An Exploratory Study of the Familiarity and the Perceptions of Continuous Auditing Technology in Indonesia

Theodore Yana Federicco[1*], *Rosaline* Tandiono[1†]

[1]Accounting Department, School of Accounting, Bina Nusantara University, Jakarta, Indonesia 11480

Abstract. While there is an increasing interest in continuous auditing technology research, most studies focus on developed countries. Based on the above background, the objective of this study is to explore the perception of the emergence of continuous auditing technology in a developing country - Indonesia. This study uses semi-structured interviews to collect its data. The findings show that the level of familiarity and the awareness of the existence of continuous auditing technology is varied. Several drivers are identified as the factors of their familiarity and awareness – length of employment, the type of auditors, and prior knowledge. This study also finds that while auditors' perceptions toward continuous auditing are favorable, the concern of insufficient competency to adopt and adapt to such technology was also raised.

1 Introduction

The advancement of technology has inevitably affected the financial reporting and auditing environment. For example, the emergence of blockchain technology has made accounting information timelier and more trustworthy [1]. Likewise, continuous auditing technology in auditing practice has changed how audit is carried out. What was done manually can be performed continuously and automatically and on a more frequent basis with continuous auditing technology [2]. The continuous audit is an auditing system that can produce results simultaneously with, or shortly after, relevant events [3]. Since its existence, various scholars have studied continuous auditing technology. For instance, [4] present an actionable framework that combines data mining with a human expert in a continuous audit environment. [5] introduced a cloud security system, *CSBAuditor*, that enables continuous monitoring of cloud infrastructure, detecting malicious activities and unauthorized changes. [6] provided empirical evidence of the factors associated with continuous information in internal audit function risk-based audit planning (RBAP). They argued that the importance of data analytics, the collaboration with the audit committee and external auditor, and the use of IAF's results for fraud prevention have a positive influence on the use of information from continuous audits in RBAP.

Although various studies discussed continuous auditing, most studies are conceptual, and nearly all extant studies emphasize the continuous audit application. A study that focuses on the empirical evidence at the micro-level, such as the acceptance and the perceptions of continuous audit practice, is limited. [3] argued that one of the success factors in implementing continuous audits is the support from auditors. Moreover, understanding the acceptance and perceptions of auditors provides insights into how the proposed conceptual continuous auditing fits the reality of the business.

Furthermore, although a similar study has been conducted by [3], their study examined auditors' perceptions in a developed country. By far, there is a limited study on continuous audits in developing countries. Developing countries have unique characteristics compared to developed ones. Developing countries tend to have less infrastructure to adopt the latest technology. Nevertheless, developing countries are also changing rapidly, particularly countries in East Asia. According to [7], East Asia faces modernization and globalization. Studying one of the countries in East Asia provides the basis for understanding technology development, including continuous auditing technology.

1.1 Objectives

Based on the above backdrop, this study explores the auditors' perception of the emergence of continuous auditing and its adoption in Indonesia. Understanding the auditors' perception would provide an insight into the auditors' reception and their readiness to adopt and adapt to the advancement of continuous auditing technology in Indonesia. Specifically, this study aims to answer the following questions:

1. To what extent are auditors in Indonesia familiar and aware of continuous auditing technology?
2. How do the auditors perceive the development of continuous auditing technology?

* Corresponding author: theodore.yf99@gmail.com
† Corresponding author: rtandiono@binus.edu

Indonesia is a proper context for several reasons to study the perception and development of continuous auditing technology. First, Indonesia is not one of the leading countries in technology advancement. However, Indonesia has the potential to grow rapidly among other East Asia countries [8]. Therefore, the level of development and reception of continuous auditing technology in Indonesia can be used to benchmark other countries in East Asia. Additionally, understanding the development and reception of continuous auditing technology in one of the leading countries in East Asia will provide a holistic picture of the advancement of the audit field globally.

This study uses exploratory qualitative research to achieve the above research objective and research questions. Exploratory research is used when the researcher believes the issue being studied is worthy of being examined, but currently, there is limited knowledge [9]. In this regard, to what extent continuous auditing has been applied in Indonesia is not clearly defined. Therefore, exploratory research is the most suitable approach. In the exploratory research, this study focuses on micro perceptions of the auditors in Indonesia. Focusing on the micro perception of auditors can guide both audit practitioners and researchers about the evolution of continuous audit from purely an academic concept to the actual practices [3].

Moreover, an in-depth examination of the auditor's familiarity and perceptions depends on the access to the auditors [3]. Thus, this study offers a unique degree of access that can complement existing research. This study first depicts the level of familiarity and awareness toward continuous auditing technology. Second, this study also demonstrates the factors that encourage and hinder the adoption of continuous auditing in Indonesia.

The rest of the paper is structured as follows. The following section discusses continuous auditing in various contexts, its usage, and its limitation. Next, the methodology of this study is explained. Findings and discussion then follow it. Lastly, this research is concluded with limitations and recommendations for future research.

2 Literature Review

This section provides an overview of the current state of the art of continuous auditing technology research that relates to this study.

2.1 Definition and the Relevance of Continuous Auditing in the Today's Audit Environment

While continuous auditing has existed for more than two decades, there is no consensus definition of continuous auditing until today [10]. Nevertheless, the definition provided by the American Institute of Certified Public Accountants provides some basis. According to the institute, continuous auditing is "a methodology for issuing audit reports simultaneously with, or a short period after, the occurrence of the relevant events" [11]. Continuous auditing is utilizing IT capability to acquire transactional and process data at the source and in a disaggregated and unfiltered manner to enhance audit efficiency, effectiveness, and timeliness [12]. Continuous auditing assists auditors by identifying exceptions and/or deviations from a defined standard or benchmark [10]. Auditors receive reports of this event from the continuous audit process. Thus, continuous auditing emphasizes real-time audit practices where any exceptions and/or deviations are detected in the shortest possible time after the event's occurrence. For this reason, some scholars equate continuous auditing with an instance auditing process that relies on electronic information [10, 13]. Combining all aspects of continuous auditing, this study defines continuous auditing as a methodology for issuing audit reports simultaneously with, or a short period after, the occurrence of the relevant events by relying on electronic information.

The ability of continuous auditing to detect any relevant auditing issues in the shortest possible time has overcome the weaknesses of traditional auditing. One of the most criticized limitations of traditional auditing is its timeliness in providing audit assurance. Studies showed that the time gap between the financial reporting and the audit examination period might cause fatal effects, such as the retarding of uncovering fraud [14]. Moreover, the availability of real-time financial reports has made traditional audit practices less relevant [15]. Thus, continuous auditing matches the current state of accounting information where real-time monitoring by auditors is enabled [16].

2.2 The Effect of Continuous Auditing on Internal and External Auditors

The existing research also studied the advantages and the effect of continuous auditing on internal and external auditors. In terms of internal auditors, continuous auditing increases audit quality and reduces audit costs and time [15]. Similarly, [17] studied the potential benefits of implementing technology in monitoring the effectiveness of company internal control systems. Their study suggested that the likelihood of material weaknesses is low, the increment of audit fees is smaller, and the audit delays are reduced due to the implementation of internal control monitoring technology.

External auditors are not directly affected by continuous auditing. However, [18] found that external auditors do not differentiate between in-house and outsourced internal auditing functions when a company uses continuous auditing. Meanwhile, [19] demonstrated that continuous auditing enhances external auditors' trust and reliance on the internal audit function. These studies indicate that continuous auditing applied by the internal audit function provides more confidence for external auditors in the internal audit process.

The prior research demonstrates that continuous auditing technology affects internal and external audit practices differently. Therefore, this study also examines the perceptions of both internal and external auditors to analyze their level of awareness and the

benefits of continuous auditing technology for both types of auditors in Indonesia.

3 Methods

In an exploratory study, flexibility and open-mindedness are the two essential aspects [9]. This study employs semi-structured interviews to collect data catering to these qualities. The semi-structured interview allows the researchers to have a greater range of respondents' answers and stay within the themes set in advance [20]. In recruiting the participants, the researchers employ purposive sampling and snowballing. Under the purposive sampling, the researchers chose participants with substantial knowledge about the issue being discussed to ensure the richness of the data [21]. In this sense, the researchers aimed at external and internal auditors to participate in this study.

4 Data Collection and Analysis

At the beginning of the data collection, only a small number of auditors participated. Additionally, both researchers have a limited network of auditors. Therefore, the researchers used snowballing to ensure the data was sufficient to clarify the studied issue.

Snowballing technique is a way to recruit participants by relying on the recommendation of the interviewees to introduce other participants to get involved in this study. Such a snowballing method is suitable when the researcher has limited networking with the pool of participants [22]. After the tenth interview, the researchers could not find significant new information. Thus, the researchers concluded that the data collection had reached saturation and ended the process. Table 1 provides the profiles of the interviewees.

Data analysis was carried out as soon as each interview was conducted. It started by transcribing the interview verbatim. After the interviews were transcribed, the researchers went through each transcript to immerse themselves in the data. Next, the researchers conduct coding. The code was based on any similarities between interviewees, significant contrast on the same issue, anything that surprises the researchers, and anything that the researchers find interesting. Such coding allows the data to speak for itself rather than putting meaning on the collected data [23].

From the codes, the researchers formed themes. The themes are the awareness and the familiarity of continuous auditing among auditors and the auditors' perception of the development of continuous auditing technology. The findings from the themes are discussed below.

Table 1. Respondents' profile

Respondent's identifier	Age	Gender	Working industry	Auditor type	Total working experience
PA	40s	Male	Audit firm	External	22 years
KI	20s	Female	Audit firm	External	7 years
BY	20s	Male	Audit firm	External	7 years
PDF	30s	Male	Mining	Internal	12 years
ANT	40s	Male	Web Service	Internal	21 years
PR	20s	Male	Audit firm	External	2 years
BN	40s	Female	Insurance	Internal	24 years
PGW	40s	Male	Banking	Internal	23 years
JAR	40s	Male	Insurance	Internal	20 years
PHN	20s	Male	Healthcare	Internal	1,5 years

5 Results and Discussion

5.1 The Awareness and the Familiarity of Continuous Auditing among Auditors

This study finds that auditors' awareness and familiarity with continuous auditing depend on several factors. First is the length of their employment. Those with higher employment lengths have a better understanding of continuous auditing. This is evidenced by those respondents who have been building their careers as auditors for seven years and above; they were able to describe and discuss continuous auditing in more detail.

Second, their role, whether external or internal auditor, also affects their awareness and familiarity with continuous auditing. This study finds that those who are or had been taken the role of an internal auditor are more aware of such technology. Another interesting observation is that those external auditors who understand continuous auditing perceive it to be more helpful in assisting internal auditing work. Such perception is driven by the fact that external auditors require more judgment in accomplishing their job:

"But for us, public accountants (external auditors), we might still not be familiar with this continuous auditing… Because, when it comes to audits, there are many judgments to be made- if we want to automate it (implement continuous auditing), we are afraid of various things that can go wrong… "(PA, Local CPA Firm Owner)

For some external auditors, if they discuss continuous auditing, their understanding is more towards providing continuous services to clients than an automated auditing job done by technology:

"Continuous audit for us [external auditors] means to have continuous partnership with clients. If the clients

come to us for service that will be continuous [audit]" (BY, Big 4 External Auditor)

There are several results from the above statements. First, the finding indicates that continuous auditing technology directly impacts internal auditing activities compared to external auditing works. Perhaps, internal audit utilizes a risk-based approach in the audit planning, and that approach can be widened by assuming continuous auditing technology [24]. Second, the finding also demonstrates that the term continuous auditing is a fluid concept. The finding is similar to [3] remarked that continuous auditing is an abstract concept and thus can be a different understanding. In this study, a different auditor has a different understanding of continuous auditing technology. Perhaps, the lack of consensus about the term is the cause of such diversity.

Third, the auditor's prior knowledge and exposure to the auditing field also contribute to the understanding of continuous auditing. For example, while an internal auditor, one of the respondents is unfamiliar with continuous auditing. Another respondent who is an external auditor understands continuous auditing from his university study and relates to the current environment:

"Continuous auditing… Well, I have (heard of it), because when I was in university my (thesis) topic was about internal audit; you see, continuous audit usually grows in the internal audit environment" (PR, Big 4 External Auditor).

Nevertheless, during the interviews, those who claimed to be familiar with continuous auditing did not discuss the practical usage of such technology. Nearly all discussed the conceptual benefits of continuous auditing technology. Additionally, in Indonesia, the audit field is still dominated by senior auditors whose age is 40 and above. This group of auditors is usually not technology-savvy. However, they have more comprehensive networking and are likely to be members of professional associations. For example, most internal auditors' interviewees are members of the Indonesian chapter of the Institute of Internal Auditors (IIA). They likely have more exposure to the latest auditing development, including continuous audits. Thus, it is argued that knowing continuous auditing does not mean that they are technologically competent. The finding is different from [3], wherein their study, many of the participants, had been involved in the development of continuous auditing or were in the training process of such technology. Perhaps, the different level of technology adoption at the country level is the cause of such difference.

5.2 The Auditors' Perception of the Development of Continuous Auditing Technology

Those respondents who are familiar and aware of continuous auditing technology, regardless of whether they are internal or external auditors, agree that continuous audit is a significant benefit to the auditing field. The first advantage perceived by the auditors is the continuous auditing technology eases the work of the auditors:

"Continuous auditing technology will make the work of auditors easier. If we can implement it across various business processes, it becomes easy for us: we investigate what exceptions (errors) you have" (BN, Internal Auditor).

Using continuous auditing technology enhances the role of internal auditors and increases the audit assurance:

"By using continuous audit technology, internal audits are not just providing the traditional audits but also additional examination. These will enhance the audit as well." (BN, Internal Auditor)

Continuous auditing technology is also perceived to be more efficient and timelier in detecting any mistakes or errors:

"Audits are usually "after the fact"- which means the event has occurred, and after that, we identify, so it is more investigative or identifying. With Continuous Audit, for example, a financial payment transaction, we can continuously perform an audit for it (the transaction), so it can be detected faster if there is an error or mistake." (JAR, Internal Auditor).

While nearly all participants perceived continuous auditing technology favorably, they also doubted its success in its adoption. Mostly, it is because of the readiness of the auditors to adopt and adapt to the technology:

"…if the auditor is not competent enough, there is a possibility that he conducted the continuous audit program incorrectly; This is what must be reviewed every six months or every year- whether the audit program is still relevant or not." (ANT, Internal Auditor).

The findings indicate that while continuous auditing technology provides several benefits, the issue of the auditor's competence becomes one of the major concerns. Moreover, [16] argued that continuous audit relies on having a robust data flow and the system configuration. Any likelihood of an improper configured continuous auditing system running into data compatibility will give out wrong or irrelevant results. Consequently, the system must be reviewed periodically to ensure properly configured [16]. Thus, other than the auditor's competence in running continuous audits, the auditor's knowledge of the possible errors also plays a significant role in the success of continuous auditing technology adoption.

6 Conclusion

This study has demonstrated that while continuous auditing has been adopted in various developed countries, a country such as Indonesia is still on its way to adopting and adapting to such technology. From the perception of auditors, it is found that not all auditors were familiar with and aware of the emergence of such technology. Several factors were identified, including the length of employment, the type of auditors, and the prior knowledge. Those who have had a more extended employment history as an auditor tend to be more familiar with and aware of continuous auditing technology. Likewise, internal auditors are more

familiar and aware of such technology than external auditors. Lastly, those exposed to such technology during their university life are more familiar and aware of such technology. However, this study argued that their familiarity and awareness might not indicate their level of technical competence. Also, this study found that the lack of consensus on the meaning of continuous auditing technology has caused divergent views of such terms.

In general, auditors also perceived the rise of continuous auditing technology favorably. Several arguments for continuous audit are easing the auditor's work, enhancing audit assurance, and being more efficient and timelier in detecting errors. However, there is also a concern about the readiness of auditors to adopt and adapt to such technology as their level of technical competence is still a question. Additionally, understanding the potential errors that such technology might bring is also necessary to ensure the success of continuous auditing technology adoption.

This study contributes to the existing literature on continuous auditing technology. First, it focuses on a developing country that is currently scarce. Second, it examines the micro-level of auditor's perceptions, which is currently limited [3]. Third, it provides empirical evidence of the level of familiarity, awareness, and readiness in adopting and adapting continuous auditing technology.

This study made several recommendations to ensure that such technology's adoption and adaptation are balanced globally. First, local government needs to be more aware of the advancement of technology, including in the audit field. Building sufficient infrastructure to ensure the adoption of technology is crucial. The government can also provide a more affirmative regulation to ensure technology adoption. Second, developed countries may encourage developing countries to adopt the recent technology that has been adapted. Workshops, training, and knowledge sharing can be some of the activities done to ensure the balance of technology adoption around the world.

While this study offered several contributions and recommendations, this study focuses on the auditors' perception only. This limitation can be the avenue for future research. First, future research may extend the participants to regulatory bodies to analyze their readiness and support for continuous auditing technology. Second, future research might focus on the continuous auditing technology adaptation process in developing countries to complement this study.

References

[1] H. Byström, "Blockchains, Real-time Accounting, and the Future of Credit Risk Modeling," *Ledger*, vol. 4, pp. 40–47, 2019.

[2] M. Alles, G. Brennan, A. Kogan, and M. A. Vasarhelyi, "Continuous Monitoring of Business Process Controls: A Pilot Implementation of a Continuous Auditing System at Siemens," *Contin. Audit.*, pp. 219–246, 2006.

[3] M. A. Vasarhelyi, M. Alles, S. Kuenkaikaew, and J. Littley, "The acceptance and adoption of continuous auditing by internal auditors: A micro analysis," *Int. J. Account. Inf. Syst.*, vol. 13, no. 3, pp. 267–281, 2012.

[4] M. Jans and M. Hosseinpour, "How active learning and process mining can act as Continuous Auditing catalyst," *Int. J. Account. Inf. Syst.*, vol. 32, no. January 2017, pp. 44–58, 2019.

[5] K. A. Torkura, M. I. H. Sukmana, F. Cheng, and C. Meinel, "Continuous auditing and threat detection in multi-cloud infrastructureNo Title," *Comput. Secur.*, vol. 102, 2021.

[6] M. Eulerich, C. Georgie, and A. Schmidt, "Continuous Auditing and Risk-Based Audit Planning—An Empirical Analysis," *J. Emerg. Technol. Account.*, vol. 17, no. 2, pp. 141–155, 2020.

[7] L. E. Westphal, *Technology strategies for economic development in a fast changing global economy*, vol. 11, no. 4–5. 2002.

[8] ADB, "INNOVATE INDONESIA Through, Unlocking Growth Transformation, Technological," 2020.

[9] R. A. Stebbins, "Exploratory Research," *The Sage Encyclopedia of Qualitative Research Methods*. SAGE Publication Ltd., pp. 327–329, 2008.

[10] M. Eulerich and A. Kalinichenko, "The current state and future directions of continuous auditing research: An analysis of the existing literature," *J. Inf. Syst.*, vol. 32, no. 3, pp. 31–51, 2018.

[11] AICPA, *Audit Analytics and Continuous Audit: Looking Toward the Future*. 2015.

[12] M. G. Alles, A. Kogan, and M. A. Vasarhelyi, "Putting Continuous Auditing Theory into Practice: Lessons from Two Pilot Implementations," *J. Inf. Syst.*, vol. 22, no. 2, pp. 195–214, 2008.

[13] D. Y. Chan and M. A. Vasarhelyi, "Innovation and practice of continuous auditing," *Int. J. Account. Inf. Syst.*, vol. 12, no. 2, pp. 152–160, 2011.

[14] S. Flowerday, A. W. Blundell, and R. Von Solms, "Continuous auditing technologies and models: A discussion," *Comput. Secur.*, vol. 25, no. 5, pp. 325–331, 2006.

[15] Z. Rezaee, R. Elam, and A. Sharbatoghlie, "Continuous auditing: The audit of the future," *Manag. Audit. J.*, vol. 16, no. 3, pp. 150–158, 2001.

[16] H. Du and S. Roohani, "Meeting Challenges and Expectations of Continuous Auditing in the Context of Independent Audits of Financial Statements," *Int. J. Audit.*, vol. 11, no. 2, pp. 133–146, 2007.

[17] A. Masli, G. F. Peters, V. J. Richardson, and J. M. Sanchez, "Examining the Potential Benefits of Internal Control Monitoring Technology," *Account. Rev.*, vol. 85, no. 3, pp. 1001–1034, 2010.

[18] B. I. Davidson, N. K. Desai, and G. J. Gerard, "The Effect of Continuous Auditing on the Relationship between Internal Audit Sourcing and the External Auditor's Reliance on the Internal Audit Function," *J. Inf. Syst.*, vol. 27, no. 1, pp. 41–59, 2013.
[19] I. Malaescu and S. G. Sutton, "The reliance of external auditors on internal auditors," *J. Inf. Syst.*, vol. 29, no. 1, pp. 95–114, 2015.
[20] S. Kvale, "The Qualitative Research Interview: A Phenomenological and a Hermeneutical Mode of Understanding," *J. Phenomenol. Psychol.*, vol. 14, no. 2, pp. 171–196, 1983.
[21] L. A. Palinkas, S. M. Horwitz, C. A. Green, J. P. Wisdom, N. Duan, and K. Hoagwood, "Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research," *Adm. Policy Ment. Heal. Serv. Res.*, no. 42, pp. 533–544, 2015.
[22] C. Noy, "Sampling knowledge: The hermeneutics of snowball sampling in qualitative research," *Int. J. Soc. Res. Methodol.*, vol. 11, no. 4, pp. 327–344, 2008.
[23] H. J. Rubin and I. S. Rubin, *Qualitative Interviewing The art of hearing data*. SAGE Publication Ltd., 2005.
[24] Delloitte, "Continuous Monitoring and Continous Auditing: From Idea to Implementation," 2010.