts were not available were excluded from the study.

2. Conducting the review (Second step)

Articles were retrieved by exploring the keyword "knowledge audit". The searches also found articles related to "accounting and taxation and financial issues", which were excluded from the research.

In the following, the keywords of "knowledge audit model", "knowledge audit framework", "knowledge audit methodology", and "knowledge audit method" were used to run the search. In this research, the articles were considered that had presented a model or framework of stages and components of knowledge auditing. This systematic review is in line with Jaber Ansari's (2018) research, which studied the articles in this field and presented some significant components in KA models and frameworks from 2010 to 2015. We have tried to understand the progress and differences of the components considered in the KA models and frameworks

in different periods.

2-1. Selection of primary sources

The articles were reviewed in terms of title, abstract, and keywords. Review articles, translations, or reviews were removed, and finally, 20 related articles were selected for research.

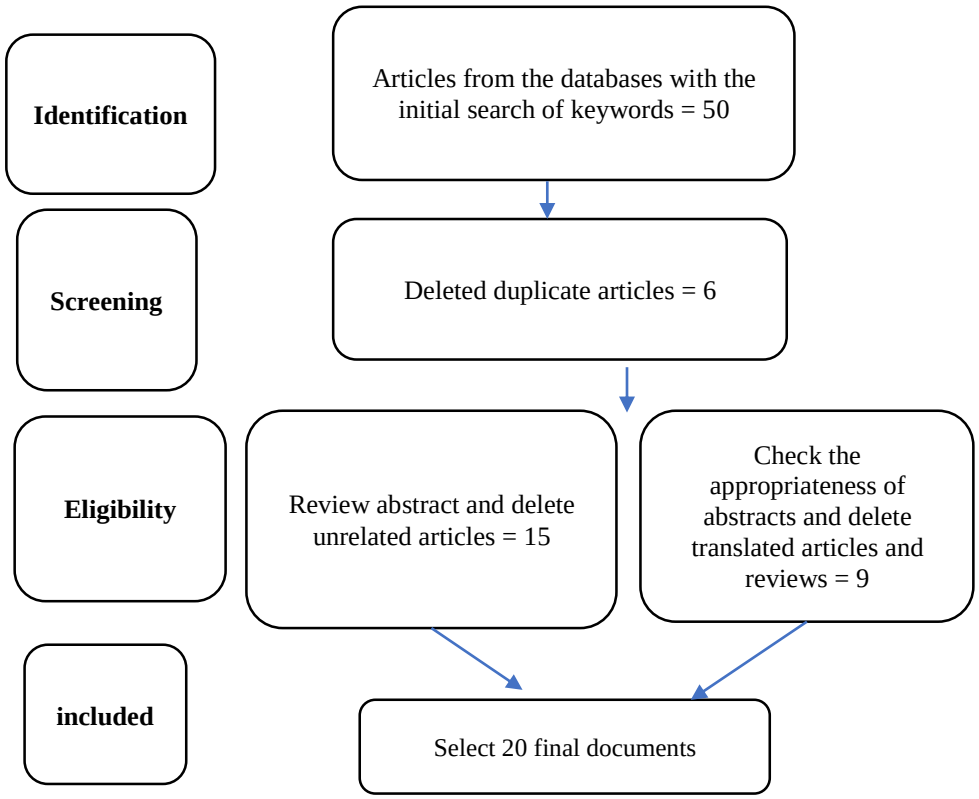

Figure 1: The process of choosing articles (PRISMA flow diagram)

2-2. Study quality assessment

The selection of information sources analyzed in this article was based on the scope of knowledge audit models and valid referenced sources. The choice process was confirmed by the research colleague. The classification in the data analysis stage was done once by both research colleagues. Then the performed classifications were jointly reviewed, and the necessary changes were applied. Accordingly, the categorization of the topics focused on the sources is the result of the consensus of two research team colleagues.

3. Reporting the review (Third stage)

3-1. What are the components of knowledge auditing research in recent papers?

Among the 20 sources analyzed, 5 are Persian, and 15 are English. Audit models were reviewed in articles between 2016 and 2020. In the audit models studied, 18 new components were identified that were not mentioned in Jaber Ansari (2018). According to the identified components, no new stage was added to Jaber Ansari's framework (2018), and an attempt was made to place these components in each of the stages presented by Jaber Ansari (2018) due to their nature.

Table 1 shows the number of elements in each of the articles published during the period 2016-2020 in the order of the frequency of elements in the study. The article by Medina Nogueira et al. (2017) with the highest frequency of elements is at the top of the table while the Nazari Farrokhi et al.'s (2020) article with the review of 8 elements used the smallest number of components in its audit model.

Table1

Frequency of elements in the knowledge audit processes

Authors	Publication year	Frequency
Medina Nogueira et al.	2017	28
Nene	2020	28
Shahmoradi et al.	2016	27
Jaber Ansari	2018	26
Navidi et al.	2017	24
Rahman et al.	2018	23
Łyp	2017	20
Sabti Al-shammari	2019	19
Taheri et al.	2017	18
Zulkifli et al.	2016	17
Sohal et al.	2018	17
Kashirskaya et al.	2020	15
Daghfous & Zoubi	2017	13
Abuazza & Labib	2019	13
Mohammadi & Alipour Hafezi	2016	12
Naghiadeh et al.	2017	10
Bobrek & Ivanović	2017	10
Mohd Drus et al.	2017	9
Goodarzi, Jahani& Naghizadeh	2017	9
Nazari Farrokhi et al.	2020	8

In the stages of KA, in addition to Jaber Ansari's components (2018), new components are also identified and specified in Table 2 with different colors.

In the first stage of the KA process, i.e. study and analysis stage of the organization, 2 new components were added to 4 existing components, i.e. measurement standards and competitors' knowledge. In the second stage, the preliminary activity of KA, 2 new components were added to the 3 existing components, i.e. tool learning by staff and employee participation. The third stage, knowledge management infrastructure, consisted of 3 components plus 6 new components, namely, leadership, the importance of ethical principles, the importance of ontology, application of artificial intelligence and technology, human resources, and management commitment. In the fourth stage, i.e. determination of the knowledge management situation, 4 new components were added to the 4 previous components, i.e. importance of explicit and implicit knowledge, the importance of intellectual property, the importance of internal and external knowledge, and the study of business knowledge. The fifth stage is an analysis of the knowledge management audit result, presenting 3 new components including the elimination of similar knowledge, identification of possible knowledge deficiencies, and

knowledge valuation that were added to Jaber Ansari's (2018) framework with 3 components. In the sixth step, the use of analysis data, which had 8 components, a new component was added, namely, the existence of a reward system. No new component was added to the seventh step, i.e. the continuous re-auditing, which had one component. New components have been proposed in the models over time so that they can be used in the audit of organizational knowledge.

2- What are the differences between the components studied in the articles of the last 5 years and the articles of the earlier period (Jaber Ansari Research, 2018)?

As shown in Table 2, the most frequent components identified in each stage of knowledge audit can indicate the importance of that component in the practical implementation of knowledge audit in the organization.

Table 2
Identified components of the audit models 2016-2020

			2016	2016	2016	2017	2017	2017	2017	2017	2017	2017	2017	2017	2018	2018	2018	2019	2020	2020	2020	2020
Stage		Authors	Shahmoradi et al.	Mohammadi& Alipour Hafezi	Zulkifli et al.	Mohd Drus et al.	Taheri et al.	Navidi	Goodarzi et al.	Bobrek et al.	Goodarzi et al.	Daghfous	Łyp	Medina Nogueira	Navidi	Jaber Ansari	Sohal et al.	Abuazza	Sabti Al-shammari	Nazari et al.Faorkhi	Nene	Kashirskaya et al.
1	The study and analysis stage of the organization	competitors' knowledge						*					*			*	*					*
		measurement standards					*			*				*		*		*				
		Business core process of organization	*		*	*	*	*	*	*	*	*		*	*	*		*			*	*
		Swot analysis												*		*	*	*				
		Define success factors	*		*		*	*	*				*	*		*			*		*	
		Identify missions, vision, goals	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*		*	*
2	Preliminary activity of knowledge audit	Employee participation	*											*				*	*		*	*
		Tool learning by staff																*				
		Determining knowledge audit methodology	*	*		*		*					*	*	*	*	*	*	*		*	*
		Organizing a knowledge audit team	*	*		*		*				*	*	*		*					*	
		Supporting management system												*		*						
3	Knowledge management infrastructure	Leadership	*	*	*						*						*		*	*	*	*
		The importance of ethical principles																		*		

Stage		Authors	Shahmoradi et al. 2016	Mohammadi& Alipour Hafezi 2016	Zulkifli et al. 2016	Mohd Drus et al. 2017	Taheri et al. 2017	Navidi 2017	Goodarzi et al. 2017	Bobrek et al. 2017	Goodarzi et al. 2017	Daghfous 2017	Łyp 2017	Medina Nogueira 2017	Navidi 2018	Jaber Ansari 2018	Sohal et al. 2018	Abuazza 2019	Sabti Al-shammari 2020	Nazari et al.Faorkhi 2020	Nene 2020	Kashirskaya et al. 2020
		The importance of ontology					*										*					
		Application of artificial intelligence and technology	*		*		*							*	*			*	*	*	*	
		Human resources	*	*				*		*			*	*							*	*
		Management commitment	*	*							*						*		*	*		
		Culture evaluation	*		*		*							*	*	*					*	
		IT system	*			*	*							*		*			*		*	
		Focus on the knowledge management process			*	*	*	*				*	*	*	*	*			*		*	
4	Determination of the knowledge management situation	Importance of explicit and implicit knowledge										*					*				*	
		Importance of intellectual property									*		*				*			*		
		Importance of internal and external knowledge	*		*		*			*	*			*			*				*	*
		Study of business knowledge	*										*								*	*
		Knowledge map	*	*			*	*		*			*	*		*			*		*	*
		Knowledge resources	*	*	*		*	*	*	*	*		*	*	*	*			*	*	*	*
		Knowledge flow	*	*	*	*	*	*	*	*			*	*	*	*			*		*	*
		Knowledge inventory	*		*		*	*		*		*	*	*	*	*			*		*	
5	Analysis of KMA result	Elimination of similar knowledge															*			*		
		Identification of possible knowledge deficiencies			*		*														*	
		knowledge valuation						*			*			*							*	
		Knowledge Network Analysis	*					*	*					*		*			*		*	

Stage		Authors	Shahmoradi et al. 2016	Mohammadi& Alipour Hafezi 2016	Zulkifli et al. 2016	Mohd Drus et al. 2017	Taheri et al. 2017	Navidi 2017	Goodarzi et al. 2017	Bobrek et al. 2017	Goodarzi et al. 2017	Daghfous 2017	Łyp 2017	Medina Nogueira 2017	Navidi 2018	Jaber Ansari 2018	Sohal et al. 2018	Abuazza 2019	Sabti Al-shammari 2020	Nazari et al.Faorkhi 2020	Nene 2020	Kashirskaya et al. 2020
		Social network analysis	*				*	*								*						*
		Gap analysis	*		*			*				*	*	*	*	*		*	*		*	
6	Use of analyzed data	Existence of reward system	*														*					
		Implementation of new strategies						*					*	*		*	*	*			*	
		Design action plan of knowledge management						*				*	*		*	*			*			
		Providing appropriate knowledge auditing strategies	*					*					*	*	*	*	*	*			*	
		Providing suggestions		*	*	*	*	*				*	*	*	*	*	*	*				
		Providing priorities and solutions	*					*	*			*	*		*	*	*					
		Informing the result			*			*	*				*			*	*					
		Result reporting on knowledge audit	*		*			*	*	*		*	*	*	*	*			*		*	*
		Specifying problem	*	*	*		*				*	*	*	*	*	*		*	*	*	*	
7	Continues RE-Audit		*	*		*		*	*			*	*	*	*	*	*	*	*		*	*

It seems that identifying the mission, vision, and goals of the organization with a frequency of 19 in the study and analysis phase of the organization, determining the knowledge audit methodology with a frequency of 13 in the introductory activity phase, and the component focusing on knowledge management process with a frequency of 12 in the knowledge management infrastructure phase have the highest frequencies in their respective phases. Knowledge resources with a frequency of 17 in the fourth stage, i.e. determining the status of knowledge management, the component of a gap analysis with a frequency of 12 in the analysis of the result of the audit, and continuous re-audit in the last step with a frequency of 15 have the highest frequencies in other stages.

On the other hand, the least common components identified in the studied sources are

related to the SWOT analysis component, and competitors' knowledge with a frequency of 3 in the first stage, tool learning by employees with one repetition in the second stage, ontological importance and the importance of ethical principles with one repetition in the third stage, the importance of overt and covert knowledge with a frequency of 3 in the fourth stage, and the elimination of similar knowledge and the existence of a reward system in the fifth and sixth stages, respectively, with a frequency of one.

The number of articles reviewed in Jaber Ansari's study (2018) is ten, and in the present study, it is 20. In this study, 44 elements were identified in the articles of 2016-2020. Therefore, knowledge audit models and methodologies in the study of Nan (2020) and Medina Nogueira et al. (2017) with 28 elements have the highest frequency of the use of identified elements. In addition, Nazari Faorkhi et al.'s (2020) intelligent audit model with 8 elements had the smallest number of elements.

To compare the emphasized components in different stages of knowledge audit in the present article with those in Jaber Ansari (2018), Table 2 was prepared. The percentage of components in different stages of the present study and Jaber Ansari (2018) is such that in the articles reviewed in the years 2010 to 2015, 80% of the articles included components of the first stage, and the lowest percentage is related to the sixth stage to which less attention is paid in the articles (Table 3). However, in the articles from 2016 to 2020, 75% of the articles emphasized the seventh stage, and the lowest percentage is related to the fifth stage. The scatter of percentages in the articles from 2016 to 2020 is less than the articles from 2010 to 2015, which means that in the articles under review; almost the same importance is given to the components of these steps.

Table 3

Percentage of stage coverage in articles by study

Stages	Studying articles 2016-2020 (percentage)	Studying articles 2010-2015 (percentage)
1	45.83	80
2	31	46.66
3	34.44	36.66
4	47.5	60
5	29.16	20
6	40.55	11.25
7	75	30

As can be seen, attention to the initial stages, i.e. stages one to four of the knowledge audit process in the articles of 2010-2015, is more than in the articles of 2016 to 2020. Steps 5 to 7 in the period 2016-2020 have received the highest attention and study. This indicates that, for the knowledge audit process to be effective and efficient there should be an evaluation and analysis of appropriate knowledge of the organization to survive. The study and analysis of the organization in the first study and the continuous re-audit in the second study have the greatest importance and emphasis.

Discussion

In this paper, studies of KA in the period 2016-2020 were reviewed and analyzed. In comparison with the research results of Jaber Ansari (2018), who has studied the articles of KA in the period 2010-2015, we can point out the cases that have received the most attention from

the authors; These include the impact of organizational intelligence and reward system (Shahmoradi, Karami & Farzaneh Nejad, 2016), the importance of employee commitment and management (Zulkifli, Abdullah & Ibrahim, 2016), the role of individuals in the network of knowledge and ontology (Taheri, Shafazand, Che Pa, Abdullah & Abdullah, 2017), and the use of standards in performing organizational knowledge audits (Abuazza, Labib & Savage, 2019). Since 2017, the trend of using smart technologies has increased (Lip, 2017; Medina Nogueira et al., 2017; Sohal, Ragsdell, Hislop & Brown, 2018; Abuazza, et al. 2019; Registration, 2019; Nazari Farrokhi et al., 2020; Nene, 2020; Kashirskaya, Sitnov, Davlatzoda & Vorozheykina, 2020), and it is observed that the first intelligent model of knowledge audit was introduced in 2020 (Nazari Farrokhi et al., 2020). This model can help people find duplicate content by using semantic and structural analysis methods in texts. As a result, this model can be the first step in creating an intelligent process in KA to prevent the entry and production of duplicate knowledge.

In our study, experts' attention has been drawn to steps 4 to 7 in knowledge audit models. Moreover, as a result of the advancement of technology, the role of artificial intelligence in articles has been highlighted in this field. In stage two, the preliminary activity of KA, the components of organizing the KA team, and determining the KA methodology play a more prominent role in recent articles. As a result, it can be said that at the beginning of the KA in an organization, the components of this stage are of great importance.

In the third stage, the knowledge management infrastructure, the focus on the knowledge management process has received much attention. New KA models focus on the knowledge management process and its implementation steps in the organization. This stage is rarely seen in Jaber Ansari’s article.

In the fourth stage, determining the status of knowledge management, components of knowledge storage, knowledge flow, knowledge resources, and knowledge map have been of particular importance in this study and are essential in providing a model or framework for KA.

In the fifth stage, considering the number of components in this stage, which is shown in Table 2, all three components of gap analysis, social network analysis, and knowledge network analysis have been significantly targeted and studied in the articles of this study.

In the sixth stage, using the analyzed data, 8 components of problem identification, reporting the results of KA, informing the result, presenting priorities and solutions, providing suggestions, presenting appropriate KA strategies, designing a practical plan knowledge management, and the implementation of new strategies have been considered by the authors of the articles, and these components have played an important role in providing an audit model.

As can be seen, presenting priorities and solutions, and making suggestions, from 2016 onwards, as well as designing a practical knowledge management plan, implementing new strategies, and presenting appropriate KA strategies from 2017 are highly important. These components were not seen in Jaber Ansari's review of KA articles for the period 2015-2010. Of course, it can be said that the components are different due to the advancement of technologies, the needs assessment of organizations, and identifying the challenges of organizations in the process of KA in different periods.

The seventh step is re-audit and continuous auditing which is one of the essentials of a successful model or framework in KA, which facilitates the possibility of finding problems and shortcomings in the system and eliminating them, and thus helps the organization to achieve its goals. As can be seen in Table 2, the seventh step has gained its place in the articles from 2016

onwards and is of special importance.

Conclusion

This study focused on the knowledge management process and found that information technology system, knowledge flow, knowledge gap analysis, social network analysis, knowledge network analysis, problem identification, outcome information, prioritization and solutions, suggestions, presenting appropriate KA strategies, implementation of new strategies, and re-audit and continuous KA in the organization are of special importance and can be seen significantly in the research during 2016-2020. One of the issues in Jaber Ansari's study is evaluating the knowledge culture of the organization to prepare the organization to accept knowledge management strategies. As can be seen in the present study, there is not much difference between the introduced models or methods in terms of evaluating organizational culture. This component needs more attention and study in presenting the audit model of an organization. Since organizational culture is one of the most important components for implementing knowledge management in an organization, it is important to create a suitable culture to put people on the path of knowledge management. Organizational culture can significantly affect the performance and effectiveness, mentality, and productivity of its employees and it can attract, motivate and retain talented people in a company (Warrick, 2017). The articles of this study indicate the beginning of creating accurate strategies for the organization and clarifying the path of KA in the organization.

Articles from 2010 to 2015 have a weak knowledge network analysis to achieve knowledge. In this study, KA models and frameworks pay special attention to knowledge flow, knowledge gaps, and knowledge resources. KA models or frameworks are not re-evaluated to identify problems and opportunities, while continuous re-evaluation is a feature of newer articles.

Disclosure statement

No potential conflict of interest was reported by the authors.

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