

Information Audit for Knowledge Discovery: A Systematic Literature Review

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Abstract. Information audit is a set of actions which examine whether or not the information poses in a company support the organizational mission, goals, and objectives. This process is also required as a fundamental step for compliance and information quality checking. Therefore, in this digital age when companies have to deal with the complexity and a huge amount of data, they deploye Information Audit to strengthen their performance. Therefore, this systematic literature review research focuses on finding the methodology, framework, and technique that exist. In the end, this study will provide some recommendations.

Keywords: Information Audit, Knowledge Audit, Information Audit Method, Information Audit Framework, Information Audit Technique.

1 Introduction

Nowadays, organizations and companies are paying more attention to the information they own and collected. Henczel [13] states that companies put the information as one of the most critical strategic assets thus companies are focused to manage, control, and develop the information resource to information users. In addition, the volume of information has multiplied in the manifold, and the information exchange between organizations or departments has increased which made the communication information-intensive [4]. Despite these trends, companies are facing the challenge to optimize their treatment of the information so that it could meet the organizational strategies and objectives. In order to address this problem, information audit could be utilized by companies as a stable method for enhancing the information quality.

Therefore, the purpose of this study is giving an insight on the implementation of Information Audit both in research and practice by identifying the categorization among the methods, framework, and techniques of information audit. This study can also be considered as the fundamental knowledge for doing further research in information audit.

2 Research Method

This systematic literature review is conducted by adopting the process defined by Kitchenham [15]. The databases we used in this systematic literature review are Scopus, Science Direct, Springer, IEEE, ACM Digital Library. In the process of finding the primary resources, we did not set the time limit for the year of publishing since one of the aims of this study is addressing the information audit methods and frameworks since the first time they introduced. Regarding research string, we defined the query based on the topic of this study and proposed research questions. As suggested by Kitchenham [15], the first step to formulate the search query is to define the keywords. We decided to use the terms "Information Audit", "Methods", "Frameworks" and "Techniques" as the main keywords and combined them with logic operators "AND" and "OR" to be a research query. After trying several query combinations, we finally chose the following search query to retrieve the relevant articles:

("Methodology" OR "Framework" OR "Technique") AND ("Information Audit")

We could argue that this query is stable since we tested to change the position of one of the keywords, "Information Audit", upfront and the number of articles showed for each database stays same. We also used the refine search or filter search, particularly in Scopus to limit the number of articles based on the inclusion criteria. A concrete inclusion criteria is as follows:

- A study in the form of a scientific peer-reviewed paper.
- A study which focuses on the information audit in their Information System or Information Technology department.
- A study that presents or describes the method or framework or technique they used in the implementation of Information Audit.
- A study which is written in English.

A concrete exclusion criteria is as follows:

- A study that is non-peer reviewed such as a workshop or technical report.
- A document which is a chapter from a book.
- A study that is not about Information System and Information Technology perspective.
- The study is not reported in English.

We filtered the articles which are only written in English. We did not apply the filter in the other databases since the feature to refine the query based on the language is only available in Scopus. Therefore, we still got some articles which are not written in English and refined them manually in the title and abstract selection stage. The steps performed during the study are abstractly defined in the Figure 2,

3 Discussion

After analyzing 50 selected the papers, we found the definition of method and technique from Thomas [25] which asserts that method is a systematic way

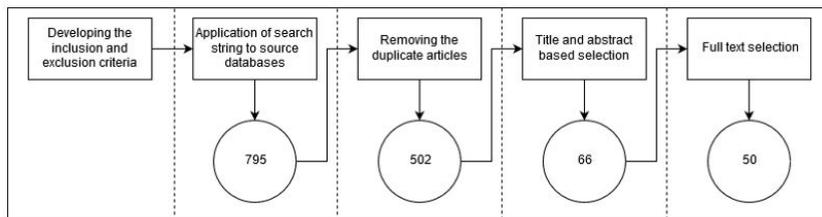


Fig. 1. Systematic Literature Review Process

of doing something and technique as the way to collect the data. While the framework is "broad overview, outline, or skeleton of interlinked items which supports a particular approach to a specific objective and serves as a guide that can be modified as required by adding or deleting items". Then we classified those elements based on relevance with domains. One of the outcomes of this study is a metric available on second authors research gate profile where substantial information from each study was recorded. The metric helped the authors to extract interesting facts and important trends that show during the study. Therefore, this section will discuss some of our findings.

1. **There is a limited study which focuses on developing methods of Information Audit since 2001.** Method found in this research is scoreboard audit by Rus [20] and method of judging duplicate by Liu et al [17]. However, there is a big gap between the method of judging duplicate [17] and the seven stages method by [12]. Our study could not find any method developed between the period 2001 to 2012. In addition, even though the finding shows in Figure 2, that articles published from 2008 to 2017 are more than from 1993 to 2007, the focus of the studies from 2008 to 2017 are not merely on information but there was a shift from information audit to knowledge audit as advocated by [16], [19], [5, 10, 11, 22, 23, 28].
2. **Methods were not applied in practice.** Another trend that found in this research is that the studies which focus on developing the theory are dominant which account for 58.3%. It can be concluded that the studies which highlight the implementation or outcome of the information audit are needed more attention from both the researcher and practitioner. This statement also supported by a study from Frost and Choo [8] which states that there are more observations to the development of theory than information audit application. The fact that should also be highlighted is the methods such as [3, 13, 18] were not applied in the most articles that focus on practice as found in systematic literature review. Among 21 studies which focus on practice, there are only three studies that evaluate methods [1, 9, 14].
3. **No domain dependent information audit framework.** Among the 50 studies in this research, there is only one framework which focuses on the process of information audit, Integrated information audit framework for electricity companies (EICIA) [6]. However, it does not mean that the other

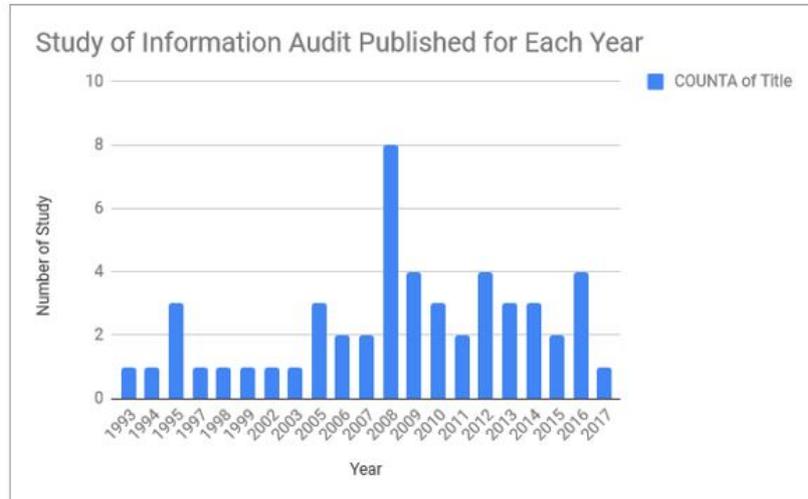


Fig. 2. The number of studies published in each year

five methods mentioned in the previous subsection are not focused on the information, yet the remaining frameworks are an extension from the purpose of information audit such as LSAM [27] and security audit in e-government [2] that has specific purpose on checking the security of the system. While the study by [26] employed COBIT which is a comprehensive framework for IT audit.

4. **There are no standardized techniques for Information Audit.** Considering the list of techniques collected in this study which are more than twenty techniques, it could be concluded that there are no standardized techniques for information audit due to its varied purposes. Henczel [12] also mentioned since the environments where the information audit conducted are diverse, so there is no universally accepted model. Another fact is that the techniques for information audit come from various background theory such as strategic planning and math. For instance, SWOT [7] analysis which is commonly used in strategic planning while the example of techniques that come from mathematics is Bayes Algorithm [29] and Multi-Pattern Matching Algorithm [24].
5. **Several methods of Information Audit are utilized in Knowledge Audit.** Roberts [19] states that the outcome of the information audit which is the explicit and tangible evidence of content that is realizable, observable and transferable is the fundamental content for knowledge audit. So, it could be assumed if there is a relation between an information audit and knowledge audit. Furthermore, some of the methods of information audit also categorized as knowledge audit methods such as [3,12,18,21] and [16]. One of the biggest

open question came out from this study is that "Is information audit and knowledge audit, two names of same concept or they are different? "

4 Recommendations

There are three recommendations for advancing the study in information audit which are derived from this literature review.

- Recommendation 1: The first suggestion is to focus on the implementation thus could be a guideline for other practitioners. In addition, as suggested by Frost & Choo [8], it is needed to apply more fundamental information audit methodologies in full to case studies.
- Recommendation 2: Based on the findings, most of the domain of the studies are business process monitor and knowledge audit [4], [16], [19], [11] as can be seen from Figure 3. Meanwhile, the number of studies on security are far below them. Thus there is gray area for researchers to explore more in information audit process for information security domain.
- Recommendation 3: The study on testing and validating the current methods, frameworks, and technique are lacking. Based on the finding in Figure 4, the number of studies which tested either the methods or frameworks in a case study is below than the study which focus on research. Therefore, the study on testing and validating the methods or frameworks will be a useful reference for practitioners when choosing the best method for their environment.

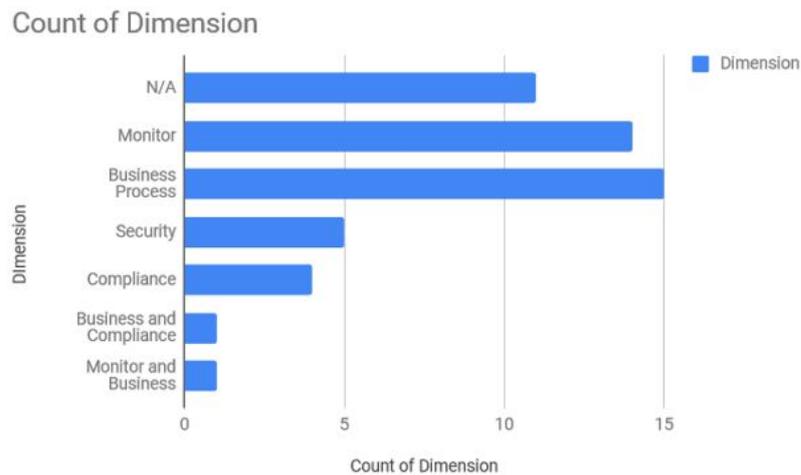


Fig. 3. The number of Dimension for Information Audit

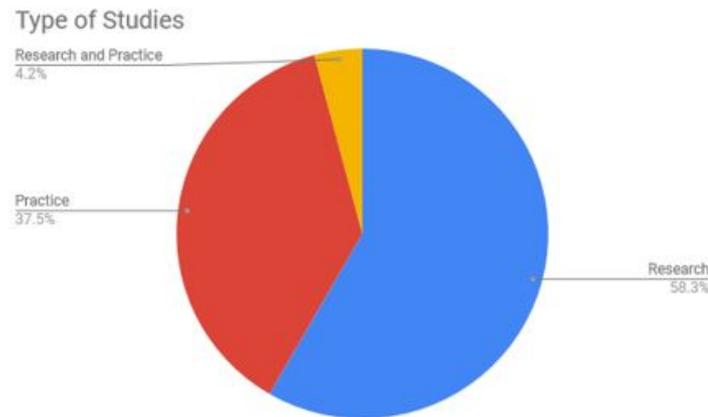


Fig. 4. The percentage of studies based on the type of studies

5 Conclusion

This systematic literature review posted and answered research questions which highlight the methods, frameworks, and techniques in information audit in order to have a better insight on the current development in the information audit research and application. From the 50 studies that we collected, it is noteworthy that the development of information audit methods was started in the early 90's and the characteristics of methods are various and go hand in hand with the improvement of business environment. This study found four categorization of information audit field (business process, compliance, monitor and security). While the enormous number of information audit techniques that authors found in this study address the diverse field that can support the process of information audit. Furthermore, the shortage of frameworks of information audit also the fact that should be underlined by researchers. They also need to pay more attention to developing methods that can be accepted in the current business environment and business objectives.

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