

Fraud Prevention in Indonesian State-Owned Enterprises: Examining the Impact of IT-Based Auditing, Risk Management, Internal Control Systems, and Ethical Culture

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Abstract. This study investigates the impact of information technology-based auditing, risk management, and internal control systems on fraud prevention in Indonesian state-owned enterprises, considering the moderating role of ethical culture. The research employs a quantitative approach, collecting data through questionnaires from 272 employees across various departments. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the study finds that information technology-based auditing, risk management, and internal control systems positively influence fraud prevention. However, the results do not support the moderating role of ethical culture in strengthening these relationships. The study contributes to the existing literature by examining the interplay of technological, managerial, and cultural factors in fraud prevention, offering practical implications for organizations seeking to combat fraud effectively. Future research should explore additional contextual factors and employ longitudinal designs to better understand the dynamics of fraud prevention in different settings.

Keywords: Information Technology Based Audit, Risk Management, Internal Control System, Fraud Prevention and Ethical Culture

1. Introduction

The COVID-19 pandemic has ushered in significant changes and challenges across various aspects of human life. In the year 2020, the entire world faced an economic downturn, leading almost every nation to impose strict restrictions. Many countries even implemented lockdowns, causing a direct and sharp decline in the economy. Consequently, there has been an upsurge in cases of fraudulent activities as a response to the substantial economic pressure. Fraud, or fraudulent behavior, involves intentional actions contrary to truth, performed with the aim of obtaining something not rightfully belonging to the perpetrator, thereby causing losses to the company. Fraud commonly occurs in the form of theft of assets other than cash, irresponsible receipt of funds, and unauthorized expenditures (Hamdani, 2016). While eliminating fraud entirely may prove challenging, its impact can be minimized. Failing to prevent and detect fraud can have fatal consequences for an organization.

In 2020, the deteriorating economic conditions and lack of supervision have created an environment where companies are primarily focused on addressing the Covid-19 pandemic crisis. Unfortunately, this situation has inadvertently provided opportunities for fraudulent individuals within these companies to exploit the circumstances and engage in activities that can harm the organization. The Covid-19 pandemic has brought about a multitude of problems worldwide, affecting various aspects including social, economic, and political spheres. Apart from its detrimental impact on human health and safety, this crisis has indirectly weakened and worsened the economy. This is evident from the significant number of job layoffs, leading to a drastic decrease in people's purchasing power. Consequently, the pandemic may contribute to an increase in crime and fraud.

According to the ACFE's investigation results in 2020, there were 2,504 cases of occupational fraud between January 2018 and September 2019. This represents only a fraction of the total fraud cases reported annually across various industries worldwide. The research data covers 23 different industry categories, impacting organizations of all sizes and types. In the United States and Canada, there were 895 cases, accounting for 46% of the total, while Sub-Saharan Africa reported 301 cases (15%), the Asia-Pacific region recorded 198 cases (10%), Western Europe documented 128 cases (7%), the Middle East and North Africa reported 127 cases (7%), South Asia recorded 103 cases (5%), Latin America and the Caribbean reported 101 cases (5%), and Eastern Europe and West/Central Asia documented 95 cases (5%). The rise in earnings manipulation cases in financial reporting has led investors to focus more on cash flow reporting. Investors expect that an increase in revenue should be reflected in cash flow, indicating a strong financial performance. Indonesia ranks 4th in the Asia-Pacific region for the highest number of fraud cases, with 23 cases reported in 2022 (Association of Certified Fraud Examiners, 2022).

Preventing fraud is not only more effective but also more economical than treating its aftermath. A workplace characterized by honesty, openness, and mutual support can reduce potential losses (Festi & Natariasari, 2014). This proactive approach proves more effective than reactive or repressive measures. Prevention can avert significant losses and safeguard the reputation of individuals and organizations. Delayed or inadequate handling of fraud only provides opportunities for perpetrators to continue covering their actions with further fraudulent activities (Wahyuni-TD et al., 2021).

A lot of research has been done regarding fraud prevention. Yusuf et al. (2020), fraud prevention must be achievable, meaningful, and compatible with other policies. The results suggest that companies and websites can serve as effective communication tools for communicating fraud prevention efforts to internal and external stakeholders, aiming to avoid actions that violate rules and potentially harm the organization. Ferina et al. (2021) and Novalia et al. (2021) extend this perspective, emphasizing the importance of information technology and IT-based auditing as tools to support decision-making, policy development, and information dissemination for fraud prevention. Other researchers (Dharmawati et al., 2022; Syahfitri Harahap & Nengzih, 2021; S. E. Tarjo, 2022), suggest that management needs to recognize fraud prevention as a crucial element in good governance practices. This study emphasizes the value of enterprise risk management in reducing and stopping fraud, especially in Indonesian local

government governance. Several scholars (Akbar, 2019; Halbouni et al., 2016; Samuel et al., 2021; Saputra et al., 2022; Saud et al., 2020) have dedicated their efforts to exploring the links between internal control systems, e-procurement implementation, and ethical corporate culture with regards to preventing fraud. According to these studies, an ethical culture can help avoid fraud by moderating these interactions. This study will concentrate on the functions of risk management, internal control systems, and IT-based audits in preventing fraud, building on earlier studies. Taking these factors into account, this study attempts to provide a more comprehensive view on how fraud prevention initiatives might be improved and implemented more successfully.

The rapid and continuous advancement of information technology has opened new horizons in the field of auditing (Astuti & Ramayani, 2022). Its presence not only adds value but also becomes a crucial component in the audit process, aiding auditors in understanding and managing relevant information systems for financial reporting, while simultaneously helping detect and address potential issues (Akbar, 2019; Ferina et al., 2021). The benefits of information technology in auditing encompass enhanced process efficiency through automation, improved accuracy and reliability of data through sophisticated system utilization, and elevated quality of audit reports through the utilization of analytical tools and data visualization (Akbar, 2019). Information technology-based auditing, recognized as a tool that streamlines the audit process and contributes to fraud prevention, optimizes the efficiency and effectiveness of audits (Juhandi et al., 2020; Samagaio & Felício, 2023).

Previous studies have demonstrated a significant influence of technology-driven information audits on the prevention of fraudulent activities. A study conducted by Islam & Stafford (2022) indicates that technology-based information audits affect auditing quality and assist companies in preventing fraud. This is not the same as the research that (Sujana et al., 2020) did. According to Tang & Karim (2019) study, there is no discernible effect of the reporting system on getting rid of fraud in village financial management. Furthermore, this study discovered that computer auditing methods had little to no impact in reducing fraud.

Fraudulent practices within organizations pose a threat that needs to be anticipated early. According to Kaho & Riwu (2014), Using efficient risk management is one strategy to stop fraud. Risk management is a methodical and structured process that involves identifying, measuring, mapping, developing, and monitoring and controlling the application of risk management strategies. In fraud, risk management in fraud-prone areas is an ongoing and continuous process conducted by management in managing risks related to the potential occurrence of fraud in the organization's business processes to prevent fraudulent activities. According to Karyono (2013), every organization, without exception, faces various types of risks, including the risk of fraud. It is the responsibility and role of management to guarantee that the business has the right procedures and safeguards in place to manage and reduce these risks. This process involves managing organizational resources in a way that allows for the identification, assessment, and handling of fraud risk before its impact is felt. According to the experience of several organizations, effective risk management is not only related to the recognition and assessment of risk but also involves proactive steps to prevent such risks. Develop and implement policies and procedures that reduce the possibility of fraud, risk management should also involve continuous monitoring and timely responses to potential or actual indications of fraud.

The cases involving PT Asabri and Asuransi Jiwasraya are related to risk management issues due to inadequate governance of fraud risk, possibly imprecise risk assessments, weak internal control activities, substantial fund deviations, and a lack of proper risk monitoring and evaluation. In the context of fraud prevention, these cases underscore the need for robust risk management with comprehensive risk assessments, stringent internal control reinforcement, meticulous monitoring, and swift responses to deviations or violations to prevent fraud risks that could harm the state and society.

Several studies show the significant impact of risk management regarding preventing fraud. Research carried out by Supriyanto et al. (2022) generally concludes that effective risk management

can help organizations prevent fraud and minimize fraud when it occurs. Furthermore, risk management has also been proven to play a role in improving an organization's adherence to laws and guidelines, enhancing the effectiveness of internal controls, and increasing public trust in the organization. Sudarmanto (2020) proposes that professionals and auditors should establish proactive risk management strategies and early detection protocols to prevent fraud effectively. However, other research presents a different perspective. Pangaribuan (2018) found a significantly negative effect between information security breaches and risk management efficiency in fraud prevention efforts. Additionally, Sugiyanto & Rahayu (2019) indicate that fraud prevention is not influenced by risk management. Given the differences in these research results, it appears crucial for organizations to consider several factors when implementing and managing risk management, including the quality and efficiency of internal controls, as well as information security aspects.

Implementing an internal control system in every operation can make the organization and fight against fraud more effective. A comprehensive and thoroughly applied internal control system, along with periodic monitoring, can help reduce the risk of financial losses caused by fraud in the financial sector. As said by Susanto (2017), the system of internal controls is a crucial instrument in detecting potential financial fraud that could harm a company. A study that shows the significant impact of internal control systems regarding preventing fraud, Maria et al. (2023) demonstrates the beneficial impact of the internal control system on anti-fraud measures. Nevertheless, contradicts perspective was revealed by Fernandhytia & Muslichah (2020), who claims that inadequate organizational structures and a lack of control make the internal control system detrimental to the prevention of fraud.

From the various studies mentioned above, there is a reflection of variations in research results regarding the influence of IT-based audit, risk management, and internal systems for preventing fraud. Some studies demonstrate the effectiveness of these variables in preventing fraud, while others show non-significant or even negative findings. Thus, there is a research gap that needs to be addressed concerning the precise relationship between these variables in the context of fraud prevention. More specifically, this research aims to explain how agency theory can be an appropriate framework to describe the relationship between IT-based audit, risk management, ethical culture and internal control system in relation to fraud prevention. In other words, this research seeks to understand how these variables interact with each other and how they can be effectively used in fraud prevention efforts, as well as to identify any significant relationships that have not been uncovered in previous research.

An organization's ethical culture plays a key role in managing the relationship between IT-based audit, Internal control systems and risk management in fraud prevention. Robbins & Coulter (2017) suggests that a strong ethical culture can assist organizations in preventing fraudulent practices, building a good reputation, and fostering a healthy and productive workplace. Employees in an ethical work environment are inclined to act more responsibly and ethically, ultimately reducing the frequency of fraud occurrences. A study by Suh & Shim (2020) found that the ethical culture within an organization has an impact on fraud prevention. This is reflected through the influence of ethical culture on how employees perceive and employ strategies to prevent fraud. In this regard, a strong ethical culture within an organization can encourage employees to be more proactive in implementing fraud prevention strategies. However, some studies yield different findings, Djatmiko et al. (2020) argue that organizational ethical culture may have a negative influence on fraud prevention. This could be attributed to various factors, including but not limited to the work environment, individual characteristics, and other factors that may influence individual decisions to engage in fraud. Therefore, it is important to understand that although the ethical culture of an organization can act as a moderating variable in combating fraud, other factors also need consideration. Further research is needed to better understand the complex relationships and interactions between these variables in the context of fraud.

Previous research has attempted to understand the contributing factors to fraud prevention, including the role of IT-based audit, risk management, internal control systems, and ethical culture.

However, research results are still inconsistent, creating a research gap that motivates this study. The main aim of this research is to contribute to the theoretical and practical understanding of how IT-based auditing, risk management, internal control systems, and ethical culture impact fraud prevention. It is anticipated that this research will assist in designing more effective strategies and policies to prevent and address fraud within organizational settings. More specifically, this research aims to examine how IT-based audit, risk management, internal control systems, and ethical culture influence fraud prevention within the corporate environment. Additionally, the study will analyze the interaction between these variables in fraud prevention efforts. Thus, this research may provide deeper insights into how organizations can leverage IT-based audit, risk management, mechanisms of internal control and a culture of ethics in preventing fraud. The results of this study also have the potential to assist organizations in designing effective strategies to strengthen ethical culture and enhance the effectiveness of these practices. The proposed research title based on this focus is "The impact of Information Technology-based audits, risk management and internal control systems on fraud prevention as moderating variables of ethical culture".

The research problems are being tackled in this study by drawing on the fraud triangle theory and the gone theory. According to the fraud triangle theory, preventing fraud requires a robust system and fostering a culture of integrity within the organization. The gone theory complements this by suggesting that electronic systems can help limit the avenues for fraud. It also delves into motivational aspects for fraud, such as personal needs and greed, and systemic issues like lack of proper oversight.

The objective of this study is to fill the voids and discrepancies discovered in previous research concerning the impact of information technology on audit, risk management, internal control systems, and ethical culture in the realm of fraud prevention. Several gaps have been identified in prior research, such as the absence of emphasis on the interplay between these factors within the context of state-owned enterprises (BUMN) in Indonesia, inconsistencies in findings regarding the effect of risk management on fraud prevention, and limitations in comprehending how ethical culture can act as a mediator for the influence of other factors on fraud prevention.

This study makes a valuable contribution by introducing an all-encompassing conceptual framework that merges these elements and scrutinizes their interactions within the realm of state-owned enterprises (BUMN) in Indonesia. As a result, a more profound comprehension of how organizations can capitalize on information technology in auditing, risk management, internal control systems, and ethical culture is anticipated to be gained in order to thwart fraud. Moreover, novel perspectives on the connections between these variables and how their efficient execution can fortify anti-fraud endeavors are presented in this research. Hence, practical advice for organizations to formulate more efficient strategies for fraud prevention and mitigation in the corporate setting is expected to be offered. Ultimately, this study is poised to make a noteworthy contribution to the existing knowledge in fraud prevention and establish a sturdy groundwork for the advancement of best practices in combatting fraud challenges in the digital age.

2. Literature Review

2.1. Fraud Triangle

Cressey (1953) introduced the concept of the fraud triangle, also known as the fraud triangle theory, to illustrate the risk factors that contribute to instances of fraud. Sayyid (Sayyid, 2015) further explains that the fraud triangle theory serves as a conceptual framework that highlights three conditions that lead to fraudulent actions. According to Pasaribu & Kharisma (2018), the fraud triangle theory delves into the underlying causes of fraud. It reveals that individuals within an organization engage in fraudulent activities due to the presence of opportunity and the absence of rationalization and ethical behavior from management or employees. As a result, those involved in fraud often seek self-justification, making it crucial to minimize available opportunities as an effective method for reducing fraud (Ariastuti &

Yuliantari, 2020).

2.2. Gone Theory

In his publication, "*The Accountant Handbook of Fraud and Commercial Crime*," Jack Bologne introduced the Gone Theory. This theory, first adapted by the Indonesian Supreme Audit Agency (BPKP) in their publication "*Strategi Pemberantasan Korupsi Nasional*" in 1999, outlines the key factors influencing fraud. It emphasizes the close connection between human collusion, corruption, and these contributing elements: Greed, Opportunities, Needs, and Exposures. This theory expands upon the existing fraud triangle concept initially articulated by Cressey (1953), which states that fraudulent situations involve three factors: Pressure, Opportunity, and Rationalization. The GONE Theory, as a comprehensive framework, identifies an additional root cause - Need - as central to understanding and addressing fraud, in addition to Greed, Opportunity, and Exposures.

2.3. Fraud Prevention

Fraud, according to the ACFE, involves using deceitful actions to obtain financial advantages (Astrina et al., 2023). It is a deliberate act executed to mislead another party, resulting in a loss for the deceived party and a gain for the deceiving party (Arifah & Setyawan, 2022). Implementing fraud prevention measures is vital to thwarting fraudulent activities. Typically, fraud detection comes into play when fraud prevention measures are unsuccessful. A common approach in organizations to tackle fraud involves implementing a fraud reporting policy (Othman et al., 2015).

2.4. Information Technology Based Audit

Information technology auditing is a crucial process that involves the collection and evaluation of all activities related to information systems within a company. It is also commonly referred to as a computer audit and is used to assess the effectiveness and integration of the company's information system assets in achieving its organizational goals (Nuratmojo et al., 2015). Recent research has shown that internal audit and whistleblower systems can play a significant role in preventing fraud, as demonstrated in a study conducted on rural banks (Dubey, 2022). Additionally, the COVID-19 pandemic has highlighted the importance of information technology auditing in detecting fraud, emphasizing the need for competent auditors, especially in the field of IT auditing, to ensure the quality of audit reports (Yasmin et al., 2022). Hence, the subsequent hypotheses can be identified:

Hypothesis 1: Information Technology-Based Auditing affects Fraud Prevention

2.5. Risk Management

Risk management involves the identification of potential events that could have a detrimental impact on the company, evaluating the associated risks, and implementing appropriate responses (COSO, 2017). Typically, the identification of events within the company can lead to two outcomes: risks and opportunities. Risks have the potential to negatively affect the company, whereas opportunities are events that can contribute to the accomplishment of company objectives. However, research findings indicate that risk management does not have a significant impact on fraud prevention (Shanmugam et al., 2012; T. Tarjo et al., 2022). Hence, the subsequent hypotheses can be identified:

Hypothesis 2: Risk Management affects fraud prevention

2.6. Internal Control System

Previous studies have investigated the efficacy of internal control in preventing fraud, demonstrating that it indeed has a favorable and substantial impact on the detection and prevention of fraudulent activities. According to the research conducted by Josiah et al. (2012), the implementation of effective internal control measures acts as a deterrent for fraudulent behavior carried out by both management and employees. This assertion is further supported by Shabuddin et al., who emphasize that internal control serves as a mechanism for organizations to supervise and direct their resources, thus playing a

crucial role in averting the misappropriation of physical and non-physical assets. Hence, the subsequent hypotheses can be identified:

Hypothesis 3: Internal Control System affects Fraud Prevention

2.7. Ethical Culture

Ethical culture within an organization encompasses a set of values, norms, and beliefs that are commonly embraced by all members (Crain, 2015). This ethical culture plays a crucial role in shaping the work approach and conduct of employees, aiming to foster ethical behavior. By promoting ethical culture, organizations strive to prevent actions that could result in detrimental consequences and, equally important, deter employees from engaging in fraudulent activities. Research indicates that a corporate ethical culture not only serves as a safeguard against illegal or unethical scandals but also cultivates a culture of appropriate ethical conduct throughout the company (Schwartz, 2013). Such a culture can encourage the desired ethical behavior, as employees either conform to the company's ethical standards through socialization or internalize these norms as their own. The triangle fraud model proposed by Cressey (1953) suggests that criminal behavior often stems from individuals rationalizing their actions, essentially justifying and defending deviant behavior (Murphy & Dacin, 2011).

The integration of information technology in the workplace has brought about a profound transformation in the nature of jobs, employees, organizations, and management systems employed to oversee these organizations. The proficiency of investigators and auditors in delivering value to the organization is contingent upon their adeptness in utilizing information technology effectively. The findings of this research demonstrate that comprehending the utilization of information technology via big data analytics yields a favorable and noteworthy impact on the prevention of fraudulent activities (Herland et al., 2018; Zhang et al., 2015). Therefore, the following hypotheses can be recognized.

Hypothesis 4: Ethical Culture mediates the effect of Information Technology-Based Auditing on Fraud Prevention

Fraud risk management involves the process of identifying and mitigating risks associated with potential and actual cases of fraud within a company (Hussaini et al., 2018). By implementing fraud risk management practices, companies aim to enhance their prevention, detection, and response mechanisms to combat fraud effectively. PricewaterhouseCoopers (PwC) emphasizes that Fraud Risk Management (FRM) is crucial for reducing the likelihood of fraud occurrences (PwC, 2022). Research indicates a strong link between organizational ethical culture, such as the ethical "tone at the top," and fraud prevention efforts (Bekiaris & Papachristou, 2017). Conversely, some studies highlight the varying effectiveness of fraud prevention strategies, with forensic accounting techniques being identified as particularly useful in certain countries (Efiong et al., 2016).

Hypothesis 5: Ethical Culture mediates the effect of Risk Management on Fraud Prevention

The triangle fraud model highlights the role of opportunity in fraud occurrence. This is often due to insufficient internal supervision, the company's failure to detect fraud, and information asymmetry. To combat fraud, the company establishes systems for recognizing, monitoring, and reviewing HR procedures. Effective internal control is essential in preventing and detecting fraud, safeguarding organizational resources. Research by Wangombe et al. (2016) emphasizes the need for commercial banks to evaluate various fraud control strategies. Therefore, the following hypotheses can be recognized.

Hypothesis 6: Ethical Culture mediates the effect of Internal Control System on Fraud Prevention.

2.8. Conceptual Framework

Based on the research background and theoretical studies above, the conceptual framework of this research can be described as follows:

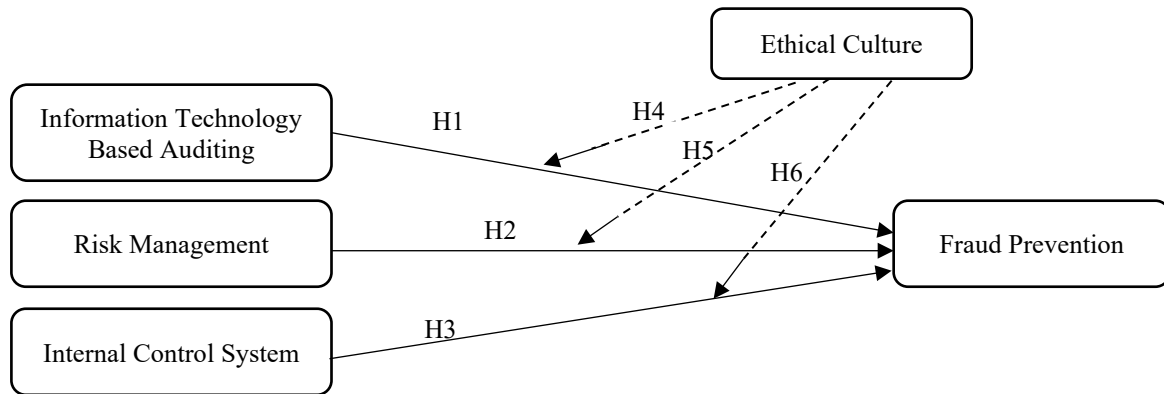


Fig. 1: Conceptual Framework

3. Research Methodology

The population in this research is State-Owned Enterprises (BUMN). Based on the Minister of State-Owned Enterprises (BUMN) Regulation Number Per-4/MBU/03/2021, it is spread across 12 different industrial sectors according to the classification set out in the regulation. BUMN companies were chosen as samples for several reasons: (1) this research uses audit variables based on information technology, risk management, and internal control systems, where it is likely that this measure is more commonly used in BUMN companies, (2) BUMN companies were chosen as the focus research on the grounds that state-owned companies are one of the largest companies and play an important role in developing the Indonesian economy. The respondents in this study were around 5-10 people representing several relevant positions. These positions are: Human resource management, technology and information, risk management and compliance, general and financial services, organizational and personnel planning, internal monitoring systems and others, according to Hair et al (2017), stated one of the sample size guidelines The minimum in SEM-PLS analysis is ten times the maximum number of formative indicators used to measure a construct. With reference to this statement, the minimum sample in this study is $10 \times 22 = 220$ respondents,

The research method used by the author is a quantitative method, the data source is primary data, namely data obtained directly from respondents at the research location by distributing a 6 (1,2,3,4,5,6) Likert scale questionnaire. Data collection techniques include observation, questionnaires, literature studies and documentation. The measuring scale used is Interval.

The type of data analysis used is Descriptive Statistics, which is an analysis used to develop or predict an existing theory to obtain a complete and precise picture of the research objectives. Technical analysis uses Structural Equation Modeling (SEM) based on Partial Least Square (PLS) with SmartPLS 4.0 software. Structural model analysis has several stages, namely: 1) Formulating structural model theory, 2) Outer model analysis, 3) Inner model analysis, and 4) Hypothesis testing.

4. Result and Discussion

4.1. Results

Respondent Demographics

In this study, there were 272 respondents, consisting of 33% females and 67% males. Regarding age distribution, 30% of respondents were between 20-30 years old, 41% were between 31-45, 22% were between 46-55, and 7% were above 56 years old. In terms of work experience, 26% had a tenure of 3-5 years, 24% between 5-10 years, and 50% had more than 10 years of experience. The companies' establishment duration varied, with 10% between 5-10 years, 7% between 11-15 years, 7% between 16-20 years, 6% between 21-25 years, 4% between 26-30 years, and 66% above 30 years. Respondents

held various positions, including human resource management (5%), technology and information department (8%), risk management and compliance (7%), general and financial services (19%), planning and personnel (4%), internal control system (4%), and others (53%).

Descriptive Statistics

Table 1. Descriptive Statistics Result

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Information Technology-Based Auditing (ATI)	272	1,18	6.0	4.465	0.885
Risk Management (MR)	272	1,45	6.0	4.718	0.821
Internal Control System (SPI)	272	1,5	6.0	4.453	0.910
Fraud Prevention (PF)	272	1,4	6.0	4.593	0.862
Ethical Culture (BE)	272	1,4	6.0	4.670	0.795

According to the descriptive statistical data provided in the table above, this research exhibits a minimum value of 1.1, representing 'strongly disagree,' and a maximum value of 6, representing 'strongly agree.' The mean values for each variable fall within the range of 4 and 5, with a tendency to be closer to 4, which suggests agreement. Furthermore, the standard deviation for each variable is smaller than the mean values, indicating minimal variability among the variables in the table.

Outer Model Testing

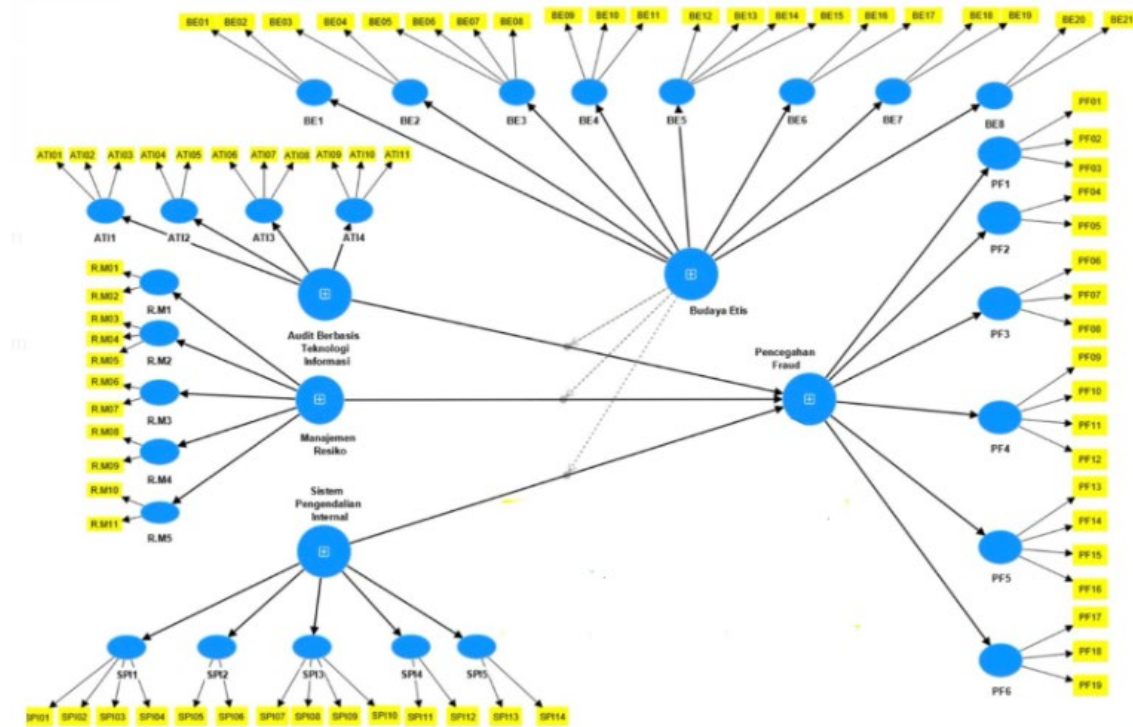


Fig.2: Structural Model

Average Variance Extracted (AVE)

Average Variance Extracted (AVE) is the value used in convergent validity testing because the value is obtained from the results of convergent validity. In this research, the expected AVE value is > 0.5 , and so if we look at the latent variable constructs, all constructs have values above 0.5 (Hair, 2017). For more details, the AVE results can be seen in the table below:

Table 2. AVE Convergent Validity Output Results

Construct	AVE
Information Technology-Based Auditing	0.583
Risk Management	0.663
Internal Control System	0.620
Fraud Prevention	0.539
Ethical Culture	0.690

Discriminant Validity

Based on the cross loading test table above, it shows that each indicator of each latent variable has a higher correlation with the construct being measured compared to other variable constructs (latent variables), so it can be concluded that all indicators for each variable have good discriminant validity.

For more clarity, see the table below:

Table 3. Discriminant Validity Assessment Results

Indicator	Variable					Description
	ATI	MR	SPI	PF	BE	
ATI01	0.686	0.440	0.471	0.502	0.490	Valid
ATI02	0.592	0.401	0.400	0.396	0.348	Valid
ATI03	0.665	0.395	0.452	0.471	0.464	Valid
ATI04	0.691	0.440	0.468	0.498	0.414	Valid
ATI05	0.707	0.457	0.423	0.495	0.395	Valid
ATI06	0.759	0.505	0.536	0.552	0.477	Valid
ATI07	0.632	0.468	0.469	0.506	0.467	Valid
ATI08	0.712	0.577	0.513	0.555	0.443	Valid
ATI09	0.722	0.555	0.574	0.564	0.537	Valid
ATI10	0.765	0.589	0.682	0.632	0.576	Valid
ATI11	0.686	0.600	0.574	0.601	0.538	Valid
R.M01	0.639	0.786	0.622	0.672	0.532	Valid
R.M02	0.578	0.829	0.652	0.694	0.593	Valid
R.M03	0.567	0.829	0.661	0.705	0.632	Valid
R.M04	0.618	0.819	0.671	0.719	0.615	Valid
R.M05	0.605	0.818	0.630	0.693	0.577	Valid
R.M06	0.560	0.813	0.725	0.717	0.593	Valid
R.M07	0.546	0.796	0.684	0.682	0.627	Valid
R.M08	0.589	0.851	0.688	0.732	0.628	Valid
R.M09	0.539	0.829	0.663	0.718	0.645	Valid
R.M10	0.594	0.871	0.710	0.751	0.650	Valid
R.M11	0.561	0.703	0.714	0.615	0.530	Valid
SPI01	0.631	0.676	0.798	0.686	0.614	Valid
SPI02	0.581	0.705	0.746	0.696	0.622	Valid
SPI03	0.604	0.756	0.755	0.733	0.661	Valid
SPI04	0.608	0.727	0.811	0.712	0.639	Valid
SPI05	0.579	0.797	0.783	0.740	0.640	Valid
SPI06	0.509	0.581	0.766	0.603	0.514	Valid
SPI07	0.635	0.692	0.865	0.706	0.637	Valid
SPI08	0.606	0.646	0.783	0.698	0.655	Valid
SPI09	0.485	0.509	0.654	0.522	0.419	Valid
SPI10	0.527	0.576	0.754	0.644	0.521	Valid
SPI11	0.525	0.543	0.740	0.612	0.511	Valid
SPI12	0.590	0.635	0.844	0.699	0.636	Valid
SPI13	0.531	0.589	0.817	0.657	0.580	Valid
SPI14	0.643	0.677	0.875	0.761	0.699	Valid
PF01	0.566	0.572	0.635	0.745	0.700	Valid
PF02	0.569	0.616	0.669	0.686	0.593	Valid

Indicator	Variable					Description
	ATI	MR	SPI	PF	BE	
PF03	0.445	0.486	0.501	0.637	0.575	Valid
PF04	0.511	0.536	0.624	0.704	0.595	Valid
PF05	0.605	0.689	0.680	0.779	0.628	Valid
PF06	0.597	0.767	0.717	0.850	0.713	Valid
PF07	0.587	0.661	0.652	0.707	0.565	Valid
PF08	0.601	0.695	0.660	0.774	0.616	Valid
PF09	0.466	0.446	0.468	0.541	0.396	Valid
PF10	0.505	0.617	0.543	0.706	0.594	Valid
PF11	0.571	0.752	0.684	0.800	0.677	Valid
PF12	0.574	0.590	0.629	0.662	0.535	Valid
PF13	0.588	0.643	0.598	0.751	0.601	Valid
PF14	0.672	0.717	0.688	0.826	0.704	Valid
PF15	0.504	0.557	0.663	0.706	0.634	Valid
PF16	0.616	0.677	0.701	0.811	0.726	Valid
PF17	0.518	0.497	0.523	0.593	0.467	Valid
PF18	0.526	0.687	0.678	0.787	0.742	Valid
PF19	0.548	0.698	0.645	0.797	0.746	Valid
BE01	0.622	0.643	0.678	0.784	0.814	Valid
BE02	0.541	0.627	0.640	0.746	0.822	Valid
BE03	0.570	0.619	0.648	0.746	0.871	Valid
BE04	0.627	0.636	0.647	0.743	0.816	Valid
BE05	0.551	0.656	0.649	0.729	0.851	Valid
BE06	0.632	0.649	0.634	0.729	0.830	Valid
BE07	0.571	0.626	0.628	0.719	0.855	Valid
BE08	0.525	0.585	0.615	0.690	0.835	Valid
BE09	0.601	0.624	0.607	0.707	0.838	Valid
BE10	0.582	0.658	0.683	0.758	0.861	Valid
BE11	0.576	0.700	0.649	0.740	0.843	Valid
BE12	0.432	0.531	0.536	0.630	0.771	Valid
BE13	0.527	0.606	0.621	0.695	0.824	Valid
BE14	0.527	0.587	0.618	0.690	0.843	Valid
BE15	0.447	0.512	0.568	0.593	0.714	Valid
BE16	0.550	0.613	0.658	0.707	0.869	Valid
BE17	0.547	0.591	0.606	0.664	0.805	Valid
BE18	0.578	0.582	0.621	0.705	0.843	Valid
BE19	0.582	0.615	0.649	0.710	0.853	Valid
BE20	0.631	0.609	0.643	0.691	0.826	Valid
BE21	0.563	0.630	0.661	0.704	0.843	Valid

Composite reliability

Composite reliability To ensure that there are no problems related to measurement, the final step in evaluating the outer model is to test the unidimensionality of the model. This unidimensionality test was carried out using composite reliability and Cronbach's alpha. For both indicators the cut off value is 0.7.

Table 4. Composite reliability test result

Construct	Composite reliability
Information Technology-Based Auditing	0,892
Risk Management	0.949
Internal Control System	0.952
Fraud Prevention	0.894
Ethical Culture	0.977

Inner Model Testing

Coefficient of Determination

Tabel 5. Coefficient of Determination

Dependent Variable	R-square	R-square adjusted
Fraud Prevention	0.873	0.869

Based on the table above, the adjusted R-square value for the fraud prevention variable is 0.869. This shows that 86.9% of fraud prevention can be explained as influenced by information technology-based audit variables, risk management and internal control systems which are moderated by ethical culture, while the remaining 13.1% is influenced by other variables not examined in this research. .

Hypothesis Testing

Statistical significance testing (t-test) in SEM analysis with the PLS approach was carried out using bootstrapping techniques. The data used for bootstrapping is data that has gone through the Measurement stage. Significance tests (t-tests) are incorporated into the Structural Model, providing insight into the relationships between hypothesized variables

Hypothesis testing is carried out by comparing the t-count or t-statistic value with a predetermined threshold. The t value obtained in the bootstrapping test must exceed the critical t value set at 1.96 for a significance level (α) of 5% or a p value below 0.05 (Hair et al., 2017).

Table 6. Hypothesis Testing Result

Hypothesis	Relationship	Path Coefficient	T Statistics	P Value	Decision	Description
1	ATI -> PF	0,114	2,997	0.003	H1 accepted	influential
2	MR -> PF	0.306	5,825	0.000	H2 accepted	influential
3	SPI -> PF	0,246	4.734	0.000	H3 accepted	influential
4	BE*ATI -> PF	0,004	0,120	0.905	H4 rejected	not moderating
5	BE*MR -> PF	0,017	0,370	0.711	H5 rejected	not moderating
6	BE*SPI -> PF	-0,025	0,459	0.647	H6 rejected	not moderating
R square		0.873				

*significant 5%

1) The Influence of Technology-Based Information Audits on Fraud Prevention

Based on hypothesis testing, the effect of technology-based information audits on fraud prevention has a path coefficient of 0.114, a t-statistic value of 2.997, and a p-value of 0.003. Because the t-statistic value of 2.997 is greater than the crucial t value of 1.96 and the p value (0.003) is smaller than the alpha value of 0.05, the hypothesis H1 is supported. Information technology audits have been shown to impact fraud prevention, leading to the conclusion that they play a significant role in this area.

2) The Influence of Risk Management on Fraud Prevention

Hypothesis test results show that fraud prevention is influenced by risk management. The t-statistic is 5.825, the p-value is 0.000, and the path coefficient is 0.306. Considering that the t-statistic value of 5.825 is higher than the crucial t-value of 1.96 and the p-value (0.000) is smaller than the alpha value of 0.05, hypothesis H2 is supported. Therefore, risk management has value for fraud prevention.

3) The Influence of the Internal Control System on Fraud Prevention

Based on the results of hypothesis testing, the path coefficient for the Internal Control System in preventing fraud is 0.246, the t-statistic is 4.734, and the p-value is 0.000. Considering that the t-statistic value of 4.734 is greater than the crucial t-value of 1.96 and the p-value (0.000) is smaller than the alpha value of 0.05, hypothesis H3 is supported. Thus, some argue that Internal Control Systems help avoid fraud.

4) Ethical culture moderates the influence of Technology-Based Information Audit on Fraud Prevention

The results of the hypothesis test of Technology-Based Information Audit Moderation of Ethical Culture towards Fraud Prevention have a path coefficient of 0.004 with a t-statistic value of 0.120 and a p-value of 0.905. Because the t-statistic value obtained is 0.120, namely the p-value is smaller than $t(1.96)$, and the p-value is greater than $t(0.905)$, namely α is greater than $\alpha(0.05)$, then hypothesis H4 untenable. An ethical culture will not reduce the impact of Technology-Based Information Audits on fraud prevention.

5) Ethical culture moderates the influence of risk management on fraud prevention

The results of hypothesis testing show how risk management is moderated by ethical culture on the fraud prevention path coefficient (0.017), t-statistic (0.370), and p-value (0.711). The fact that the p value (0.711) is greater than the α value (0.05) and the t-statistic (0.370) is lower than the significant t value (1.96) supports hypothesis H5. An ethical culture is unlikely to reduce the influence of risk management in preventing fraud.

6) Ethical culture moderates the influence of the internal control system on fraud prevention

The results of the hypothesis test in the table above show that the path coefficient for the moderating influence of ethical culture on the internal control system in preventing fraud is - 0.025 with a t-statistic value of 0.459 and a p-value of 0.674 in accordance with the findings of the hypothesis test. Hypothesis H6 is not supported because the calculated t-statistic value of 0.459 is smaller than the significant t value of 1.96 and the p value of 0.674 is greater than the α value of 0.05. Hence, it can be deduced that ethical culture does not act as a moderating factor in the relationship between fraud prevention and the internal control system.

4.2. Discussions

4.2.1. Technology-Based Information Audit and Fraud Prevention

The research findings indicate that Technology-Based Information Audit has a significant favorable impact on the prevention of fraud. This suggests that the better the implementation of Technology-Based Information Audit in a company, the more effective the efforts in Fraud Prevention. These results align with Islam & Stafford (2022), where Technology-Based Information Audit not only enhances the efficiency and accuracy of auditors' work but also holds crucial relevance in the context of fraud prevention. By leveraging information technology, auditors can more effectively identify patterns or anomalies that may indicate fraud in the financial or operational information of the company. The automated systems and data analysis tools used in Technology-Based Information Audit can proactively detect potential fraud by quickly and deeply analyzing large datasets.

The findings of this research align with the Fraud Triangle Theory, Technology-Based Information Audit has the potential to decrease the opportunity element for fraud. By implementing an audit system that leverages information technology, the supervision and monitoring of company transactions and activities can be conducted with greater efficiency and effectiveness. Information technology audits enable the identification of irregular patterns or signs of fraud that may be challenging to uncover using traditional audit approaches. Moreover, Technology-Based Information Audit can enhance transparency and accountability in managing company information and data, ultimately lowering the risk of data manipulation that could lead to fraud. Therefore, integrating information technology into the audit process can aid in mitigating the opportunity factor for fraud.

Enhancing the practical outcomes of these discoveries necessitates organizations to expand their investment and execute information technology within their audit procedures. The fundamental role of training and developing auditors in the realm of information technology cannot be understated as it significantly bolsters the efficacy of fraud prevention. By incorporating information technology audit systems, organizations can effectively identify irregular patterns or discern signals of fraud that may elude traditional audit methods.

4.2.2. Risk Management and Fraud Prevention

The research findings indicate that fraud prevention is significantly improved by risk management. This suggests that the better the implementation of Risk Management in a company, the more effective the efforts in Fraud Prevention. These results align with Supriyanto et al. (2022), stating that risk management is a holistic approach not only to prevent fraud but also to manage risks in general, reduce potential impacts, and ensure that the organization operates in accordance with applicable rules and regulations. Therefore, risk management emerges as a holistic approach to tackle the unpredictability and obstacles that an organization may encounter.

By taking proactive measures to manage fraud risk, organizations can enhance the efficiency of fraud prevention and fortify their safeguards against potential fraud. This aligns with the principles of fraud prevention highlighted in the Fraud Triangle Theory, which underscores the importance of mitigating the conditions that facilitate fraudulent activities. Therefore, it is imperative for companies to enhance their risk management protocols to better detect, assess, and address fraud risks. A comprehensive approach to risk management can aid in reducing fraud risks and enhancing overall fraud prevention endeavors.

4.2.3. Internal Control System and Fraud Prevention

The research findings suggest a notable positive impact of the Fraud Prevention Internal Control System. This implies that as a company enhances the efficiency of its system of internal controls, it concurrently strengthens its capabilities in preventing fraud. These results align with a study conducted by Maria et al. (2023), illustrating Internal control's impact on preventing fraud. To ensure the attainment of the company's established goals by top management, secure company assets, and facilitate efficient and effective operations (Siregar & Azzahra, 2022), the implementation of a strong and well-structured the internal control framework is essential to thwart fraudulent activities.

The findings of the study are in accordance with the Fraud Model theory, which has experienced significant growth in recent years. The initial fraud model was identified by Donald R. Cressey in 1953, and is commonly referred to as the fraud triangle. This concept highlights that the stronger and more robust the internal control system is within a company, the greater the impact on mitigating fraudulent activities. Consequently, organizations need to enhance their internal control system to ensure its effectiveness in preventing fraud. By establishing clear internal control procedures and implementing rigorous monitoring, organizations can effectively deter fraudulent behaviors from both management and employees. Furthermore, the implementation of efficient internal controls aids in the supervision and guidance of organizational resources, thus preventing any misappropriation of physical and non-physical assets.

4.2.4. Ethical Culture, Technology-Based Information Audit, and Fraud Prevention

The statistical test results indicate that ethical culture does not play a significant role in strengthening technology-based information audit in the context of fraud prevention. This suggests that rapid adaptation to ever-changing information technology remains a constant challenge. Organizations have not fully realized or equipped themselves with the latest technology capable of detecting and preventing fraud effectively, as explained by Suyanto et al. (2022). This may explain why an ethical culture alone is not sufficient to reinforce technology-based information audits without the accompaniment of updated technical knowledge. Saputra et al. (2022) study emphasizes the importance of 'tone at the top' and a strong ethical culture in preventing fraud. However, this research does not directly demonstrate that an ethical culture will automatically enhance the effectiveness of technology-based information audits. The evolving ethical culture in the examined organizations has not reached a stage where it significantly influences the implementation of information technology in auditing.

This study demonstrates that simply having a strong ethical culture within an organization is insufficient in deterring fraud. Although ethical values are crucial, organizations must also leverage information technology as a means to detect and prevent fraudulent activities. In this scenario, technology-driven information auditing assumes great significance. Technology-driven information auditing entails the utilization of information technology to scrutinize and oversee an organization's information systems. By harnessing information technology, auditors can gather and analyze data with efficiency and precision. They can trace digital trails and identify dubious patterns that could potentially signify fraudulent behavior.

The integration of information technology in auditing provides organizations with immediate access to pertinent data and information, enabling auditors to effectively monitor potential fraud in real-time. By promptly detecting and resolving issues, auditors can prevent them from escalating. It is essential for organizations to prioritize the proper development and implementation of information technology, ensuring that the systems and software utilized in technology-based audits align with the organization's objectives. Additionally, organizations should engage auditors who are skilled and trained in utilizing information technology for audits.

4.2.5. Ethical Culture, Risk Management, and Fraud Prevention

The outcomes of statistical tests show that ethical culture does not contribute much to increasing the influence of risk management in the context of fraud prevention. This shows that ethical culture is not a static concept, but develops over time and is influenced by various internal and external factors. Tripermata et al. (2021) show the importance of developing an internal ethical culture within an organization to influence fraud prevention. The observed mismatch may reflect a transitional phase in the organizational ethical culture that has not fully integrated with risk management practices. Saputra et al. (2022) and Ferina et al. (2021) emphasize the importance of 'tone at the top' in shaping the organizational ethical culture. If this 'tone' is inconsistent or does not support strong risk management, the effects of an ethical culture may not materialize in fraud prevention.

While ethical culture is a crucial value in organizations, research indicates that risk management plays a more significant role in fraud prevention. Enhancing risk management practices can enhance transparency and accountability within organizations. Establishing a clear process for managing fraud risk ensures that preventative measures are traceable. By prioritizing risk management, organizations can fortify internal control systems to mitigate fraud risks. Through stringent controls and effective oversight, organizations can reduce the likelihood of fraud and build trust with stakeholders. Thus, while ethical culture is essential, the focus on risk management is vital for fraud prevention. It is imperative for organizations to continually enhance their risk management practices to safeguard their operations, assets, and reputation from fraud risks.

4.2.6. Ethical Culture, Internal Control System, and Fraud Prevention

The results of outcome of statistical tests suggest that ethical culture does not significantly contribute to enhancing the effectiveness of the internal control system in the relation of fraud prevention. This underscores the notion that an effective internal control system plays a pivotal role in preventing fraud, as shown by Maria et al. (2023) and Suyanto et al. (2022). However, these studies do not explicitly link the effectiveness of these controls to the presence or strength of an ethical culture. Therefore, the mismatch may arise from the assumption that the presence of an ethical culture will automatically enhance internal control. Dharmawati et al. (2022) and N'Guilla Sow et al. (2018) demonstrate a noteworthy and constructive impact of internal control on fraud prevention. However, the complexity in implementing an effective internal control system can hinder the ability of an ethical culture to effectively moderate its influence on fraud prevention.

This study highlights the importance of ethical culture in fostering an honest and responsible work environment. However, it also emphasizes that factors like the clarity of internal control

procedures and strict monitoring play a more significant role in preventing fraud. Therefore, organizations should prioritize the development of clear internal control procedures and rigorous monitoring to effectively deter fraud. Clear internal control procedures ensure that every step in the organization's business processes is well-defined and understood by all team members, enabling them to identify and prevent potential fraud. Additionally, close monitoring is crucial in fraud prevention as it allows management to quickly detect any suspicious activities or transactions and take appropriate actions. This research underscores the importance of focusing on enhancing internal control procedures and monitoring practices to effectively combat fraud and uphold organizational integrity.

5. Conclusions and Further Works

This study examined the impact of information technology-based auditing, risk management, and internal control systems on fraud prevention in Indonesian state-owned enterprises, while also considering the potential moderating role of ethical culture. The findings suggest that these factors positively influence fraud prevention efforts, highlighting the importance of technological tools, proactive risk management, and robust internal controls in combating fraudulent activities. However, the study did not find support for the moderating role of ethical culture in strengthening these relationships, indicating that the mere presence of an ethical culture may not be sufficient to enhance the effectiveness of these fraud prevention mechanisms. Organizations should focus on developing comprehensive fraud prevention strategies that integrate technological solutions, risk management practices, and internal control systems, while also fostering a strong ethical culture through education, training, and consistent reinforcement of ethical values. Future research should explore additional contextual factors, such as organizational structure, leadership, and employee characteristics, to gain a more nuanced understanding of the complex interplay between various elements in fraud prevention.

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