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## Article

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# Information Quality and Management Support as Key Factors in the Applications of Continuous Auditing and Continuous Monitoring: An Empirical Study in the Government Sector of Indonesia

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## ABSTRACT

The objective of this research was to verify the effects of information quality and management support as critical contributors to the successful application of continuous auditing and continuous monitoring in the government sector. This study utilized survey research that was conducted in the Line Ministries (LMs) in Indonesia. The research data was collected through questionnaires, face-to-face interviews, and focus group discussions. The structural equation modeling (SEM) approach was used for data analysis with the assistance of Lisrel 8.8 statistical software. The result shows that there is a strong influence of information technology and management support on the applications of continuous auditing and continuous monitoring. Another finding is that an improved application of continuous monitoring results in an improved application of continuous auditing in the Line Ministries in Indonesia.

## KEY WORDS:

Management Support, Information Quality, Continuous Auditing, Continuous Monitoring, Structural Equation Modeling

**JEL Classification:** M42, H11

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## 1. Introduction

The very rapid and massive progress of information technology in the era of the industrial revolution 4.0 has demanded the government, as a public organization, have a strategy to overcome the continuous and complex risk environment (Kurniawan, 2017). One

of the most efficient strategies, according to KPMG (2008), is the application of continuous auditing (CA) and continuous monitoring (CM) of the business organization, transactions, systems, and organizational control. The use of information technology for risk-based performance and organizational control is a practical alternative for meeting the need for continuous monitoring and auditing, which can facilitate the government in enhancing its capacity to perform risk-based supervision and control (Ezzamouri & Hulstijn, 2018; KPMG, 2008).

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According to Deloitte (2010), internal control can be enhanced by taking a broader view of risk and by broadening audit instruments and techniques through the application of CA or various CA mechanisms. CA provides information related to compliance to policies, procedures, and regulations that supports activities and financial reporting targets, while CM provides relevant transaction data in a speedy, timely manner and at a low cost to monitor performance and support effective and efficient decision making (Deloitte, 2010).

The Indonesian government has partially adopted CA and CM. This is indicated by factors including the application of the web- and mobile-based System of the State Treasury (SPAN), where ministers and heads of government institutions can monitor budget implementation in their respective work scopes in realtime. In the auditing process, internal auditors have also used the Online Monitoring System of the State Treasury (OMSPAN) data for collecting initial audit information and evidence. The CM application through SPAN will provide additional transparent information on government budget allocation progress as well as achieved programs and activities. It will also enhance the quality of decisions and policies related to the national budget management, as well as enable budget users to monitor their budget implementation at work unit levels (Angriani, 2015).

However, CA and CM have not been applied optimally by the government and this has caused many problems in the internal control system. The Indonesian Supreme Audit Institution (2017) has recorded 868 findings related to the weaknesses of the government's internal control system (see Table 1). The study by Hunton, Mauldin, and Wheeler (2008) shows that even though CA and CM have already been supported by real-time technology and methodology, the accuracy of the financial reports cannot be completely guaranteed. This is due to the auditors' lack of preparedness in applying the business-risk IT, and the fact that management support has not yet identified, mitigated, and managed risks extensively, resulting in an unreliable audit (Tang, 2011). The study by Alles, Kogan, and Vasarhelyi (2008) shows that the most significant constraints faced by an organization in applying CA and CM are inadequate management support related to budget availability and regulations and the system's capacity to provide a large amount of accurate quality data or information in realtime.

Unfortunately, previous studies (Rezaee, Elam, & Sharbatoghlie, 2001; Skantze, 2017; Vasarhelyi, Alles, Kuenkai-kaew, & Little, 2012; Wu, Shao, & Ho, 2008) focused more on the technology architecture model of CA and CM, while management support and information quality (Alles et al., 2008) were not fully and comprehensively analyzed. Previous studies (Siala Bouaziz & Jarboui, 2019; Skantze, 2017; Vasarhelyi et al., 2012; Wu et al., 2008) have not discussed the effects of management support and quality information on the CA and CM applications or the effect of CM on the CA application. Therefore, it is essential to perform this study to understand the extent of the information quality and management support influence on the CA and CM applications in the government sector in Indonesia.

## 2. Literature Review

### 2.1. Information Quality

Information quality has been defined in several previous writings (DeLone & McLean, 1992; Floridi & Illari, 2014; Kahn, Strong, & Wang, 2002; Kennett & Shmuelli, 2017; Nelson, Todd, & Wixom, 2005; Petter, DeLone & McLean, 2008). According to Petter et al. (2008, p. 239), information quality is the desired characteristics of an information system output. These characteristics are relevancy, comprehensiveness, accuracy, completeness, timeliness, and appropriateness. In other words, information quality depends on the quality of the output of an information system (DeLone, & McLean, 1992; Mulyani & Arum, 2016; Nelson et al., 2005). A study by Nelson et al. (2005) defines information quality from the standpoint of the intrinsicness or context of the information. The intrinsic view reflects the congruence between the data values of the information system and the data's actual values (Lee, Strong, Kahn, & Wang, 2002; Orr, 1999). These data values are inaccurate, outdated, and inconsistent (Goodhue, 1995; Wang & Strong, 1996; Seddon, 1997; Levitin & Redman, 1998; Namazi and Namazi, 2017).

According to previous studies (Batini & Scannapieco, 2016; DeLone & McLean, 1992; Kahn et al., 2002; Majdalawieh, Sahraoui, & Barkhi, 2012; Romney & Steinbart, 2012; Seddon, 1997; Xu, Nord, Nord, & Lin, 2003), information quality in the CA and CM applications in the LMs is measured by the following indicators: (1) timeliness; (2) accuracy; (3) relevancy; (4) accessibility; (5) completeness; (6) error-free; and (7) security.

**Table 1.** Weaknesses of the government internal control system

No	Type of Finding	Total Findings
1	The recording has not yet been conducted or is not accurate	146
2	The process of compiling the report is not in accordance with the regulations	116
3	The information system for accounting and reporting is not adequate	64
4	The information system for accounting and reporting has not yet been supported by competent personnel	5
5	The activities planning is inadequate	98
6	The policies implementation results in increased spending allocations	95
7	Deviations from regulations on revenue and spending	86
8	The policies implementation has resulted in the loss of potential revenues	49
9	The mechanism for management of state revenues is not in compliance with the regulations	38
11	The operational procedure system has not yet been fully compiled	105
12	The operational procedure is not running optimally	45
13	The Internal Supervision Unit is not optimal	19
14	There is no adequate separation of tasks and functions	2

Source: Adapted from "Summary of results of 2017 first semester examination" by The Indonesian Supreme Audit Institution (2017). Jakarta: Badan Pemeriksaan Keuangan RI. Retrieved from [http://www.bpk.go.id/assets/files/ihaps/2017/1/ihaps\\_i\\_2017\\_1507002855.pdf](http://www.bpk.go.id/assets/files/ihaps/2017/1/ihaps_i_2017_1507002855.pdf)

## 2.2. Management Support

Management support is defined as the level at which management understands the importance of personal involvement in the organization's activities and goals (Jitpaiboon & Kalaian, 2005). A study by Elbanna (2013, p. 279) defines it as a form of management's real action in the form of a commitment to finance implementation, to allocate resources, to be actively involved, to actively coordinate in the implementations, to apply a reward and incentive system and to use the implemented system. Meanwhile, Vasarhelyi et al. (2012) define management support as a form of manager coordination between related units, their involvement in the adoption, and their awareness of CA and CM's importance. In the context of this study, management support is defined as the nonmaterial and material support made available by the management of the institution to the CA and CM applications to attain an

effective government internal control (Elbanna, 2013; Jitpaiboon & Kalaian, 2005; Vasarhelyi et al., 2012).

Based on existing writings (Boonstra, 2013; Bruqué-Cámara, Vargas-Sánchez, & Hernández-Ortiz, 2004; Carbonel & Rodriguez-Escudero, 2009; Garrett & Neubaum, 2013; McComb, Kennedy, Green, & Compton, 2008) and on the researchers' empirical experience in the context of this research, the effects of management support on the CA and CM applications in the LMs are measured by the following indicators: (1) benefit awareness; (2) support; (3) communication; (4) knowledge; (5) expertise; (6) financial support; and (7) infrastructure.

## 2.3. Continuous Auditing

The definition of continuous auditing has been discussed frequently in previous studies. The study by Alles, Tostes, Vasarhelyi and Riccio (2006) defines CA as a method for collecting evidence and indicators re-

lated to an information system, transaction process, and control that is conducted in a continuous manner and through the application of modern information technology. Chiu, Liu, and Vasarhelyi (2018) define CA as a method that facilitates an auditor in continuously providing results and reports. It differs from a traditional audit in its frequency and its use of automation vs. a manual process (Vasarhelyi & Halper, 1991).

Based on previous studies (Adesina, Oluغبغا, & Zaccheus, 2016; Amin & Mohamed, 2016; Chan & Vasarhelyi, 2018; Vasarhelyi et al., 2012), in the context of this research, the CA application in the LMs is measured by the following indicators: (1) frequency; (2) approach; (3) audit procedure; (4) testing nature; (5) testing timing; (6) sample size; (7) data modeling and analytics; and (8) reporting.

#### 2.4. Continuous Monitoring

Vasarhelyi, Alles, Kuenkaikaw and Litley (2010) define continuous monitoring as a management function to ensure that policies, procedures, and processes are operating effectively. Monitoring can occur on a daily, weekly, or monthly basis, depending on the characteristics of the business cycle. CM is a revision of the process that facilitates the determination of the organization's short, medium, and long term goals (KPMG, 2008). Kanavaris (2014) defines CM as an automated feedback mechanism that is implemented by management to monitor information technology, transactions, and control systems frequently and continually within a specified period. Meanwhile, Hillo and Weigand (2016) define CM as a control mechanism used by management to ensure the control system is operating as it should and that the stipulated procedures process transactions.

Based on past publications (Deloitte, 2010; Kanavaris, 2014; KPMG, 2008; Hunton et al., 2014), in the context of this study, the CM application in the LMs is measured by using the following indicators: (1) the system used by the first and second line of defense; (2) continuous or rotating; (3) continuously reported; (4) increased value through improved financial and operating controls; (5) reduction and, ultimately, minimization of ongoing compliance costs; (6) replacement of manual preventive controls with automated detection controls; and (7) establishment a more automated, risk-based control environment with lower operational costs.

### 2.5. Research Hypotheses Development

#### 2.5.1. The Effect of Information Quality on the Continuous Auditing Application

A study by Alles et al. (2008) reveals that an automatic audit procedure can produce information whenever it is needed, thereby enhancing the timeliness of the audit results. Automation of the audit procedure is essential to the CA application, and it needs real-time and timely availability of information. Alles, Kogan and Vasarhelyi (2002) state that the audit frequency in CA is a function of the demand for quality information within an accelerated timeframe by utilizing the available information technology.

Murcia, Souza and Borba (2008) state that one of the main functions of an auditor is to verify the quality of the audited data or information. The first measurement of information quality is the total number of errors in the database system of the auditee. The number of error is minimized when the database is monitored continuously by the management (Pathak, Chaouch, & Sriram, 2005). A CA application needs a quality flow of information from the system owner to the auditor, under the criteria that it must be authorized and that its confidentiality, integrity, and authenticity are ensured (Searcy & Woodroof, 2003). A CA implementation will likely be more successful if it can provide the quality information needed by the CA-based audit activities (Alles et al., 2002; 2006; 2008; Kuhn & Sutton, 2010). Previous studies (Alles et al., 2002; 2008; Murcia et al., 2008; Pathak et al., 2005; Searcy & Woodroof, 2003; Shin, Lee, & Park, 2013) have suggested the following hypothesis:

*H1: The quality of information positively affects the continuous auditing application.*

#### 2.5.2. The Effect of Management Support on the Continuous Auditing Application

Mainardi (2011) states that management support has a very critical role in a CA application. Management support is essential because there is a lack of user understanding, unwillingness to partner, and the need for full-time support. A study conducted by Sun, Alles, and Vasarhelyi (2015) state that the factors affecting a CA application include management support and the organizational structure of the internal audit. Lack of management support is one of the impediments for adopting CA (Alles et al., 2006; 2008; Varsahelyi et al., 2012).

Warren and Smith (2006) state that one of the impediments to CA is related to management support, including lack of appropriate skills, lack of baseline criteria, and lack of IT infrastructure. Adesina et al. (2016) make the same claim that one of the critical factors affecting CA application is management support. Previous studies (Adesina et al., 2016; Alles et al., 2006; 2008; Mainardi, 2011; Sun et al., 2015; Varsahelyi et al., 2012; Warren & Smith, 2006) have proposed the following hypothesis:

*H2: Management support has a positive effect on the continuous auditing application.*

### 2.5.3. The Effect of Information Quality on the Continuous Monitoring Application

A study by Alles et al. (2008) states that one of the conditions faced by researchers when applying continuous monitoring is data dependency. Data modeling and analytic data techniques are applied to test the specifications of transactions in continuous monitoring (Kogan, Sudit, & Varsahelyi, 1999). This type of modeling involves the use of transaction data that has historically been audited. The analysis results depend on whether the quality of the available data or information is satisfactory (Chan & Varsahelyi, 2018).

According to Hillo and Weigand (2016), regardless of the differences between CA and CM, both serve to control and monitor functions to analyze data in real-time against a predetermined set of rules. The result depends on the quality of the data or information provided by the systems (Kuhn & Sutton, 2010). In several studies (Alles et al., 2008; Chan & Varsahelyi, 2018; Hillo & Weigand, 2016; Kogan et al., 1999; Kuhn & Sutton, 2010), the following hypothesis is proposed:

*H3: Information quality affects the continuous monitoring application.*

### 2.5.4. The Effect of Management Support on the Continuous Monitoring Application

Continuous monitoring is not challenging to implement. However, management has not entirely accepted CM and is not yet willing to finance the technology needed for its implementation. One of the determining factors for its effectiveness is management support. Management support is not merely management's awareness of the importance of this implementation but also its full support when the CM is implemented (Coderre, 2006).

Kiesow, Zarvich, and Thomas (2015) formulated 16 critical success factors for implementing CM. In their framework, management support is the primary critical factor that must be addressed. Other studies (Byrnes et al., 2012; Varsahelyi et al., 2012) have come to the same conclusion—the lack of management support can lead to the failure of the CM application. Warren and Smith (2006) state that management support is a determining factor in applying CM with satisfactory results. Put differently, the better the management support, the better the implementation. In this study (Byrnes et al., 2012; Coderre, 2006; Kiesow et al., 2015; Varsahelyi et al., 2012; Warren & Smith, 2006) the following hypothesis is proposed:

*H4: Management support positively affects the continuous monitoring application.*

### 2.5.5. The Effect of the Continuous Monitoring Application on the Continuous Auditing Application

Shin et al. (2013) proposed and systematically presented a method for implementing CA on a system based on enterprise resource planning (ERP) with applied CM. Monitoring through ERP is conducted continually by the auditor as part of CM. Majdalawieh et al. (2012) state that a CA application offers many benefits including increased audit efficiency from reduced costs and time and increased audit effectiveness with CM (Rezaee, Sharbatoghlie, Elam, & McMickle, 2002). Continuous control monitoring (CCM) is a procedure to monitor the control of access, authorization, system configuration, business process, and the continuous data assurance (CDA) that provides audit planning inputs in a CA application (Alles et al., 2006; 2008; Varsahelyi et al., 2010).

CA and CM are inseparable in controlling the business process that requires management and an auditor to perform control verification of an organization's financial process (Alles et al., 2006). The activities an auditor performs to conduct CA very much depend on whether the organization performs continuous monitoring of the internal control to ensure reasonable assurance of the CA results (Coderre, 2006). In this study (Alles et al., 2006; 2008; Coderre, 2006; Majdalawieh et al., 2012; Shin et al., 2013; Varsahelyi et al., 2010), the following hypothesis is proposed:

*H5: The continuous monitoring application positively affects the continuous auditing application.*

**Table 2.** Research respondents

No	Target Population	Target Respondents		
		Auditing Unit	Working Unit	Total
1	Ministry of National Development Planning/ National Development Planning Agency	10	20	30
2	State Development Audit Agency	20	35	55
3	Ministry of Finance	30	35	65
4	Ministry of Public Works and Public Housing	30	35	65
5	Ministry of Trade	20	35	55
6	Indonesian Supreme Audit Institution	25	35	60
7	Ministry of Education and Culture	20	30	50
8	Ministry of Health	20	30	50
9	Ministry of Communications and Informatics	20	30	50
10	Ministry for the Empowerment of the State Apparatus and Bureaucracy Reform	20	30	50
11	Ministry of Agriculture	10	20	30
12	National Agency for Population and Family Planning	10	20	30
Total Number of Respondents		235	355	590

### 3. Research Methodology

#### 3.1. Population, Sample, and Respondents

A preliminary survey determined the target population of this research. Of the 60 LMs surveyed, 12 LMs have applied CA and CM at maturity levels 1 and 2. The sample in this research was designed using the nonprobability method through the purposive sampling technique. The consideration for using the purposive sampling in this research was that the LMs that had already applied CA and CM are at minimum maturity of levels 1 and 2. Focus group discussions and preliminary surveys determined the LM's population. The minimum total sample number considered the rule of thumb of the structural equation modeling (SEM) method. According to Wijanto (2015, p. 55), the required sample size for estimation is a minimum of five respondents for each research indicator. With

a total of 44 indicators in this research, the minimum sample was 220 samples, or 37.2% of the target samples, as shown in Table 2.

The units of analysis in this research were audit units and technical units of the LMs. The respondents in this research were internal auditors from the audit units and personnel from the technical units who had implemented CA and CM.

#### 3.2. Data Analysis Method

The analysis of data in this research used the descriptive and verification analysis methods. The descriptive analysis was aimed at providing a qualitative description of the observations made on each of the research variables. The verification analysis in this research used the inferential statistics approach, also known as the inductive statistics approach. Inferential statistics is a statistical technique for analyzing sample data; the result is applied to the popula-



tion by testing the sample data's significance against the population parameters, namely, the t-statistic testing at a confidence interval. The level of significance used in this research was 95% with a margin of error of  $\alpha=5\%$ .

The verification analysis in this research used the SEM approach by applying the measuring and structural testing models. The measuring testing model was aimed at testing the validity and reliability of the research instruments. The structural testing model was aimed at testing the hypotheses of the research. Before the two tests were conducted, the research model had been tested for goodness of fit.

## 4. Research Findings and Discussion

The data collection was conducted in 50 business days and was conducted directly by visiting each analysis unit, namely, inspectorates and technical units in the LMs. The data were collected through questionnaires with 397 respondents and interviews with 21 respondents. Then, the collected data were complemented by focus group discussions that were conducted at eight LMs. After the initial verifications, 13 of 397 respondents were found to be invalid. Therefore, only 384 of the total questionnaires could be further processed and analyzed (96.73% of the total respondents).

### 4.1. Respondent Demographics

Based on the analyzed units, the majority of respondents were from technical units, with a total of 212 respondents (55%); 172 respondents (45%) were auditors. Based on their positions, the majority of the respondents were staff members, with a total of 323 respondents (84%); 61 respondents (16%) were superiors. Based on gender, the majority of respondents were males, with a total of 235 personnel (61%); 149 respondents (39%) were female. Based on the level of education, the majority of respondents held a Bachelor's degree, with a total of 165 respondents (43%), 162 respondents (42%) held a Master's degree, and a total of 14 respondents (4%) held a Doctor's degree. Based on tenure, the majority of respondents were employed for less than ten years, with a total of 145 personnel (38%), 127 respondents (33%) had worked ten to 20 years, and a total of 112 respondents (29%) had worked more than 20 years. Generally, the wide variety of respondents did not present any issues in their responses on the application of CA and CM at the LMs.

### 4.2. Measuring Model Test

Testing of the measuring model was conducted to measure the validity and reliability of the research instruments. According to Hair, Hufit, Ringle and Sarstedt (2014), the correct size is viewed from the relative interest and the standard factor loading (SFL) value of each indicator. If the value is  $\geq 0.50$ , the indicators are valid and significantly explain the variable. The research results show that all of the indicators are valid. The reliability of the structure is measured by the value of the construct reliability (CR), which should be  $\geq 0.70$ , and the value of variance extracted (VE), which should be  $\geq 0.50$  (Hair et al., 2014). The testing results in Table 3 show that all indicators of the research variables have a value of  $CR \geq 0.70$  and a value of  $VE \geq 0.50$ . Therefore, it can be concluded that the instruments built in this research are valid and reliable for measuring the research variables.

### 4.3. Structural Model Test

An evaluation analysis of the structural model is conducted to see the relations among the exogenous and endogenous latent variables. The aim of assessing the structural model is to determine if the survey's empirical data support the relations in the hypotheses. The test results of the goodness of fit in this research are shown in Table 5.

From results in Table 5, it can be concluded that the values of NFI, NNFI, CFI, IFI, RFI, GFI, and AGFI are each  $\geq 0.90$ , and the value of RMSEA =  $0.053 \leq 0.08$ ; therefore, the model is a good fit. The value of SRMR =  $0.061 \geq 0.05$ , which shows a marginal fit. The value of p-value =  $0.0772 \geq 0.05$  shows a very good fit. From the combination of the various measurements, it can be concluded that generally, the model is a perfect fit. The extent of the effect among the latent variables can be seen in the standard model of estimation shown in Figures 1 and 2, for which the calculations are formulated as follows:

$$CM = 0.15*MS + 0.16*IQ, \text{ Errorvar} = 0.37, R^2 = 0.69 \quad (1)$$

$$CA = 0.16*MS + 0.10*IQ + 0.14*CM, \text{ Errorvar} = 0.33, R^2 = 0.60. \quad (2)$$

After conducting the test of the fit of the structural model as a whole, the research hypotheses tests were conducted to verify the causal relations among the research variables. The test results are shown in Table 5.

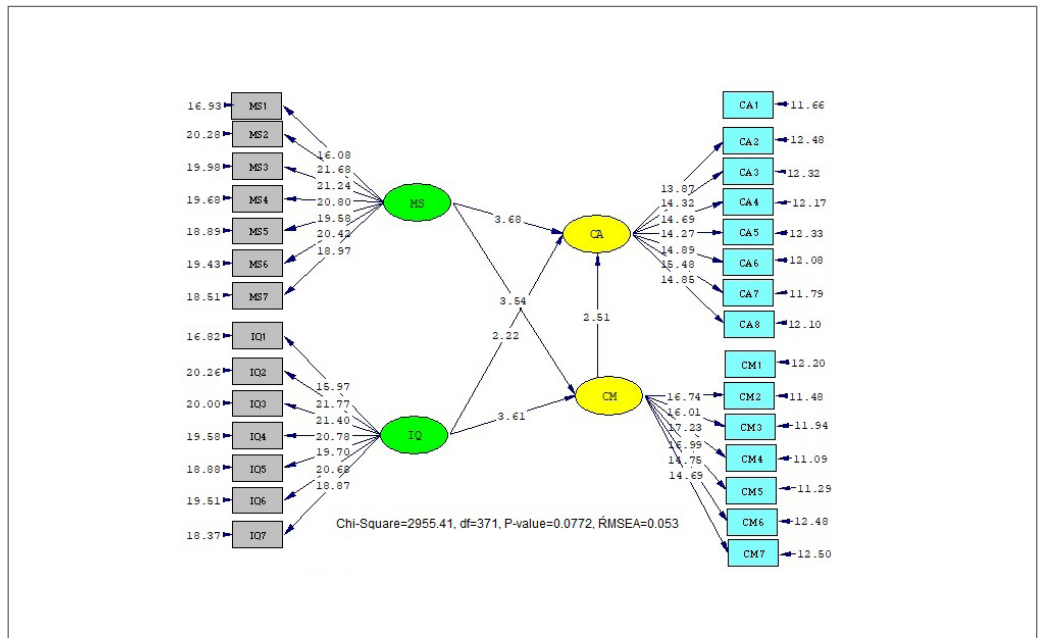


**Table 3.** Test results of Research Instruments' Validity and Reliability

Variables/Indicators	*SFL $\geq 0.5$	Estimate of Error	*CR $\geq 0.7$	*VE $\geq 0.5$	Conclusion
<b>Management Support</b>			<b>0.92</b>	<b>0.61</b>	<b>Reliability is good</b>
Benefit awareness	0.65	0.15			Validity is good
Support	0.70	0.13			Validity is good
Communication	0.66	0.14			Validity is good
Provide knowledge	0.57	0.29			Validity is good
Provide expertise	0.56	0.29			Validity is good
Financial support	0.51	0.33			Validity is good
Provide infrastructure	0.57	0.32			Validity is good
<b>Information Quality</b>			<b>0.93</b>	<b>0.65</b>	<b>Reliability is good</b>
Timeliness	0.52	0.31			Validity is good
Accuracy	0.69	0.12			Validity is good
Relevancy	0.58	0.13			Validity is good
Accessibility	0.67	0.20			Validity is good
Completeness	0.56	0.19			Validity is good
Error-free	0.56	0.16			Validity is good
Security	0.64	0.30			Validity is good
<b>Continuous Auditing</b>			<b>0.91</b>	<b>0.79</b>	<b>Reliability is good</b>
Frequency	0.61	0.25			Validity is good
Approach	0.53	0.28			Reliability is good
Audit procedure	0.58	0.28			Validity is good
Testing nature	0.70	0.29			Validity is good
Testing timing	0.57	0.28			Validity is good
Sample size	0.55	0.26			Validity is good
Data modeling and analytics	0.70	0.28			Validity is good
Reporting	0.57	0.24			Validity is good
<b>Continuous Monitoring</b>			<b>0.92</b>	<b>0.63</b>	<b>Reliability is good</b>
System used by the first and second line of defense	0.66	0.28			Validity is good
Continuous or rotating	0.62	0.20			Validity is good
Continuously reported as they occurred	0.62	0.24			Validity is good
Increased value through improved financial and operating controls	0.71	0.20			Validity is good
Reduce and ultimately minimize ongoing compliance costs	0.72	0.22			Validity is good
Replace manual preventive controls with automated detection controls	0.53	0.25			Validity is good
Establish a more automated, risk-based control environment with lower operational costs	0.52	0.25			Validity is good

**Table 4.** Test Results of the Research Model's Goodness of Fit

No	Measuring Indicators	The Goodness of Fit Index	Results	Conclusion
1	Chi-square	$p\text{-value} \geq 0.05$	0.0772	Good Fit
2	RMSEA	$RMSEA \leq 0.08$	0.053	Good Fit
3	NFI	$NFI \geq 0.90$	0.96	Good Fit
4	NNFI	$NNFI \geq 0.90$	0.99	Good Fit
5	CFI	$CFI \geq 0.90$	0.99	Good Fit
6	IFI	$IFI \geq 0.90$	0.99	Good Fit
7	RFI	$RFI \geq 0.90$	0.93	Good Fit
8	SRMR	$SRMR \leq 0.05$	0.061	Marginal Fit
9	GFI	$GFI \geq 0.90$	0.92	Good Fit
10	AGFI	$AGFI \geq 0.90$	0.91	Good Fit



**Figure 1.** Hypothesis Testing Result

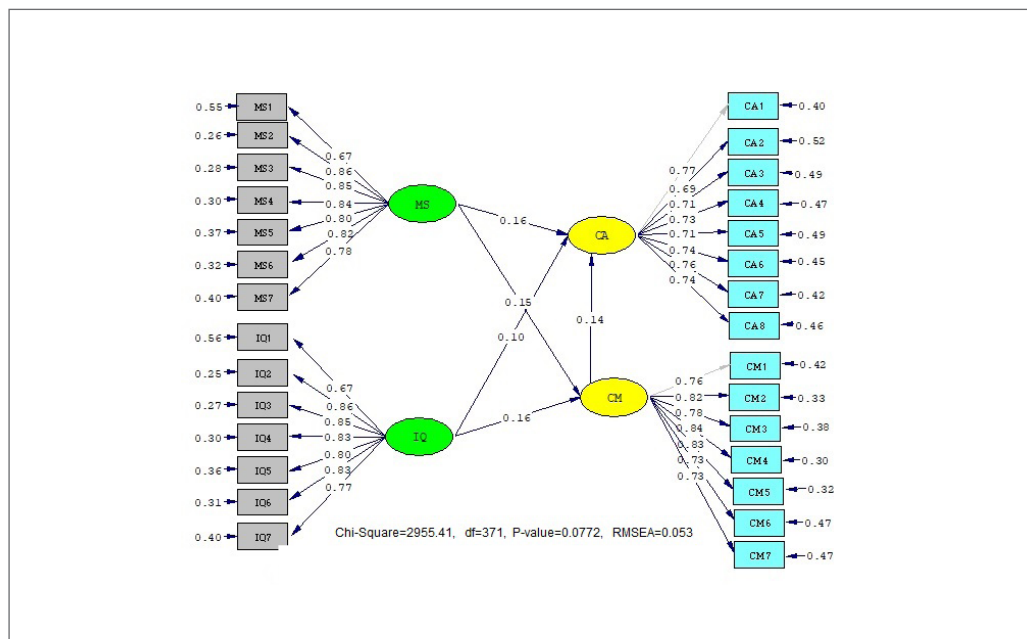


Figure 2. Relation measurement results among the research variables

Table 5. Hypotheses Testing Results

No	Path Diagram	T-Value ( $\geq 1.64$ )	Value of Loading Factors	Effect	Conclusion of the Hypothesis
1	IQ → CA	2.22	0.15	15%	Accepted
2	MS → CA	3.68	0.16	16%	Accepted
3	IQ → CM	3.61	0.16	16%	Accepted
4	MS → CM	3.54	0.15	15%	Accepted
5	CM → CA	2.61	0.14	14%	Accepted

## 5. Discussion

### 5.1 The Effect of Information Quality on the Continuous Auditing Application

The hypothesis test results show that information quality has a positive effect of 15% on the application of CA. The finding of this research has empirically verified that the better the quality of information yielded

by the application system, the better the CA application in the LMs will be.

These research findings support the previous research by Alles et al. (2008) that argues that CA must be supported by a reliable application system that can yield real-time information and data to increase the timeliness of the audit result. Alles et al. (2002) suggest that the CA application is a function of the auditor's demand

for quality information that is accelerated by utilizing the available information technology. The research findings have verified that a CA application requires a flow of high-quality data and information from the data provider, namely, the technical units to the auditor; the data must be authorized, authenticated, confidential, and have integrity (Searcy & Woodroof, 2003).

The research findings show that of the various indicators of quality information that affect the CA application, and there are indicators that are not yet optimal, such as data timeliness. This is because the data readiness from each technical unit remains problematic. The data providing units have not provided the data needed by the auditor on time. This is due to the inadequate regulations on the presentation and flow of data in the organization. If the technology is ready but the data are not yet available, the CA cannot be applied optimally. This research finding is input to the LMs to immediately enhance the quality of the regulations on data and information provided by the technical unit to the auditor. In addition to regulations, the government must build an integrated information system or application among units, and if necessary, among the LMs as well.

### **5.2. The Effect of Management Support on the Continuous Auditing Application**

The hypothesis test results show that management support has a positive effect of 16% on the CA application. The findings of this research have empirically verified that the better the management support, the better the CA application in the LMs will be. These research findings support the research of Mainardi (2011), which states that management support has a very critical role in CA implementation. Management support is needed because of inadequate user understanding, the absence of interest in using CA, and the demand for the service at any time. The research by Sun et al. (2015) mentions that one of the obstacles for CA application is the lack of management support, as proven by the absence of regulations or specific manuals for implementing CA. The lack of management support can become an impeding factor in the development of the CA application in an organization (Alles et al., 2006; 2008; Varsahelyi et al., 2012).

The research findings show that various indicators of management support are not yet optimal. Among these are benefit awareness, available expertise, and financial support. Management has not fully realized

the benefits of CA implementation, as they believe that manual audits remain adequate. In other words, they have not felt urgency for the CA application. As a result, there are not enough implementation experts available. The poor understanding of CA benefits has also impacted the financial support in the LMs. Given the findings of this research, knowledge sharing among the LMs or with private companies that are more mature in CA application is essential. Additionally, the House of Representatives and the Indonesian Supreme Audit Institution is expected to have a more active role in recommending CA application in the LMs.

### **5.3. The Effect of Information Quality on the Continuous Monitoring Application**

The hypothesis test results show that information quality has a positive effect of 16% on the CM application. The findings of this research have empirically verified that the better the quality of the information provided by the information system or the monitoring application, the better the CM application in the LMs will be.

The findings of this research support the research by Alles et al. (2008), which states that one of the conditions in CM implementation is data dependency. One of the challenges is to convert fragmented data from machine-readable into machine-understandable so that CM can be implemented. The findings of this research support the conclusions made by Hillo and Weigand (2016) that CM, as an evaluation and controlling function, also analyzes data in realtime against the established regulations. The result depends on the goodness of the data or information quality made available by the application system (Kuhn & Sutton, 2010).

The research findings show that several indicators of information quality are not yet optimal in the CM application. One is data completeness from the data providers. Additionally, technical units continue to face the problem of data readiness, which can be resolved only through the development of an integrated system with a single database that is enforced through a regulation. The government must evaluate the many applications existing in the LMs. Even though a significant number of applications exist, they are scattered in the database and platform and are not linked. The government must issue a regulation concerning how these separate applications can be integrated among the institutional units and in the LMs. In this manner, the in-

formation or data can be presented faster and be more complete, reliable, and comprehensive so that management can make more rapid and accurate decisions.

#### ***5.4. The Effect of Management Support on the Continuous Monitoring Application***

The hypothesis test results show that management support has a positive effect of 15% on the CM application. This research finding has empirically substantiated that the better the management support, the better the CM application in the LMs will be. This research finding has substantiated the study by Coderre (2006), which states that the success factor for the CM application is top management support. This support is not merely management awareness, but full support at the implementation stage. The research result has also confirmed the study by Kiesow et al. (2015) that management support is a critical factor that must be resolved before any other factors. This is also in accordance with other studies (Byrnes et al., 2012; Vasarhelyi et al., 2012) that state that the lack of understanding and support of management can lead to the failure of a CM implementation. This research result has also substantiated the opinion of Warren and Smith (2006) that management support is the determining factor in the satisfactory implementation of CM.

The research findings show that several indicators of management support in the CM application are not yet optimal, including the supportive indicator of management understanding and the fact that the CM application is not yet a top priority in the institutions. The management is currently more focused on communications with other parties regarding content monitoring than on communications concerning the CM methodology. This research finding recommends that the government encourage knowledge sharing among the LMs or with the private sector that is already mature in terms of CM application.

#### ***5.5. The Effect of the Continuous Monitoring Application on the Continuous Auditing Application***

The hypothesis test results show that the application of CM has a positive effect of 14% on the CA application. This research finding has empirically verified that the better the application of CM, the better the CA application will be in the LMs. The findings of this

study also substantiate the study by Shin et al. (2013) that states that a CA application can be successful if monitoring is performed continuously by the auditor through the utilization of an information system. The findings of this study also support the study by Majdalawieh et al. (2012) that states that a CA application offers many benefits, including an increase in audit efficiency through the reduction of costs and time, and an increase in audit effectiveness through the CM application. Therefore, CA ultimately increases control and reduces audit costs (Alles et al., 2006; 2008; Rezaee et al., 2002; Vasarhelyi et al., 2010).

The results of the research show empirically that CM supporting CA will work better as an integral part of controlling the business, in which the activities compel the management and auditor to jointly perform the verification of organizational control (Alles et al., 2006). The activities needed by the auditor to perform CA very much depend on whether management conducts CM on the internal control to ensure reasonable assurance of the CA results (Coderre, 2006). If management frequently monitors the performance effectiveness, the auditor will become increasingly dependent on the transaction data from the information system (Deloitte, 2010).

These research findings show that several indicators of the CM application are not yet optimal. One of them is the "replace manual preventive controls with automated detection controls" indicator, indicating that currently LMs primarily use manual audits and monitoring rather than using information technology. Additionally, the "continuously reported as they occur" indicator currently shows what types of transactions and monitoring results are not continuously reported to the work unit management, information users, and senior management. Therefore, this research finding recommends that LMs perform the digital transformation process gradually.

## **6. Conclusion**

Generally, the CA application in the LMs remains at a sufficient level, with CA application performed annually, and the CM application is currently at a satisfactory level. In several cases, CM has already been implemented in real-time due to support from the reliable monitoring application in the LMs, as exemplified by the use of the OMSPAN, one of the tools for monitoring financial performance in the government. Moreover, management support is a relatively important variable in the CA application in the LMs.

Information quality positively affects CA application, for example, the timeliness of available data from the data providers in each technical unit. The readiness of data provided by each technical unit is the critical factor for an auditor to be able to process the audit continually. Management support has positive effects on the CA application, such as benefit awareness and understanding by management, experts available to help accelerate the application process, adequate financial support to increase personnel welfare, increased competence of human resources, and establishment a reliable application system.

Information quality has a positive effect on the application of continuous monitoring, such as complete data being available from the data provider. The technical units continue to have the problem of data readiness, which can only be solved by developing an application system that is integrated under a single database. Management support also has a positive effect on the CM application. This effect must be enhanced through a binding regulation in the form of management support to encourage accelerated CM application in the LMs. Management support can also be enhanced by increasing the intensity of management communication on various internal and external matters. Management must be able to provide sufficient funding to enhance the knowledge of staff members through training, technical guidance, socialization, and workshops.

The CM application has a positive effect on the CA application in terms of “replace manual preventive controls with automated detection controls”. In other words, a regulation must be issued to perform the transition from manual to automatic prevention. Additionally, the “continuously reported as they occur” procedure can also enhance the effect of CM on CA. In other words, any significant transactions and monitoring results must continually be reported to the unit heads, information users, and management.

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