Decision Science Letters 13 (2024) 153–160

Contents lists available at GrowingScience

Decision Science Letters

homepage: www.GrowingScience.com/dsl

The effect of big data competencies and tone at the top on internal auditors fraud detection effectiveness

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C H R O N I C L E

Article history:
Received: July 15, 2023
Received in revised format: August 28 , 2023
Accepted: October 26, 2023
Available online: October 26, 2023

Keywords:
Big Data Competencies
Tone of The Top
Self-Efficacy
Financial Report
Fraud Detection

A B S T R A C T

Financial reports provide information about a company's assets, liabilities, equity, income, expenses and cash flow. This information can be used by various parties such as investors, creditors, government and management to make business decisions and assess company performance. Companies in obtaining good financial reports need to detect fraudulent financial statements first. Financial statement fraud can be detrimental to investors and creditors because it gives a wrong picture of a company's financial performance. This study aims to examine the effect of big data competence and the tone of the top internal auditors on the detection of financial statement fraud, as well as to mediate the effect of big data competence on the detection of financial statement fraud through self-efficacy. This research uses a sample of 183 respondents who are internal auditors in companies in Indonesia. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results of the study show that big data competence has no significant effect on the detection of financial statement fraud, but has a positive and significant effect on self-efficacy. In addition, the internal auditor's tone of the top also has a positive and significant effect on the detection of financial statement fraud. Finally, self-efficacy partially mediates the relationship between big data competence and fraud detection of financial statements. This research provides important implications for practitioners and decision makers in developing internal auditor competence in the field of big data and paying attention to tone of the top as an important factor in detecting fraudulent financial statements. In addition, this research also contributes to strengthening the understanding of the relationship between big data competence, tone of the top, self-efficacy, and fraud detection of financial statements in the Indonesian context.

1. Introduction

Financial reports are an important tool for companies to monitor financial performance and make sound business decisions. Financial reports provide information about a company's assets, liabilities, equity, income, expenses and cash flow. This information can be used by various parties such as investors, creditors, government and management to make business decisions and assess company performance (Osadchy et al., 2018). Financial reports are also required to fulfill legal obligations and comply with applicable accounting standards (Hung & Subramanyam, 2007; Ball, 2001). Good financial reports must comply with applicable accounting standards and provide accurate, comparable and relevant information for users to make the right decisions (Breen, 2013). A clear and easy-to-understand format is also important so that information is easily received and understood. Financial reports help companies monitor financial performance and make strategic decisions for the future. Good financial reports are also required to fulfill legal obligations and comply with applicable accounting standards. Users of financial statements such as investors, creditors and governments need accurate and

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doi: 10.5267/dsl.2023.10.005

accountable information to make the right decisions (Patton, 1992). Companies in obtaining good financial reports need to detect fraudulent financial statements first. Financial statement fraud detection is a process to ensure that financial reports issued by companies are accurate and accountable (Rezaee, 2005; Ravisankar et al., 2011). Financial statement fraud is a serious problem that can cause significant harm to individuals and organizations. It involves the manipulation of financial reports for personal gain and is a major threat to the well-being and growth of stakeholders and economies around the world, particularly in developing countries. The Association of Certified Fraud Examiners (ACFE) Indonesia Chapter notes that billions of dollars have been lost due to this type of fraud (Walker et al., 2018). Financial statement fraud is very dangerous because it causes financial facts to be presented incorrectly. Every company wants to provide good financial reports, thus encouraging management to improve their performance and falsify financial numbers (Setiawati & Baningrum, 2018). A good financial report is an easy-to-understand, comparable, reliable and relevant report that can provide information for users of financial reports. This situation provides the possibility for individuals to commit financial statement fraud because management and staff encourage individuals to gain personal gain by influencing financial users. Financial statement fraud is a serious business risk that can impact long-term success (Hanifa, 2015).

According to Ravisankar et al. (2011), internal auditors play an important role in detecting and preventing fraudulent financial statements, but their effectiveness has been questioned in several high-profile cases. The responsibilities of internal auditors as corporate governance actors can be divided into four categories: providing assurance, offering insight through acting as a catalyst, providing foresight, and providing advisory and consulting services (Institute of Internal Auditors (IIA), 2017). Internal auditors can help management fulfill their duties by considering and evaluating organizational risk in each audit assignment. This can be done by evaluating fraud management controls installed by management, identifying high-risk processes, testing the effectiveness of internal controls to assess residual risk of fraud events, and providing management consulting to handle fraud-related assignments (IIA, 2017). .

One of the factors that can influence the success of internal auditors in detecting financial statement fraud is Big Data competence. In today's digital era, the use of Big Data has become very important in managing corporate data and information. The ability to understand and utilize Big Data can help internal auditors to perform better data analysis in detecting fraud (Rakipi et al., 2021). In addition, the tone of the top is also an important factor in supporting the success of internal auditors in detecting fraudulent financial statements. The tone of the top is the attitude and behavior of company leaders in supporting ethics and integrity in managing company finances. These attitudes and behaviors will influence the attitudes and behavior of the internal auditors in carrying out their duties. Therefore, this study aims to analyze the influence of Big Data competence and tone of the top internal auditors on the detection of financial statement fraud. This research is expected to contribute to increasing understanding of the factors that influence the success of internal auditors in detecting fraudulent financial statements.

2. Literature Review

2.1. Big Data Competencies, Self-Efficacy and Detection of Financial Statement Fraud

Big Data Competencies and self-efficacy have a close relationship with the detection of fraudulent financial statements by internal auditors. Big Data competence includes skills and knowledge of Big Data technology that is used to manage large and complex data. Conversely, self-efficacy is an individual's belief in his ability to do a certain task well (Meredith et al., 2020). Internal auditors who have Big Data competence and high self-efficacy tend to be more successful in detecting fraudulent financial statements. They can collect, process, and analyze company financial data more effectively, thereby identifying signs of fraud more quickly and accurately. In addition, internal auditors who have Big Data competence and high self-efficacy are also able to develop better algorithms and data analysis models to support the fraud detection process (Wongpinunwatana & Panchoo, 2014). However, internal auditors who have less Big Data competence and low self-efficacy may experience difficulties in dealing with the complexity of company financial data, so they take longer to complete their assignments. These limitations can cause them to be less effective in detecting fraudulent financial statements and affect the accuracy of the financial reports produced by companies.

In order to improve the ability of internal auditors to detect fraudulent financial statements, companies need to provide adequate training and education to develop Big Data competencies and internal auditor self-efficacy. Thus, internal auditors can understand and manage more complex data and apply Big Data technology effectively in detecting fraudulent financial statements. Joshi & Marthandan's research (2020) shows that Big Data competence and self-efficacy can affect the success of internal auditors in detecting fraudulent financial statements. Big Data Competencies cover the capabilities and knowledge of internal auditors in managing large and complex data, as well as applying Big Data technology to process data. Self-efficacy is an individual's belief in his ability to do a certain task well.

In terms of detecting financial statement fraud, internal auditors who have sufficient Big Data competence and high self-efficacy tend to be more successful in carrying out their duties. They can more effectively collect, process, and analyze company financial data, so they can detect fraud that occurs. Conversely, internal auditors who lack Big Data competence and low self-efficacy may have difficulty dealing with the complexity of financial data and require longer time to complete

their tasks. Based on this explanation, in this study it can be concluded that the first hypothesis and the second hypothesis are as follows:

H_1: *Big data competencies affect self-efficacy.*
H_2: *Big data competencies affect the detection of financial statement fraud.*

2.2. Tone of the Top and Detection of Financial Statement Fraud

Tone at the Top is a concept that refers to the values, ethics and corporate culture set by the top management. Tone at the Top has a close relationship with the detection of financial statement fraud by internal auditors (Patelli & Pedrini, 2015). Top management that promotes ethical and integrity values within the organization is likely to have a positive effect on fraudulent financial reporting detection. A positive tone at the top can influence corporate culture and motivate internal auditors to be more alert and critical of signs of fraud. Conversely, a negative tone at the top or a lack of concern for integrity can trigger fraudulent practices and reduce the ability of internal auditors to detect fraud.

Several studies also show that a positive tone at the top can improve the ability of internal auditors to detect fraudulent financial statements. Research by Wang & Fargher (2017) found that a positive tone at the top can improve the ability of internal auditors to recognize signs of fraud and reduce the risk of fraudulent financial statements. In addition, research by Ruhnke & Schmidt (2017) found that a positive tone at the top can improve audit quality and strengthen the ability of internal auditors to detect fraudulent financial statements. In this study, internal auditors who work in companies with a positive tone at the top tend to be more successful in detecting fraudulent financial statements. In order to improve the ability of internal auditors to detect fraudulent financial statements, companies need to pay attention to the tone at the top and build a corporate culture based on ethical values and integrity. This can help motivate internal auditors to play an active role in detecting fraudulent financial statements and improve audit effectiveness. Thus, the third hypothesis can be concluded as follows:

H_3: *The tone of the top influences the detection of financial statement fraud.*

2.3. Self-Efficacy and Detection of Financial Statement Fraud

Self-efficacy or self-confidence of internal auditors can affect their ability to detect fraudulent financial statements. Internal auditors who have a high level of self-efficacy tend to have more self-confidence and optimism in carrying out audit assignments (Lee et al., 2016). In the context of detecting financial statement fraud, a high level of self-efficacy can help internal auditors to identify and deal with signs of fraud more effectively. This can happen because internal auditors who have a high level of self-efficacy tend to have more self-confidence and optimism in carrying out audit assignments. They tend to be more critical and think analytically in carrying out audit assignments, which can help them to be more sensitive to the potential for fraudulent financial statements (Atmaja & Sukartha, 2021). In addition, they also tend to be more skilled in analyzing data and making the right decisions. Conversely, internal auditors who have a low level of self-efficacy tend to lack confidence and are hesitant in carrying out their audit assignments. This can reduce their effectiveness in detecting financial reporting fraud, as they tend to be less sensitive to signs of fraud and less skilled at performing data analysis.

Previous research conducted by Pawitra & Suhartini (2019) shows that internal auditors who have a high level of self-efficacy tend to be more critical and think analytically in carrying out audit assignments. This can help them to be more sensitive to potential fraudulent financial reporting, and can strengthen their ability to analyze data and make informed decisions. In contrast, internal auditors who have a low level of self-efficacy tend to lack confidence and are hesitant in carrying out audit assignments, which can reduce their effectiveness in detecting fraudulent financial statements. Companies need to pay attention to the level of internal auditor self-efficacy and strengthen it through training and skills development, as well as providing adequate support in carrying out audit tasks. In addition, companies also need to pay attention to other factors that can affect internal auditor self-efficacy, such as the work environment, management support, and organizational culture (Su et al., 2016). By paying attention to these factors, companies can improve the ability of internal auditors to detect fraudulent financial statements and increase overall audit effectiveness.

Then another study conducted by Earl et al. (2015) showed that self-efficacy can mediate the relationship between big data competencies and the detection of financial statement fraud. That is, a high level of self-efficacy can strengthen the influence of big data competencies on the ability of internal auditors to detect fraudulent financial statements. This can happen because internal auditors who have high levels of big data competencies and high self-efficacy tend to be more skilled in using technology and data analysis to detect fraudulent financial statements. They tend to have high self-confidence and motivation in carrying out audit assignments, which can help them to be more focused and think analytically in conducting data analysis (Shih et al., 2009). Thus, it can be concluded that the fourth and fifth hypotheses in this study are as follows:

H_4: *Self-efficacy influences the detection of financial statement fraud.*
H_5: *Self-efficacy mediates the relationship between big data competencies and the detection of financial statement fraud.*

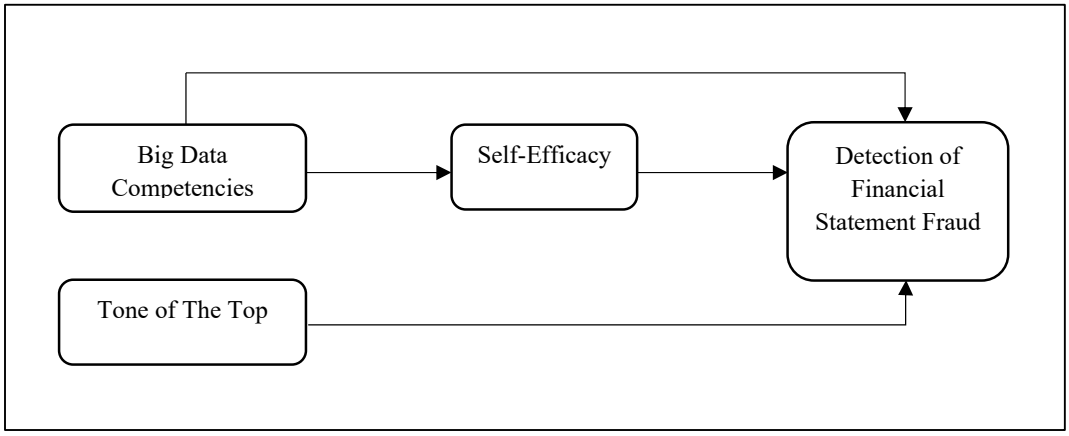

Fig. 1. Conceptual Framework

3. Research Method

The research methodology used in this study is quantitative research with a survey approach. The research sample was drawn from the population of internal auditors in Indonesia using purposive sampling technique. A total of 183 questionnaires were successfully collected from various companies in Indonesia. The collected data were analyzed using Partial Least Square (PLS) method using SmartPLS 3.0 software. The analysis was conducted in several stages, including validity and reliability testing of the research instrument, regression testing to examine direct relationships between variables, and mediation testing to examine indirect relationships between variables. The variables used in this study consist of big data competencies, tone of the top, self-efficacy, and detection of financial statement fraud. Big data competencies and tone of the top, self-efficacy and detection of financial statement fraud were measured using a 7-point Likert scale. After the data was analyzed, the research results were presented in the form of tables and graphs and explained narratively.

4. Results

The data analysis was performed using the PLS method. The first analysis test was to find the loading factor value of a variable. To obtain the loading factor values of the variables, a principal component analysis (PCA) test was performed on the dataset used. This analysis was conducted to identify which variables had the greatest contribution to the variance of the data and then factor rotation was performed to obtain the loading factors. The loading factor values were also used to build a predictive model between the dependent and independent variables. The higher the loading factor value of a variable, the greater its influence on the dependent variable. The analysis test in this study can be seen in the figure below:

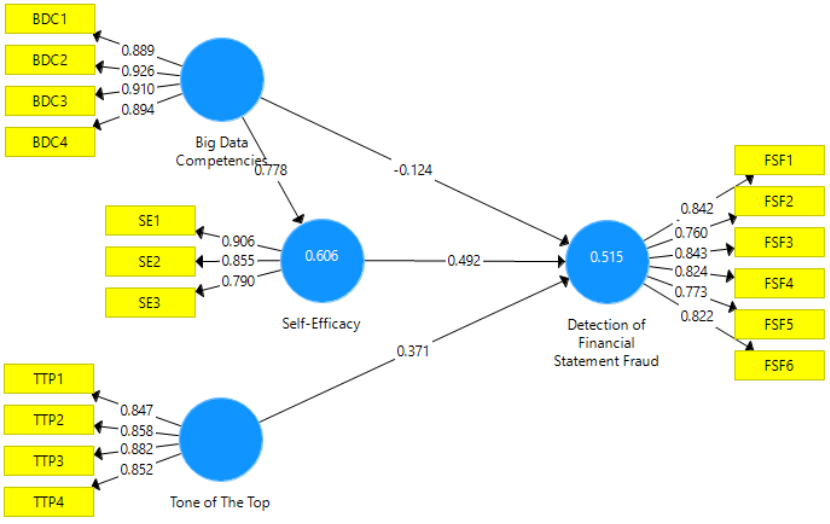

Fig. 2. SmartPLS analysis

The analysis test results showed that the standard loading factor values of all latent indicator variables overall exceeded the threshold of 0.7. The standard loading factor value of the big data competencies variable ranged from 0.889 to 0.926, followed by the tone of the top variable which ranged from 0.847 to 0.882, while self-efficacy ranged from 0.790 to 0.906,

and detection of financial statement fraud ranged from 0.760 to 0.843. This can be interpreted as indicating that each indicator variable measured in the PLS model significantly contributes to explaining the variation of the latent variable or dependent variable measured in the model. With loading factor values above 0.7, it can be concluded that each indicator variable has a strong correlation with the latent variable and can be relied upon to explain and predict the behavior of the latent variable. The standard loading factor values of all variables in more detail can be seen in the table below:

Table 1
Standard Loading Factor value

	Big Data Competencies	Tone of The Top	Self-Efficacy	Detection of Financial Statement Fraud
BDC1	0.889			
BDC2	0.926			
BDC3	0.910			
BDC4	0.894			
TTP1		0.847		
TTP2		0.858		
TTP3		0.882		
TTP4		0.852		
SE1			0.906	
SE2			0.855	
SE3			0.790	
FSF1				0.842
FSF2				0.760
FSF3				0.843
FSF4				0.824
FSF5				0.773
FSF6				0.822

The Convergent Validity can also be seen from the standard loading factor. The purpose of the Convergent Validity test is to determine the validity of each relationship between the indicators and the latent variable constructs. An indicator can be considered to have met Convergent Validity and have a high level of validity when the standard loading factor value is > 0.70 (Chin & Todd, 1995). Based on the results in the table above, it can be concluded that each indicator has met Convergent Validity and has a high level of validity. Furthermore, reliability and validity tests were conducted on the variables to ensure the reliability of the data obtained from the measurement instruments used in quantitative research. The purpose of reliability and validity tests on the variables is to evaluate the consistency and stability of the measurements taken and to what extent the measurement instruments used can accurately measure the constructs or variables. The results of the reliability and validity tests in this study can be seen in Table 2.

Table 2
Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Big Data Competencies	0.926	0.926	0.948	0.819
Tone of The Top	0.883	0.883	0.919	0.740
Self-Efficacy	0.809	0.817	0.888	0.725
Detection of Financial Statement Fraud	0.896	0.903	0.920	0.658

An indicator can be considered reliable if the result of the Cronbach's alpha value obtained is greater than 0.7. Then, an indicator can be considered valid if the AVE value obtained is greater than 0.5. From the results of the reliability and validity test in the table above, the Cronbach's alpha value of the big data competencies variable is 0.926 and the AVE value is 0.819. With these values, it can be concluded that the big data competencies variable is reliable and has good convergent validity. Next, the tone of the top variable obtained a Cronbach's alpha value of 0.883 and an AVE value of 0.740, therefore the tone of the top variable can also be considered reliable and valid. Furthermore, for the self-efficacy variable, the Cronbach's alpha value obtained is 0.809 with an AVE value of 0.725, hence the self-efficacy variable is also reliable and valid. Finally, the detection of financial statement fraud variable obtained a Cronbach's alpha value of 0.896 and an AVE value of 0.658. Thus, the detection of financial statement fraud variable can also be considered reliable and has good convergent validity. Furthermore, validity can also be assessed using discriminant validity. Discriminant validity can be evaluated based on cross loadings, which should show that an indicator has higher loading on its own construct than on other constructs (Sekaran & Bougie, 2016). The results of the discriminant validity test show that all indicators have higher loading on their own construct than on other constructs. This means that each indicator in this research has a high level of validity. Further details can be seen in Table 3 below:

Table 3
Discriminant Validity Test

	Big Data Competencies	Tone of The Top	Self-Efficacy	Detection of Financial Statement Fraud
BDC1	**0.889**	0.702	0.696	0.507
BDC2	**0.926**	0.764	0.729	0.478
BDC3	**0.910**	0.763	0.698	0.528
BDC4	**0.894**	0.817	0.695	0.551
TTP1	0.677	**0.847**	0.640	0.594
TTP2	0.701	**0.858**	0.666	0.579
TTP3	0.751	**0.882**	0.734	0.538
TTP4	0.770	**0.852**	0.727	0.558
SE1	0.794	0.820	**0.906**	0.566
SE2	0.650	0.697	**0.855**	0.494
SE3	0.530	0.522	**0.790**	0.708
FSF1	0.468	0.571	0.636	**0.842**
FSF2	0.477	0.509	0.504	**0.760**
FSF3	0.383	0.473	0.519	**0.843**
FSF4	0.507	0.567	0.591	**0.824**
FSF5	0.392	0.468	0.443	**0.773**
FSF6	0.527	0.602	0.635	**0.822**

Furthermore, the study continued with direct and indirect hypothesis testing to determine the significance of the relationships between variables. Direct hypothesis testing was conducted using regression analysis, where testing was performed to determine the relationship between independent and dependent variables. This is important to ensure the significance of the relationships between variables in the model. Direct hypothesis testing can be considered significant if the influence of variables on each other obtains T statistics values greater than 1.96 and a p-value less than 0.05. The results of direct hypothesis testing in this study are as follows:

Table 4
Direct relationship

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Information
Big Data Competencies → Self-Efficacy	0.778	0.772	0.044	17.656	0.000	Significant
Big Data Competencies → Detection of Financial Statement Fraud	-0.124	-0.135	0.137	0.907	0.365	Not Significant
Tone of The Top → Detection of Financial Statement Fraud	0.371	0.372	0.129	2.872	0.005	Significant
Self-Efficacy → Detection of Financial Statement Fraud	0.492	0.497	0.089	5.542	0.000	Significant

The results of the hypothesis testing in the table above show that in the first hypothesis which states that big data competencies have an influence on self-efficacy to get a statistical T value of 17,656 with a P value of 0,000. The T statistical value obtained is greater than 1.96 and the P value is less than 0.05, meaning that the first hypothesis in this study is acceptable or it can be said that big data competencies have a significant influence on self-efficacy. Then in the second hypothesis which states that big data competencies have an influence on the detection of financial statement fraud, it obtains a statistical T value of 0.907 with a P value of 0.365. The value obtained in this second hypothesis cannot meet the minimum standard for the specified T statistic and P value, so the second hypothesis in this study cannot be accepted. Furthermore, the third hypothesis which states that the tone of the top has an effect on the detection of financial statement fraud gets a T statistic value of 2.872 and a P value of 0.005. Therefore, the third hypothesis can be accepted or it can also be said that the tone of the top has a significant influence on the detection of financial statement fraud. Then in the fourth hypothesis, which states that self-efficacy influences the detection of financial statement fraud, it obtains a T statistic of 5,542 and a P value of 0,000. Thus, the fourth hypothesis in this study can also be accepted because the value obtained already meets the minimum standard of the specified T statistic and P value, or it can be said that self-efficacy has a significant influence on the detection of financial statement fraud. Then, to test the relationship between variables using mediating factors, an indirect hypothesis test was carried out. In the indirect hypothesis test, the test is carried out to find out whether there is an indirect effect between the independent variables and the dependent variable through mediators or mediating factors that affect the relationship. In path analysis, the relationship between the independent and dependent variables is tested through

a mediator. The results of indirect hypothesis testing in this study obtained the following results:

Table 5
Indirect relationship

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Information
Big Data Competencies → Self-Efficacy → Detection of Financial Statement Fraud	0.383	0.384	0.078	4.907	0.000	Significant

From the results of indirect hypothesis testing in table 5 above, the results obtained are a statistical T value of 4,907 with a P value of 0,000. The value obtained has fulfilled the standard T statistic and the specified P value (T statistic > 1.96, P value < 0.05). That way the fifth hypothesis in this study can be accepted, or it can also be said that self-efficacy can be used as an appropriate mediating factor for the relationship between big data competencies and the detection of financial statement fraud. The results of the study show that big data competencies and self-efficacy can influence the success of internal auditors in detecting fraudulent financial statements. Therefore, it is important for companies to provide adequate training and education for internal auditors in developing big data competencies and increasing their self-efficacy, so as to improve their ability to detect fraudulent financial statements. Companies also need to pay attention to the tone at the top and build a corporate culture based on ethical values and integrity, to improve the ability of internal auditors to detect fraudulent financial statements. In addition, companies need to pay attention to the level of internal auditor self-efficacy and strengthen it through training and skills development, as well as providing adequate support in carrying out audit assignments. In addition, companies also need to pay attention to other factors that can affect internal auditor self-efficacy, such as the work environment, management support, and organizational culture. By paying attention to these factors, companies can improve the ability of internal auditors to detect fraudulent financial statements and increase overall audit effectiveness.

5. Conclusion

The research findings indicate that the higher the level of big data competencies possessed by internal auditors, the more effective they are in detecting financial statement fraud. These results are in line with previous studies that show the use of big data technology can help improve the effectiveness of audits in detecting financial statement fraud. However, this study did not find a significant influence between big data competencies and detection of financial statement fraud. This suggests that even though internal auditors have high big data competencies, it does not necessarily increase their ability to detect financial statement fraud. In addition, the research findings also show that tone of the top has a positive and significant influence on the detection of financial statement fraud. This indicates that a company culture based on ethical and integrity values can motivate internal auditors to actively participate in detecting financial statement fraud and enhance audit effectiveness. These findings are also consistent with prior research indicating that organizational culture factors can influence the ability of internal auditors to detect financial statement fraud. Furthermore, the higher the level of confidence and ability of internal auditors in detecting financial statement fraud, the higher their ability to detect financial statement fraud. Additionally, the level of confidence and ability of internal auditors in detecting financial statement fraud plays a crucial role in bridging the relationship between big data competencies and the ability of internal auditors to detect financial statement fraud.

This study contributes to the improvement of audit effectiveness in detecting financial statement fraud by showing that the use of big data technology and a corporate culture based on ethical and integrity values can help enhance the ability of internal auditors in detecting financial statement fraud. In addition, tone of the top is also an important factor in shaping a corporate culture based on ethical and integrity values, which can motivate internal auditors to be more active in detecting financial statement fraud. Therefore, companies should pay attention to the importance of developing Big Data competencies and building a corporate culture based on ethical and integrity values to improve audit effectiveness and prevent financial statement fraud. It is recommended that organizations pay attention to tone of the top as a signal to employees that the organization prioritizes integrity and ethics in conducting business activities, and also pay attention to and enhance employees' self-efficacy in using big data for detecting financial statement fraud.

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