Analysis Factors Affect Information System Audit Using COBIT and ITIL Framework

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Abstract: Improved IT performance drives business growth, enhances competitive advantage, and enables strategic improvements in IT management and governance. This condition is increasingly important because business organizations and systems and technology are increasingly complex. In the application and use of technology, information technology audits require a framework based on principles that drive the desired behavior. In writing this literature review, the information technology audit method used is ITIL, and COBIT as guidelines for corporate information technology governance and audit processes. In its use, the ITIL framework is designed to ensure a flexible, coordinated and integrated system for the effective governance and management of IT services. While the COBIT framework is designed from a number of components that function to adjust, maintain, and shape system governance. To conduct an information system audit, the authors need to pay attention to things that can affect IT performance. This study produces a model to determine the factors that affect the Information System Audit. Researchers conducted a literature review from various sources that discussed Information System Auditing Using the COBIT and ITIL Frameworks which were collected from some of the literature found. Several factors that influence the Information System Audit are Design Factors, Knowledge Worker factors, Operational factors, Risk Assessment Factors, and Gather Evidence Factors. The author also conducted a systematic mapping study to find research gaps, namely the method of mapping the relationship between research topics and how much research has covered each topic and the relationship between topics.

Keywords: Audit; COBIT; governance; information system; ITIL

INTRODUCTION

Along with the times, Information Technology is also needed in agencies or institutions to develop and face competition, especially in the field of information technology and accounting with audit specifications that are in accordance with information systems. In its use, the ITIL framework is designed to ensure a flexible, coordinated and mutually integrated system for the effective and efficient governance and management of IT services. The role of information system audit is needed by large companies to check the reliability of the computerized systems they use in company operations. In writing this literature study, the information technology audit method used is ITIL V.4, COBIT 2019, as a guide for the information and communication technology corporate governance audit process. The use of the ITIL V.4 framework, is designed to ensure a flexible, coordinated and integrated system for the effective governance and management of IT services (Gërvalla, Preniqi, & Kopacek, 2018). while the COBIT 2019 framework is designed from a number of components that function to adjust, maintain, and shape the governance system (Gantman & Fedorowicz, 2016).

To conduct an information system audit, the research need to pay attention to things that can affect IT performance. Among the factors that affect an information system audit, namely the design factor which consists of 3 categories, namely: Contextual, Strategic and Tactical, this factor has several aspects, namely: Achievement, Reconsideration, talent, technology, improvement, transition, service, implementation and deliver, creating the portfolio, structure, processes, behavior, collaboration. The worker knowledge factor has several aspects, namely: Technology, Knowledge Development, Modified, determinants, consistent, incorporate and explain.

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Operational factors have aspects, namely: Alignment, Operational, Management, Achievement, Security, achieving, managing. The Risk Assessment Factor has the following aspects: Impact of time, Decision making process, redundancy allocation problem (RAP), complexity, mechanisms. And the Gather Evidence factor has the following aspects: Compability, Integration, Classified, Availability, Validated, Reability, value and impact.

The structure of this paper is (i) introduction; (ii) research methods used for literature review; (iii) Results (iv) Discussion; and (v) Conclusion. This study aims to explore the factors that influence the adoption of information systems auditing from COBIT or ITIL.

LITERATURE REVIEW

COBIT
A comprehensive tool for creating IT Governance in an organization is the use of COBIT (Control Objectives For Information And Related Technology) which brings together various management needs by bridging the gap between business risks, control requirements, and IT technical issues. COBIT provides best business practice references covering all organizational processes and describes them in logistics activities that can be managed and controlled effectively. The main objective of COBIT is to provide clear information and good practice for Governance to organizations around the world to help senior management to understand and manage IT-related risks. COBIT does this by providing an IT Governance framework and detailed control guidelines for management, business process owners, users and auditors (Utomo & Mariana, 2011).

ITIL
Information Technology Infrastructure Library (ITIL), a framework developed by the office of Goverment Commerce (OGC) in the UK. ITIL is an IT management approach that is most accepted worlwide, it is also a best practice of consistent and comprehensive IT management that provides effective service quality and in the use of information systems in a business environment, it is also a framework that can be developed and adapted in the development of a business environment system (Handayani & Aziz, 2020).

METHOD
The steps of the literature review method used consisted of: (i) determining research questions, (ii) searching for literature, (iii) selecting criteria, and (iv) extracting and synthesizing data.

Research question
The research question is: How to audit information systems well? And what theory is used to audit information systems? From this research question, several keywords can be used, namely audit using the COBIT and ITIL frameworks. These keywords are used to search and extract relevant literature.

Strategy
Search for articles using Publish or Perish software. The web search engine used is Google Scholar. Articles taken from journals with publisher Elsevier and IEEE, the keyword used is "Audit Cobit, ITIL".

Selecting Criteria
Screening was carried out on selected articles with several criteria, namely: year of publication of articles, type of publication of articles, correlation of titles with research questions, and topics discussing information system audits. Articles submitted for review must: (i) be published from 2016 to 2021; (ii) the article is not a conference; (iii) written in English; (iv) the title and abstract of the article must be correlated with the research question. The results of the search using the Publish or Perish software within a span of 5 years (2016 - 2021) can be seen in table 1.

Table 1 Article Search Results

Publisher	Keyword	Result (articles)
Elsevier	Audit Cobit	124
	Audit Cobit, ITIL	44
IEEE	Audit Cobit	284
	Audit Cobit, ITIL	129

Data Extraction and Synthesis
Articles that meet the criteria are then assessed for quality. Articles are classified according to individual

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perspective or organizational perspective, year of publication, name of article. In the literature extraction, adoption and theory factors were collected. A literature review was carried out to obtain a synthesis. Literature review is the process of reviewing and evaluating the results of data extraction. The review and audit process is carried out by analyzing gaps and making possible recommendations.

RESULT

The search results from the electronic journal database with the keywords "Cobit Audit, ITIL" found 581 articles. After screening, 30 articles were selected as the main articles, as shown in table 2.

Table 2 Systematic Literature Review Articles

No	Source	Finding	Method	Object
1	(Yamamoto, 2017)	Status of activities achievement, operations management and service operations	Quantitative maturity level with pcapd cycle approach	307 items taken from 1884 items, Japan's main operating service for the pcapd project.
2	(Wautelet, 2019)	Alignment of IT solutions developed on strategic objectives.	IT governance framework with modrigo	Case study in hospital
3	(Ferreira, Nery, & Pinheiro, 2016)	Able to Optimize the amount of time for decision making and prioritize issues that result in the greatest impact on the business and financial loss.	A multi-criteria qualitative approach with ITIL best practices tools.	M-MACBETH, in the decision stage problem management process.
4	(Al-Matari, Helal, Mazen, & Elhennawy, 2021)	Talent, Technology, Organizational Unit, Finance, Management and Operations.	Qualitative ISM3 (Information System Maturity Model)	*Cyber Security*
5	(Enríquez, Sánchez-Begines, Domínguez-Mayo, García-García, & Escalona, 2019)	Real System Compatibility and Integration.	PLM Using Model Driven Engineering.	R&D Projects Implemented by Research Group and Airbus.
6	(Marnewick, 2016)	Organizations are aware of and Apply management best practices in the business case	Qualitative Research Methodology.	Literature suggesting measurement.
7	(Hosono & Shimomura, 2017)	Design is reconsidered, functional specifications are updated and related objects are identified.	Qualitative Agile Software Development.	Developer, Operator and Delivery Guide.
8	(Gantman & Fedorowicz, 2016)	Future audit research on processes accompanying product systems development.	Qualitative Research with COBIT and Surveys.	432 large-scale sources from outside the ISD Project, which are completed or nearing completion.
9	(Aminzade, 2018)	To have an optimal level of security specifically for the organization, especially in terms of fast breach detection, response and recovery.	IT risk assessment with NIST Critical Success Factors (CSF) Framework	Securing corporate security networks from cyber criminals.

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10	(Alreemy, Chang, Walters, & Wills, 2016)	The extracted, analyzed and modified factors have been summarized, classified and sorted by importance, relativity, and according to the category they represent.	Quantitative Survey and Critical Success Factors (CSF)	In Saudi Arabia and to 120 experts in both the public and private sectors, in various industries such as telecommunications companies, universities, research institutes and government ministries.
11	(Raymond, Bergeron, Croteau, & Uwizeyemungu, 2019)	To demonstrate success using a capability-based strategic IT alignment perspective with the ITG study and comparing IT strategic management for other organizational and industrial sectors, and especially in the service sector.	Strategic IT management framework research model.	IT governance in SMEs uses survey data obtained from 223 manufacturers.
12	(Shrestha, Cater-Steel, Toleman, Behari, & Rajaeian, 2020)	Possibility to monitor process improvement using process attributes rather than strict audit capability levels. As well as being able to carry out assessments which are one source of evidence of availability, determine process capability or investigate granular process attributes for improvement.	The process of IT service management (ITSM) with the SMPA method.	Tried in two Australian organizations and evaluated positively in the US foreign exchange trading business.
13	(Yandri, Suharjito, Utama, & Zahra, 2019)	There are 4 stages of making FITIL, namely: fuzzification, knowledge base, inference, and defuzzification. The results of the conditions before and after the improvement process have succeeded in increasing the level of maturity in each ITIL cycle	Information Technology Service Management (ITSM) using Fuzzy best practice ITIL v3	Analysis of the data obtained from the Telecommunications Company.
14	(Joshi, Bollen, Hassink, De Haes, & Van Grembergen, 2018)	Research findings can infer the reliability of validated items through measuring agreement between coders on a limited sample of data, it is important to note that the process of coding data from public disclosures is definitely subjective. Although the industry-level strategic role of the classification is broad.	Governance maturity and strategic role with Cobit.	This study uses cross-sectional data from 124 companies.
15	(Wilkin, Couchman, Sohal, & Zutshi, 2016)	The finding that CGIT is driven from the top down is evident in the emphasis on written policies, as well as the identification of los' and social's of resource management as a key challenge.	Survey using quantitative data	Explored from the point of view of Chief Information Officers and executive managers of smaller and larger organizations, particularly in Australia, regarding IT governance. Using a survey of 143 respondents (43 from SO and 100 from LO).

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16	(Ariffin & Ahmad, 2021)	Based on the comparative analysis, this study obtained five indicators of DF organizational maturity and readiness: (1) Human resource and capacity development, (2) Organization, policy and cooperation, (3) Process, (4) Technology and technicality, (5) Legislation invitations and regulations.	Capability maturity model based on CMMI ver. 2 practice areas.	Based on the application of cybercrime activity carried out by the United States Institute of Internal Auditors.
17	(Terlizzi, Albertin, & de Moraes, 2017)	Sufficient strategic knowledge and authorization, responsible for establishing governance and control mechanisms to ensure that critical projects are selected.	Adopt benefits management (BM) with COBIT framework to audit IT processes.	Implemented in four leading financial institutions in Brazil through interviews, document analysis, and a survey of 186 professionals.
18	(Gërvalla, Preniqi, & Kopacek, 2018)	This article contributes to IT investment and IT resource management in an organization, starting with technology change, operational cost reduction, maintenance, decision-making processes with a focus on improving organizational sustainability.	The IT Infrastructure Library (ITIL) framework approach to Governance.	IT in corporate governance that contributes to the management of IT resources, with a focus on prioritizing and justifying IT investments, controlling, budgeting, and setting authorization levels.
19	(Alimam, Bertin, & Crespi, 2017)	Literature findings for easy reference, the proposed taxonomy highlights that the main focus of the researcher is on the strategy and transition stages.	Quantitative survey with ITIL framework for service life cycle management.	A total of 45 articles, spanning from 2010 to 2016, were analyzed to evaluate the current state of the ESM literature.
20	(Schmitz, Schmid, Harborth, & Pape, 2021)	Outcomes depend on professional factors such as experience, industry, familiarity with maturity level and receiving certification.	Conception model of information security management system (ISMS).	The maturity of some industries, for example, the German automotive industry, has even established the security maturity level as the de facto standard for measuring information security.
21	(Proença & Borbinha, 2016)	To analyze the potential, and major limitations, of existing semantic techniques to automate methods for assessment through analysis of existing model representations of reality.	Assessment method	Maturity models used to represent organizational architecture, such as archimate, bpmn or uml.
22	(Orta & Ruiz, 2019)	To determine an adequate IT service architecture, evaluate the benefits of implementing ITIL, or deliver an effective service.	Quantitative questionnaire with ITIL.	Six-month work, in which several researchers have analyzed the available research literature in the field of ITIL implementation projects and designed Met4ITIL

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23	(Bosse, Splieth, & Turowski, 2016)	An area of research in availability optimization, the Redundancy Allocation Problem (RAP) addresses the issue of achieving an optimal trade-off between resource availability and consumption.	Availability and cost of IT services.	A Monte Carlo Petri net simulation was developed which estimates the availability and cost of a particular design.
24	(Breda & Kiss, 2020)	Components to enhance physical security by developing complex protection strategies, which enhance the security of voice and radio signal information.	IT security standards.	Studies show how organizations and regulations were formed that define current IT security recommendations and norms.
25	(Maciá Pérez, Berna Martinez, & Lorenzo Fonseca, 2021)	The results of the study, the model must: set the conditions for creating a portfolio; define criteria for selecting and prioritizing projects; consider periodic control over the validity of decisions based on project management implementation and follow-up; and finally evaluate the results based on the value and impact obtained, effective use and actual cost of IT projects.	Quantitative analysis with maturity model of IT Governance and Good Governance.	Articles model portfolio of strategic projects as an effective tool, at the University of Alicante , where it has been operating since 2013.
26	(Smits & Van Hillegersberg , 2018)	This research is mostly focused on hard governance (structure, process), soft governance (behavior, collaboration) is just as important and perhaps important to close the gap.	Systematic literature review.	Of the 65 papers revealed 34 papers discussing ITG maturity since 2012.
27	(Smits & Van Hillegersberg , The development of a hard and soft IT governance assessment instrument, 2017)	The finding is that informal organizations that use the same focus areas as in the maturity model do not add complexity and are expected to provide useful information about the context of each focus area in the maturity section of the MIG model.	Maturity assessment method.	The initial version of the MIG created in the first quarter of 2015 was based on the MIG designed by Smits and Hillegersberg.
28	(Hoffman, Sellers, & Skomra, 2018)	The findings are First can interact IT capabilities with key audit fee determinants identified in the previous literature, Second can use alternative proxies for superior IT capabilities, IW500 and third can emulate Chen et al. and divides the result into three time periods.	Quantitative analysis with IT capabilities.	Research by Chen et al. discovered after the Sarbanes Oxley Act period for 2004 to 2007, client IT capabilities reduce audit fee increases.

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No	Source	Finding	Method	Object
29	(Bounagui, Mezrioui, & Hafiddi, 2019)	The result of the evaluation is that ITIL is fairly consistent as the mapped process elements of this model provide detailed practices for defining Cloud migration strategies, planning and managing IT service changes and transitions, and managing service level agreements. The results obtained from the COBIT evaluation are also consistent enough to emphasize the completeness of this framework which indicates a high coverage score. The findings of the ISO/IEC 27001/2 evaluation were a focus on information security, which explains the low coverage scores shown by the model with respect to the required domains of CM, RM, and SLA.	CC governance review and analysis with COBIT, ITIL and ISO.	The Cloud Security Alliance, the three main CC security risks are insecure interfaces and APIs, data loss or leaks, and hardware failure.

No	Source	Finding	Method	Object
30	(Amorim, Mira da Silva, Pereira, & Gonçalves, 2021)	Research was carried out to incorporate new scalable mechanisms into the methodology, and a new approach to the development life cycle, omitted Sprint 0, Scrum adoption was limited to the implementation step only, and after definition of each project scope.	Agile Methodology on GEIT implementation with COBIT 5.	Paper published in IEEE EDOC 2018 proceedings. Of the interviewees 71% agreed, and 29% strongly agreed, that the methodology allows greater involvement of process owners (senior managers).

DISCUSSIONS

Work process

Cobit 2019 consists of 5 domains. The five domains are then broken down into 40 processes. In 40 processes there are practices. In each of these practices, there are activities that must be carried out in the implementation of IT governance and management.

ITIL V4 uses the concept of management practice in its work process. Management practice contains the processes, roles and activities normally performed in IT governance and management. The advantage of ITIL V4 lies in the definition of management practice which greatly assists the implementation of IT governance and management. ITIL V4 defines a total of 34 management practices which are divided into 3 groups of management practices.

Measurement

The concept of measuring the implementation of IT governance and management at Cobit 2019 uses the Cobit Performance Management concept which is in line with CMMI v2. The model used is the level of capability and maturity model using a scale of 0-5. The determination of the level is based on the activities that have been carried out. ITIL uses the concepts of KPI and CSF in measuring the effectiveness of IT governance and management implementation.

Factor model

In this study also made a model based on the factors that arise so that a model is obtained to determine the factors that affect the Information System Audit are as follows:

Design Factor

Design factors are factors that can influence an enterprise's design, governance and positioning for success in the use of information and technology. This design factor consists of 3 (three) categories, namely: Contextual, Strategic and Tactical.

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Table 3 Design Factors and Aspects

Factor	Aspects	Source
Design Factor	Achievement, Reconsideration, talent, technology, improvement, transition, service, implementation and deliver, creating the portfolio, structure, processes, behavior, collaboration	(Yamamoto, 2017), (Hosono & Shimomura, 2017), (Al-Matari, Helal, Mazen, & Elhennawy, 2021), (Ariffin & Ahmad, 2021), (Alimam, Bertin, & Crespi, 2017), (Shrestha, Cater-Steel, Toleman, Behari, & Rajaeian, 2020), (Proença & Borbinha, 2016), (Schmitz, Schmid, Harborth, & Pape, 2021), (Yandri, Suharjito, Utama, & Zahra, 2019), (Orta & Ruiz, 2019), (Maciá Pérez, Berna Martinez, & Lorenzo Fonseca, 2021), (Smits & Van Hillegersberg, The continuing mismatch between IT governance maturity theory and practice: a new approach, 2018), (Smits & Van Hillegersberg, The development of a hard and soft IT governance assessment instrument, 2017)

Knowledge Worker Factor

Knowledge workers factor are those who are able to provide assessments using systemic thinking and who can apply systematic approaches, best practices, and tools to utilize IT effectively.

Table 4 Knowledge Worker Factors and Aspects

Factor	Aspects	Source
Knowledge Worker	Technology, Knowledge Development, Modified, determinants, consistent, incorporate and explain	(Al-Matari, Helal, Mazen, & Elhennawy, 2021), (Gantman & Fedorowicz, 2016), (Ariffin & Ahmad, 2021), (Alreemy, Chang, Walters, & Wills, 2016), (Yandri, Suharjito, Utama, & Zahra, 2019), (Terlizzi, Albertin, & de Moraes, 2017), (Hoffman, Sellers, & Skomra, 2018), (Bounagui, Mezrioui, & Hafiddi, 2019), (Amorim, Mira da Silva, Pereira, & Gonçalves, 2021)

Operational Factor

Operational factor is a review of part of the procedures and methods for the organization with the aim of providing recommendations regarding the achievement of business objectives and company policies.

Table 5 Operational Factors and Aspects

Factor	Aspects	Source
Operational Factor	Alignment, Operational, Management, Achievement, Security, achieving, managing	(Wautelet, 2019), (Raymond, Bergeron, Croteau, & Uwizeyemungu, 2019), (Al-Matari, Helal, Mazen, & Elhennawy, 2021), (Marnewick, 2016), (Yamamoto, 2017), (Aminzade, 2018), (Bosse, Splieth, & Turowski, 2016), (Breda & Kiss, 2020), (Bounagui, Mezrioui, & Hafiddi, 2019)

Risk Assessment Factors

Risk Assessment Factor is one of the factors capable of analyzing audit risk by using a risk-based audit approach so that audits are more efficient.

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Table 6. Risk Assessment Factors and Aspects

Factor	Aspects	Source
Risk Assessment Factors	Impact of time, Decision making process, redundancy allocation problem (RAP), complexity, mechanisms	(Ferreira, Nery, & Pinheiro, 2016), (Gërvalla, Preniqi, & Kopacek, 2018), (Bosse, Splieth, & Turowski, 2016), (Smits & Van Hillegersberg, The development of a hard and soft IT governance assessment instrument, 2017), (Amorim, Mira da Silva, Pereira, & Gonçalves, 2021)

Gather Evidence Factor

Gather Evidence factor is a factor that serves to obtain reliable, relevant, and useful evidence to achieve a goal effectively. Gather Evidence can be integrity, Availability, Compliance and Reliability.

Table 7. Gather Evidence Factor and Aspects

Factor	Aspects	Source
Gather Evidence	Compability, Integration, Classified, Availability, Valided, Reability, value and impact	(Enríquez, Sánchez-Begines, Domínguez-Mayo, García-García, & Escalona, 2019), (Alreemy, Chang, Walters, & Wills, 2016), (Shrestha, Cater-Steel, Toleman, Behari, & Rajaeian, 2020), (Joshi, Bollen, Hassink, De Haes, & Van Grembergen, 2018), (Bosse, Splieth, & Turowski, 2016), (Maciá Pérez, Berna Martinez, & Lorenzo Fonseca, 2021)

Research Gap

Systematic Mapping Study (SMS) is a method of mapping the relationship between research topics and how much research has covered each topic and the relationship between topics. This method is used to get a gap from the research. In this analysis, the tool used is Vosviewer as Mapping Visualization.

The metadata search results as shown in table 1 above are then entered into the Vosviewer software, resulting in a visualization as shown in the figure below:
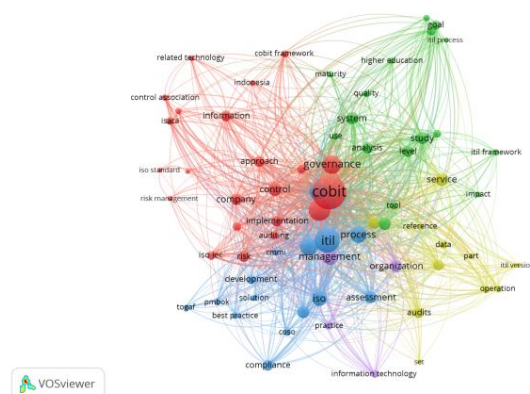

Figure 1. Mapping Clustering Results

Figure 1 shows the mapping of the 69 selected terms where there are 5 clusters namely red, blue, yellow, green and purple.
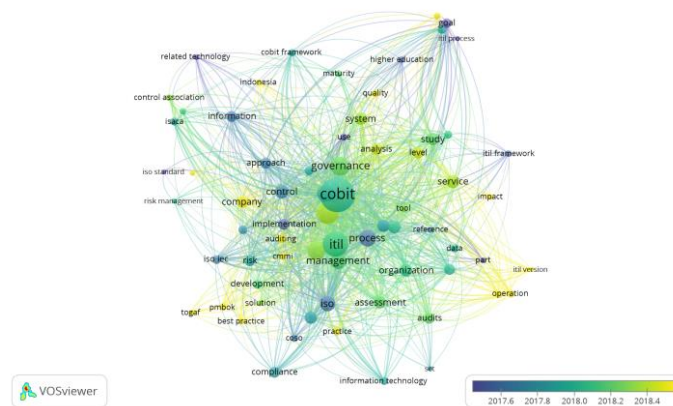
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Figure 2. Overlay Visualization

Overlay Visualization is used to map terms based on the year of research where light colors indicate research in a more recent year. Among the research terms in the current year are: audit, indicator, quality, itil version, operation, auditing, and practice.
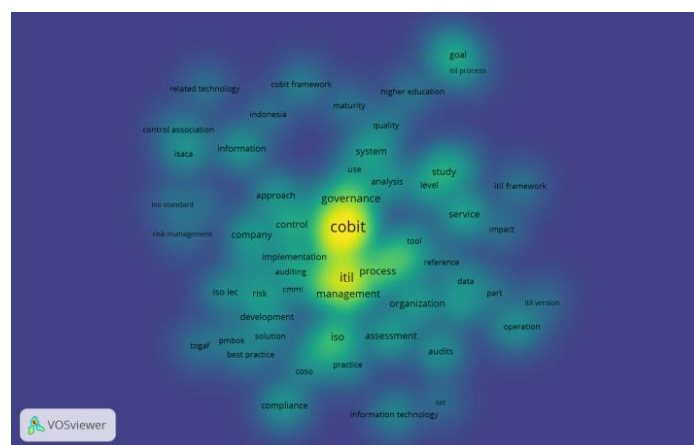

Figure 3 Density Visualization

Density Visualization shows the depth or level of frequency of the research. From the visualization, it can be seen that cobit, itil, process, and framework have been researched a lot.

The conclusion from the mapping is that auditing using Cobit and ITIL is still a current research trend (2016 - 2021). In publisher Elsevier, search results with the keyword Audit Cobit: 124 paper; Cobit Audit, ITIL: 44 papers. As for the IEEE publisher, the search results with the keyword Audit Cobit: 284 paper; ITIL Cobit audit: 129 papers. However, more specific research on the Cobit domain combined with Practice Management in ITIL has not been discussed in this study.

CONCLUSION

Based on the results and discussion found the factors that influence both consist of: design factors, knowledge worker factors, operational factors, risk assessment factors and Gather Evidence factors. Design factors are factors that can influence the design of a corporate governance system and position it for success in the use of information and technology. This design factor consists of 3 (three) main factors, namely: Contextual, Strategic and Tactical. The design factors consist of Achievement, Reconsideration, talent, technology, upgrade, transition, service, implementation and delivery, portfolio creation, structure, process, behavior, collaboration. The theory that is widely used in this design factor is the theory of IT governance using the COBIT and ITIL methods. Knowledge worker factors consist of: Technology, Knowledge Development, Modification, determinant, consistent, incorporate and explain. Risk assessment factors consist of: time impact, decision-making process, redundancy allocation problem (RAP), complexity, mechanism. And finally, the evidence gathering factors consist of: Compatibility, Integration, Classified, Availability, Validated, Reliability, Value

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and Impact. Complete research on information system audits using the COBIT and ITIL frameworks that are more specific to the ITIL domain and management practice can be a further research.

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