Development of CFA Dashboard for Continuous Audit Using R Language

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Abstract. Current manual auditing system may be difficult to the auditors, due to the enormous amount of data. Some auditors probably overlooked some illegal business processes that can cause money loss or embezzlement by the workers. Research study conducted to identify the problem by using the current manual financial auditing system found that the current system is not efficient in continuous auditing for business process. It is known that vast amount of financial data being processed during auditing may slow down the process during auditing. It can also be complex to handle which sometimes can be beyond auditors’ capability to audit business processes. Our research proposes an informative dashboard to assist auditors to assess risk. The informative dashboard is a category of operational dashboard. We apply big data management concept and implement the dashboard using the web development life cycle approach. The dashboard is implemented using R language and Shiny package. Keywords: audit, analytics, dashboard, big data management concept, R language

1. Introduction

Vast amount of data being processed can give quite a big problem in manual auditing process. The odd is that some undetected outliers’ claims maybe hidden under the big data of claims. This outlier involves an observation that deviates so much from other observations as to stimulate disbelief that it was produced by a different mechanism[1].

It is important to generate a solution to overcome these problems because the effects of these problems are too risky. Continuous auditing is an established approach to ensure the efficiency of the process. As the name ‘continuous auditing’ implies, it is owned by the audit function and can include any audit process that is repeated regularly. Continuous auditing can be cornerstones in helping internal audit respond effectively to the increased expectations that are placed upon them and it can help organizations operate more efficiently and more profitable.

A comprehensive electronic audit process enables auditors to provide some degree of assurance on continuous information simultaneously with, or shortly after, the disclosure of the information [2]. This research is aimed to apply computer-based financial auditing system will be inevitably evolved from a conventional manual auditing. The swift emerging information technology and demand for more timely communication of information to business stakeholders requires auditors to invent new ways to continuously monitor, gather, and analyze audit evidence.
2. Literature Review

2.1. Continuous auditing model

Financial auditing entails collection, analysis, and reporting of financial-related data for the purpose of detecting and preventing errors, exceptions, and fraud in the financial system. Many recent studies have emphasized the importance of continuous auditing, since in the future the major audit objectives will become the real-time business reporting on Internet [3-5].

Rezaee, Ford [6] proposes a system of continuous auditing; a system that entails selecting, monitoring, and analyzing electronic financial transaction data. Their model uses Extensible Business Reporting Language (XBRL), a standardized electronic language for business reporting. The continuous auditing model describes a system that continuously prepares, publishes, extracts and examines financial information for auditing systems.

It is known that the continuous auditing model is well-known by organization nowadays. They use this auditing model as assurance on the financial audit in their financial statements and reports. Consequently, timely assurance of information utilizing continuous auditing (CA) and perpetual control monitoring (CM) methodologies is becoming more aggressive [7].

Given the accentuation on the transformation of the entire system of auditing, the development of CA requires a fundamental rethink of all aspects of auditing, from the way in which data is made available to the auditor, to the kinds of tests the auditor conducts, how alarms are dealt with, what kinds of reports are issued, how often and to whom and many other issues, the paramount of some of which will only become ostensible as CA is implemented.

![Continuous Audit Implementation Steps](image)

Figure 1. Six steps of continuous audit implementation steps [8]

This research is aimed to propose a dashboard to represent step 1 (Establish Priority Area) and step 2 (Identifying and Monitoring and Audit Rules) of Figure 1. As mentioned by Chiang [9], dashboard is also interpreted as a visual display that presents the crucial information on a single screen.
2.2. Big data management

“Big data management is the organization, administration and governance of large volumes of both structured and unstructured data” [10]. In our previous work, we value the 4Vs (Volume, Variety, Velocity and Veracity) in the CA big data management [11]. To ensure that the data collection process done by the researchers is organized, understandable, and transparent, data management is involved [12].

2.3 Big Data Analytics in Financial Auditing

In the auditing of financial statements in accordance with International Statements on Auditing (ISAs), plentiful possible opportunities increase for Big Data Analytics [13].

For example, the following audit activities are likely to benefit from Big Data analytics:

- Identifying and evaluating the risks associated with accepting or perpetuating an audit engagement, for example, the perils of bankruptcy or high-level management fraud.
- Identifying and considering the risks of material misstatement of the financial statements due to fraud, and testing for fraud with regard to the assessed risks (ISA 240, IAASB 2014a).
- Identifying and measuring the risks of material misstatement through understanding the entity and its environment (ISA 315, IAASB 2014b). This includes performing preliminary analytical procedures, as well as evaluating the design and implementation of internal controls and testing their operating effectiveness.
- Performing substantive analytical procedures in replication to the auditor’s assessment of the perils of material misstatement (ISA 520, IAASB 2014c).
- Performing analytical procedures near the cessation of the audit to avail the auditor in composing an overall conclusion about whether the financial statements are consistent with the auditor’s understanding of the entity (ISA 520, IAASB 2014c).

The consumption of widespread data analytics on audit activities has insulated behind other practice areas even though data analytics holds great promise for auditing practice. This is because auditing offerings unique challenges in the adoption of data analytics that are not significant for other practice areas [14].

Despite the impression that data analytics are not being incorporated as readily in auditing, public accounting firms are perpetuating to make consequential investments in developing audit-cognate data analytics, and this research is an effort to understanding and applying the knowledge of data analytics to the domain.

3. Methodology

According to [15], the Web Development Life Cycle (WDLC) is a methodology that is used specifically for the development of web application. Web based system or web application is any program that is accessed over the internet using HTTP. The typical user interfaces for a web-based application are navigational structure, user interface and personalization. Over the years, the development of World Wide Web and the Internet has rapidly growth and effect how the information technology or information system to solve problems and improve the organizations’ performance. There are a number of applications on the web that are being developed and this application is known as web based information system.

In the planning phase, extensive study in related areas. It includes the data from the human expert, journals, articles, books and websites. The data collection methods that comprises of many approaches might be very useful to inherit the data to be implemented in developing the research. Data comes in two different sources and can combine both sources, which are primary and secondary sources. In this research, the only data that will be used is the secondary data, which comes in form of the audited
fields from the account payable of an organisation. However, the data is replicated to suit the specified column. In the planning phase, we outline Step 1 and Step 2 of the Six Steps of Continuous Auditing Implementation Steps (as in Figure 1). For Step 1, we interview an expert who is a well established auditor to gain information to establish the priority area. Identifying, monitoring and audit rules (Step 2) have been observed using few valid documents.

As the result of planning stage, the system designed based on the requirements and the detailed analysis phase of this research. This is the phase of system designing. This system designing is the most crucial phase in the development of a system. The logical system design arrived because of system analysis and is converted into physical system design. A use-case diagram will be illustrated to model the functionality of a system using actors and use cases.

![Figure 2. Web Development Life Cycle Phase](image)

During the analysis phase, the logical design produced is revolved into a physical design - a detailed description of what is needed to solve original problem. In this phase, a sample of user interface and a flowchart of this research are designed according to the reliable requirements in the analysis.

The system design needs to be implemented to make it a workable system. Coding of design into computer language is demanded. This phase is the part where the coding of the program is done in developing this research. The training data set will be applied in this phase during development stage of the system. This is also called the programming phase in which the programmer converts the program specifications into computer instructions, which we refer to as programs.

The well-defined procedures are transformed into control specifications by the help of a computer language. Thus, it is an important stage. The programs coordinate the data movements and control the entire process in a system. To reduce the testing and maintenance effort, a well-written code is needed. It felt that the programs must be integrated in nature generally. It requires in assisting the research to have a quick development, maintenance and future changes. Programming tools like compilers, interpreters and language of R environment is used for coding with respect to the type of application. Therefore, the programming language R is chosen for this research.

### 4. Result

This section discusses about the design and development of the tool and describes the technical part of the tool. Algorithm and techniques that is being use will also focus and explained in this section.
4.1 Flowchart Diagram

A flowchart is designed to reflect the use case diagram, and to show the flow of the dashboard.

![Flowchart Diagram](image)

**Figure 3. Flowchart Diagram**

4.2 Dashboard

Shiny is a package from RStudio that makes it easy to build interactive web applications with R. This research applies shiny from R package. Shiny is very useful in the design phase of this research because it takes less time and complexity to design and create an interface. Figure 4.6 shows a screenshot of an interface of current application that is running in Shiny.

![Screenshot – About page](image)

**Figure 4. Screenshot – About page**
Figure 5. Screenshot – Data Table page

Figure 6. Screenshot – Data Filter page

Figure 7. Screenshot – Data Filter – Summary of Similar ‘Catatan’
5. Conclusion
A vast amount of financial data processed during auditing. Our research proposes an informative dashboard to assist auditors to assess risk in the financial data. Big data management concept was applied to support continuous audit. The dashboard was developed web development life cycle approach. The interface of this system is created and designed using Shiny package of R language. Future works involve expanding the functionalities of the dashboard and improving the algorithm for the similarity check function.

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