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ERP implementation and earnings management: The moderating effect of an independent board of commissioners

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A B S T R A K

Penelitian ini menguji efek moderasi variabel Komisaris Independen pada hubungan antara implementasi ERP terhadap manajemen laba pada perusahaan non-keuangan yang terdaftar di Bursa Efek Indonesia. Variabel manajemen laba diproksikan dengan discretionary accrual yang dihitung dengan modified Jones model. Penelitian ini menggunakan data panel dari 85 perusahaan dari tahun 2017 – 2020 yang menghasilkan data sampel sebanyak 340 observasi. Menggunakan Moderated regression analysis, kami membuktikan bahwa implementasi ERP berpengaruh secara signifikan untuk menurunkan manajemen laba. Di waktu yang sama, penelitian ini juga membuktikan bahwa Komisaris Independen mampu memperkuat hubungan tersebut. Penelitian ini berkontribusi memperluas literatur terkait peran implementasi ERP terhadap manajemen laba, dan bagaimana peran Komisaris Independen dalam mempengaruhi hubungan tersebut.

A B S T R A C T

This research examines the moderating effect of the Independent Board of Commissioners on the relationship between implementing an enterprise resource planning system (ERP) and earnings management in non-financial companies in the Indonesia Stock Exchange. The earnings management variable is proxied through discretionary accruals, which refer to the calculation of the modified Jones model. This research used panel data from 85 companies from 2017 – 2020 to obtain a sample of 340. Employed the moderated regression analysis, the research finds that ERP implementation significantly influences the decline in earnings management. At the same time, the Independent Board of Commissioners can strengthen the relationship between the implementation of ERP systems and earnings management. This study contributes to expanding literature related to company information systems by providing evidence of the influence of

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ERP implementation on earnings management and how the Independent Board of Commissioner contributes to the relationship.

INTRODUCTION

The COVID-19 pandemic affects the company's performance due to uncertainty, decreased demand, supply, and activity restrictions (Ozili & Arun, 2022). Based on the Global Crisis Survey 2021, 73% of respondents stated that the crisis caused by this pandemic hurt ongoing business (PwC, 2021). In those conditions, the need for company performance information is essential. One of the sources of data on the company's performance is financial reports.

Seeing the strategic role of financial statements in decision-making gives rise to opportunistic management behavior to influence it. Such opportunistic behavior is commonly known as earnings management. Earnings management is common for companies and tends to be challenging to avoid (Dwiati & Ambarwati, 2017). Earnings management does not have an adverse effect if done reasonably, but if done excessively, it is feared that it may reduce the quality of information from financial statements (Romadani & Aryani, 2021). Earnings management cases have occurred around the world. The recent earnings management scandal in the world involves The Kraft Heinz Company, which was charged by the SEC in September 2021 with engaging in an expense management scheme. This resulted in the restatement of several years' worth of financial reporting. The Kraft Heinz Company neither admitted to nor denied the SEC's findings and agreed to pay a penalty of US$ 62 million (SEC, 2021). In Indonesia, several companies have also been entangled in cases related to earnings management. The earnings management scandal that gained public attention was PT. Garuda Indonesia in 2019 and PT. Asuransi Jiwasraya in 2020.

PT Garuda Indonesia has been involved in several cases related to profit management and controversial financial statements. In 2019, turmoil associated with Garuda Indonesia's financial statements emerged to the public (Banjarnahor & CNBC Indonesia, 2019). The case involves alleged manipulation of financial statements that caused losses to the company and created uncertainty among investors. In addition, Garuda Indonesia's fraud case analysis also highlighted the issue of unethical profit management in the company's practices. Non-transparent profit management practices can harm the company and cause distrust from various parties toward the integrity of the company. In a study discussing earnings quality, Garuda Indonesia's case was highlighted as an example of practices that affect the quality of the company's profits. This shows the importance of transparency and integrity in financial reporting to maintain the company's credibility in the eyes of the public and investors.

As reported by Putri & CNBC Indonesia (2020), the results of the Audit Board of the Republic of Indonesia investigation found the practice of profit manipulation since 2006. Based on this investigation, it was found that although PT. Asuransi

Jiwasraya has posted a profit since 2006, but the profit is a pseudo-profit due to accounting engineering. Profit manipulation in the company is carried out by engineering reserves and window-dressing the sale of Jiwasraya Saving Plan products. For this action, there are indications of losses related to mutual fund shares in Jiwasraya of up to IDR 6.4 trillion.

According to Hartoko & Astuti (2021), earnings management actions that impact the quality of information are evidence of the company's weak implementation of corporate governance. This indicates that corporate governance is essential in maintaining investor confidence and ensuring equal treatment for all interested parties. The first research relevant to the issue of earnings management was conducted by Healy (1985), which focused on examining how bonus schemes affect companies' decisions to carry out earnings management. Since then, researchers have been more deeply interested in investigating factors in earnings management. Based on the results of previous research, many indicators affect earnings management, including leverage (Agustia & Suryani, 2018; Bassiouny *et al*., 2016; Nalarreason *et al*., 2019; Romadani & Aryani, 2021); profitability (Agustia & Suryani, 2018; Capalbo *et al*., 2014), company size (Ali *et al*., 2015; Lubis & Suryani, 2018; Nalarreason *et al*., 2019) and corporate governance (Afzal & Habib, 2018; Fanani, 2014; Fitri & Siswantoro, 2022; Mahrani & Soewarno, 2018; Rajeevan & Ajward, 2019). Although earnings management is not new, it is still relevant to the research (Lisboa, 2016).

The need for quality information encourages companies to implement information systems and information technology (Widyaningdyah, 2019). Investment in information systems and technology is an effort to increase the company's competitive advantage (Tambovcevs & Tambovceva, 2022). One of the information systems implemented today is enterprise resource planning (ERP). Enterprise system is a term that describes a system that integrates data from different parts into one system and one database (Acar *et al*., 2017). The ERP system integration includes sales, marketing, manufacturing, logistics, accounting, and staffing (Wicaksono *et al*., 2015).

Research has been conducted in some countries to test the effect of ERP systems on earnings management practices. Research done by Dehning *et al*. (2017); Morris & Laksmana (2010); Patnaik *et al*. (2019); Tsai *et al*. (2012) revealed that after the implementation of ERP, there was an improvement in information quality due to declining earnings management. That finding was supported by Lata & Lata (2021); Nur & Irfan (2020), who explained that implementing the enterprise resource planning system affects the quality of information. However, Brazel & Dang (2008); Danduru *et al*. (2020); Krismiaji & Aryani (2014); Weshah *et al*. (2021) found that earnings management increases with the existence of an ERP system. Inconsistencies in the results of previous studies are possible due to the absence of moderation effects from other variables.

Moderation relationships are considered better at examining the relationship between two variables in complex business than direct relationships (Muhammad & Aryani, 2021; Namazi & Namazi, 2016). Therefore, this study adds a moderation variable, the Independent Board of Commissioners. The Independent Board of Commissioners was chosen as a moderation variable because it is one of the corporate governance mechanisms. Given good corporate governance, it can ensure that every decision taken by managers represents the interests of all parties (Mahrani & Soewarno, 2018). Independent board commissioners are non-executive directors who are not employed by the company and have no financial interest. They are appointed to serve on the board of directors to provide independent advice and oversight to the board of directors. Therefore, independent board commissioners can be crucial in moderating the relationship between ERP implementation and earnings management by providing independent oversight, risk management, strategic guidance, compliance with regulations, and representation of stakeholders' interests.

This study has two objectives: 1) Test the effect of the implementation of the enterprise resource planning system on earnings management, and 2) Explain the moderation effect of the Independent Board of Commissioners on the relationship between the implementation of the enterprise resource planning system and earnings management. Thus, the findings of this study contribute to the development of the literature by providing evidence on how the Independent Board of Commissioners is moderating the relationship between the enterprise resource planning system and earnings management. Our findings also have practical implications. Our study shows that using ERP systems leads to more truthful financial reporting (less earnings manipulation). This can help company managers decide if implementing such systems is good. Additionally, ERP systems make financial information more reliable, which is helpful for investors when making choices about where to put their money. Finally, this research confirms the theory that ERPs can reduce earnings manipulation and shows that strong independent boards can make this effect even more robust.

The remainder of this essay is structured as follows: The literature review and hypothesis development are explained in the second section. The third section covers the research methods. Results and discussion in section four. Section five highlights the conclusion remarks.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Agency Theory

Jensen & Meckling (1976) first put forward the concept of agency theory in 1976. They claim that the company's issues stem from agency relations, or the contractual arrangements between principals and agents, wherein the principal assigns the management of the resources to the agent as the capital owner. However, separating ownership and control of corporate resources often poses problems (Fitri &

Siswantoro, 2022; Kumala & Siregar, 2021). Agency theory suggests that information asymmetry encourages agents to behave opportunistically by making decisions in their favor without regard to the principal's interests (Abou-El-Sood & El-Sayed, 2022; Bouaziz *et al*., 2020; Fitri & Siswantoro, 2022). Agency theory intends to address and reduce problems arising in organizations due to the separation of owners and managers. Panda & Leepsa (2017) state that the development of agency problems is not limited to the relationship between principals and agents but is developing in a broader direction.

One of the agency problems is the conflict of interest between principals and agents in decision-making due to inequality of purpose. This is driven by the existence of more information controlled by agents than principals, commonly known as information asymmetry (Bouaziz *et al*., 2020; Fitri & Siswantoro, 2022; Zimon *et al*., 2021). One form of agency problem is earnings management, which occurs because principals and agents pursue their respective interests. Agency theory proposes a conflict of interest between shareholders (principals) and CEOs (agents). Shareholders want CEOs to maximize profits and shareholder value, while CEOs might prioritize their interests, such as job security or higher compensation. This can lead to CEOs engaging in earnings management, which is manipulating financial statements to make the company appear more profitable than it is (Bouaziz *et al*., 2020). To decrease the possibility of earnings management, firms can implement ERP systems. Al-Jabri & Roztocki (2015) found a positive correlation between information transparency and ERP adoption. This means that companies that prioritize transparency are more likely to adopt ERP systems. Research done by Dehning *et al*. (2017); Morris & Laksmana (2010); Patnaik *et al*. (2019); Tsai *et al*. (2012) revealed that after the implementation of ERP, there was an improvement in information quality due to declining earnings management. A more recent study regarding the effect of implementing ERP systems and earnings management was conducted by Toumeh (2022). The study suggests that ERP implementation is associated with decreased accrual-based earnings management in Jordanian firms. This implies that companies using ERPs tend to manipulate financial statements less through accounting choices (Toumeh, 2022). However, implementing ERP systems is not without any risk. Previous studies argue that the complexity of ERP systems can create new opportunities for hiding manipulation within the vast amount of data (Brazel & Dang, 2008).

Furthermore, ERP systems might not eliminate all managerial discretion in accounting decisions, allowing for potential manipulation. Pressure to meet short-term financial targets might still incentivize some managers to manipulate earnings even with an ERP system (Brazel & Dang, 2008; Danduru *et al*., 2020; Krismiaji & Aryani, 2014; Weshah *et al*., 2021). Therefore, the impact of ERP systems on earnings management seems complex and dependent on various factors. In this complex relationship, an independent board of commissioners can play a crucial role in mitigating the negative impact of ERP systems on earnings management.

Enterprise Resource Planning (ERP)

Enterprise resource planning (ERP) is defined by Bingi *et al*. (1999) as an information system that integrates all business processes. With the implementation of this ERP, the entire company is under a system ranging from human resources, manufacturing processes, distribution, supply chain management, sales, and accounting are closely interrelated. It is a collection of well-integrated software applications (Al-Harthi & Saudagar, 2020). Enterprise resource planning (ERP) is an information system that can manage resources, information, and business functions from a database (Lata & Lata, 2021). The concept underlying ERP systems is the automation and end-to-end integration of business processes in an organization (Kristianti & Achjari, 2017; Nur & Irfan, 2020). The purpose of implementing an enterprise resource planning system is to integrate, synchronize, and centralize organizational data, which is generally considered a vital tool for companies to succeed in the rapidly changing global market (Al-Harthi & Saudagar, 2020; Kilic *et al*., 2014).

Earnings Management

Researchers have no consensus on the definition of earnings management (Ali & Kamardin, 2018). Some perceptions of the definition of earnings management are put forward by experts, including (Healy & Wahlen, 1999), who define earnings management as an activity in which managers use judgment in financial reporting and structuring transactions to change financial statements. Earnings management is an action managers take to maximize, minimize, or smooth the company's profits (Aminah & Gunakan, 2015). In addition, the definition of earnings management is put forward by Fitri & Siswantoro (2022), which is management's action in influencing the figures in financial statements by modifying financial statements without violating financial accounting standards. Previous research results stated that earnings management could arise due to the flexibility of managers in choosing accounting methods (Sari & Khafid, 2020; Wibiksono & Rudiawarni, 2015; Yendrawati & Nugroho, 2012). When managers manipulate financial statements, there is the possibility that the reports become misleading and do not show the company's financial health (Lubis & Suryani, 2018). This undermines the usefulness of the information, making it difficult for investors, creditors, and others to make informed decisions.

Enterprise Resource Planning Systems and Earnings Management

Information on the company's performance must reflect the actual state of the company (Mustikawati & Cahyonowati, 2015; Yanti & Setiawan, 2019). The quality of financial statements that do not reflect the exact circumstances will mislead the decision-making done by the company’s stakeholders. According to Lubis & Suryani (2018), financial statements do not reflect the actual firm’s financial condition due to intervention actions carried out by managers.

The intervention by the manager is an act of earning management. According to agency theory, agency problems can give rise to information asymmetry that can

encourage management to carry out earning management (Bouaziz *et al*., 2020); Fitri & Siswantoro, 2021; Abou-El-Sood & El-Sayed, 2022). Efforts are needed to overcome the existence of information asymmetry. According to Nur & Irfan (2020), implementing a high-quality enterprise resource planning (ERP) system will reduce information asymmetry. Implementing an ERP system will increase the possibility of obtaining high-quality information. The availability of quality information can improve the manager's ability to analyze data so that problems can be detected immediately and improvements can be made directly. Accurate day-to-day operational decisions certainly bring improvements to the company's performance. This indicates that implementing an enterprise resource planning system can improve performance. Thus, managers' motivation to manage earnings decreases.

The features of ERP systems can automate business functions, improve customer service, improve the company's image, and bridge the information gap (Chopra *et al*., 2022; Ou *et al*., 2017; Widyaningdyah, 2019). ERP systems provide information that is interrelated with departmental functions throughout the organization. ERP systems can give transparency through its features, limiting opportunities to intervene so that the financial reports produced are high quality (Morris & Laksmana, 2010). This is supported by research by Lata & Lata (2021), which state that the correct information and decisions can be obtained with ERP implementation. Based on the previous studies, the hypothesis can be drawn as follows:

H1: The implementation of an enterprise resource planning system decreases earnings management.

The Moderation Effect of the Existence of an Independent Board of Commissioners

Previous research on the effect of implementing an enterprise resource planning system on earnings management showed inconsistent results. Studies by Dehning *et al*. (2017); Morris & Laksmana (2010); Patnaik *et al*. (2019); Tsai *et al*. 2012) revealed that with the existence of an enterprise resource planning system, there was an improvement in the quality of information due to declining earnings management. The results of the study are different from the research of Brazel & Dang (2008); Krismiaji & Aryani (2014); Weshah *et al*. (2021), which revealed that after the implementation of the enterprise resource planning system, the company's earnings management tends to increase. The inconsistent study results can be overcome by moderation variables (Muhammad & Aryani, 2021; Namazi & Namazi, 2016). In this study, the Independent Board of Commissioners became a moderation variable.

Research on the specific role of an independent board of commissioners in moderating the relationship between ERP implementation and earnings management is not as prevalent as the broader concept of corporate governance. However, we can

explore how independent commissioners might contribute based on their function and existing research on corporate governance. Independent board commissioners are non-executive directors who are not employed by the company and have no financial interest. Since they are independent of the company's management and finances, independent board commissioners critically check potential manipulation during ERP implementation. Their role goes beyond just advice; they actively oversee the process, manage risks, provide strategic direction, ensure compliance, and represent the best interests of all stakeholders (Alzoubi, 2019; Karianga & Kasingku, 2022).

Furthermore, independent commissioners, ideally with financial expertise, can oversee and scrutinize financial reporting practices. This can deter management from attempting to manipulate earnings, even with the complexities of an ERP system. A board with a strong presence of independent commissioners can foster more balanced and objective decision-making regarding financial reporting practices. This can reduce the influence of management seeking to manipulate earnings (Alzoubi, 2019; Karianga & Kasingku, 2022). Therefore, based on the discussion above, the hypothesis of this study is as follows:

H2: The Independent Board of Commissioners strengthens the negative influence of implementing the enterprise resource planning system on earning management.

RESEARCH METHODS

Population and Sample

Non-financial companies listed on the Indonesia Stock Exchange (IDX) from 2017 – 2020 are the population in this study. The population selection was motivated by the ease of access to the annual report data needed in this study. Financial companies are excluded because they have characteristics different from those of other industries (Kristianti & Achjari, 2017; Rahmawati, 2013). The samples in this study were taken using the purposive sampling method with the criteria: 1) The Company published an annual report for 2017 – 2020; 2) The company disclosed the use of an enterprise resource planning system; 3) The annual report published contains the information needed in the study; and 4) Presentation of financial statements in the rupiah currency.

Table 1
Sample Selection Criteria

Criterion	Total
Non-financial companies listed on the IDX 2017 – 2020	660
Incomplete annual report 2017 – 2020	(85)
Not disclosing ERP implementation during the observation period	(466)
Financial statements are not presented in rupiah	(24)
Observed companies	85
Number of samples from 2017 – 2020 (85 companies × 4 years)	340
Data outlier	(9)
Total Sample	331

Variables and Measurements

This study examines the implementation of the ERP system as an independent variable that can affect earnings management as a dependent variable. It considers the existence of an Independent Board of Commissioners and the relationship between independent and dependent variables. An enterprise resource planning system is software that integrates various company activities to increase the flow of information (Gërvalla & Ternai, 2019; Hajj & Serhan, 2019). ERP system implementation is measured using dummy variables (Krismiaji & Aryani, 2014; Weshah *et al*., 2021). The score 1 is assigned to companies with ERP systems, while the score 0 is assigned to companies that do not implement an ERP system.

This study used a moderation variable, the Independent Board of Commissioners. Fanani (2014) describes the Board of Independent Commissioners as a Board of Commissioners with no relationship with management, other members of the Board of Commissioners, and controlling shareholders. Aligning with previous research (Dwiati & Ambarwati, 2017; Fanani, 2014; Indrasari *et al*., 2017; Mahrani & Soewarno, 2018), we used the percentage between the number of Independent Boards of Commissioners and the total number of Boards of Commissioners as the proxy of Independent Board of Commissioners.

We also included the cash flow from operations ratio (OCF) and sales growth (SalesGrowth) as control variables. OCF and SalesGrowth are two variables that possibly also affect earnings management. Christiani & Nugrahanti (2014) found that OCF negatively impacts earnings management. On the other hand, Christiani & Nugrahanti (2014) and Astari & Suryanawa (2017) found that SalesGrowth positively impacts earnings management. We calculate the company's OCF variable by dividing the cash flow value of the company's operations by the total assets (Christiani & Nugrahanti, 2014). Meanwhile, the SalesGrowth variable is calculated by comparing the current period's total sales minus the previous period's total sales divided by the previous period's total sales (Astari & Suryanawa, 2017).

According to Fitri & Siswantoro (2022), earnings management is the manager's action in influencing financial statement figures by modifying them without violating financial accounting standards. Earnings management is proxied with discretionary accrual (DA) using the modified Jones Model. Some studies using this model include (Bouaziz *et al*., 2020; Romadani & Aryani, 2021; Siregar & Veronika, 2017; Weshah *et al*., 2021). Discretionary accrual is calculated through the following stages.

a. Calculate the total accruals value by the equation:

$$TA_{it} = NI_{it} - CFO_{it} \quad \text{..... 1}$$

b. Calculates the estimated accruals value by the OLS (Ordinary Least Square) regression equation:

$$\frac{TA_{it}}{A_{it-1}} = \beta_1 \left(\frac{1}{A_{it-1}}\right) + \beta_2 \left(\frac{\Delta REV_{it}}{A_{it-1}}\right) + \beta_3 \left(\frac{PPE_{it}}{A_{it-1}}\right) + \varepsilon_{it} \quad \text{..... 2}$$

c. Calculates a non-discretionary accrual model (NDA) with the equation:

$$NDA_{it} = \beta_1 \left(\frac{1}{A_{it-1}}\right) + \beta_2 \left(\frac{\Delta REV_{it}}{A_{it-1}} - \frac{\Delta REC_{it}}{A_{it-1}}\right) + \beta_3 \left(\frac{PPE_{it}}{A_{it-1}}\right) \quad \text{..... 3}$$

d. Calculating discretionary accruals:

$$DA_{it} = \frac{TA_{it}}{A_{it-1}} - NDA_{it} \quad \text{..... 4}$$

Note: TA_{it} = Total accrual for the company i in year t; NI_{it} = Net Income for the company i in year t; CFO_{it} = Cash flow from operation for the company i in year t; A_{it-1} = Total Assets for the company i in year t; ΔREF_{it} = Revenue for the company i in year t minus in year t-1; PPE_{it} = Property, plant, and equipment for the company i in year t; ΔREC_{it} = Account Receivable for the company i in year t minus year t-1; ε_{it} = error term for the company i in year t; NDA_{it} = Non-Discretionary Accruals company i in year t.

Regression Model

Hypothesis testing in this study was carried out with moderated regression analysis (MRA). The equations of this research model can be expressed as follows:

$$EM_{it} = \alpha + \beta_1 ERP_{it} + \beta_2 BOC_{it} + \beta_3 ERP_{it} * BOC_{it} + \beta_4 OCF_{it} + \beta_5 SalesGrowth_{it} + \varepsilon_{it} \quad \text{..... 5}$$

Note: EM_{it} = Earnings management for the company i in year t; ERP_{it} = Implementation of ERP systems for the company i in year t; BOC_{it} = Independent of board commissioner for the company i year t; OCF_{it} = Operational cash flow ratio for the company i year t; $SalesGrowth_{it}$ = Sales growth for the company i year t; α = Constant; β_{1-5} = regression coefficient; ε = error term.

ANALYSIS AND DISCUSSION

Based on the purposive sampling technique, 331 samples met the sample criteria. Due to data availability issues, we apply unbalanced data panels that refer to conditions where the observed units have an unequal number of time series observations (Jacob *et al*., 2014). The descriptive statistics are presented in Tables 2 and 3 below.

Table 2
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
EM	331	0.034	0.099	-0.373	0.680
BOC	331	0.372	0.120	0.000	0.750
ERP*BOC	331	0.299	0.185	0.000	0.750
OCF	331	0.062	0.103	-0.275	0.577
SalesGrowth	331	0.045	0.438	-0.864	4.033

Table 3
Frequency Distribution of ERP variable

	Total Observations	Proportion (%)
Non-ERP observations	65	19.6%
ERP observations	266	80.4%
Total	331	100.0%

Discretionary accruals are proxies of earnings management. Based on Table 2, the mean of variable earnings management (EM) is 0.034, with 0.099 as the standard deviation value. Firms, on average, appear to be managing earnings upward by 0.034. The highest earnings management was 0.680, found in the Lippo Cikarang Tbk company in 2017, while the lowest was found in the Intraco Penta Tbk company in 2017, which was -0.373. Such results suggest that earnings management can be carried out by increasing or decreasing the company's earnings. Table 3 shows that based on the research sample, 65 observational data (19.6%) of companies that did not implement ERP systems and 266 observational data (80.4%) of companies adopting ERP systems. It shows that companies adopting ERP systems are much more than companies that do not implement ERP systems.

For the BOC variable, the average is 0.372, and 0.120 is the standard deviation value. This indicates that average non-financial companies have met the minimum requirement of 30% of an independent board of commissioners. The average ERP*BOC moderation variable is 0.299, and the standard deviation is 0.185. In addition, it is also known that the maximum of the BOC variable is 0.75, and the minimum is 0, indicating that there is a company in the sample that does not have an independent board of commissioners.

The OCF and SalesGrowth variables are the control variables used in this study. The OCF variable or operating cash flow ratio describes a company's ability to obtain funds. The OCF variable averages 0.062 with a standard deviation of 0.103. The highest cash flow of operating activities of 0.577 was owned by PT Acset Indonusa Tbk in 2020, while Lippo Cikarang Tbk held the lowest value of -0.275 in 2017. The SalesGrowth variable in Table 2 shows the average values of 0.045 and 0.438 as the standard deviation values. The minimum value at Lippo Karawaci Tbk in 2019 was -0.864, and the maximum value at PT Centratama Telekomunikasi Indonesia Tbk. in 2017 was 4.033.

According to Sholihin & Anggraini (2021), there are three models on the data panel, which are the Fixed Effect Model (FEM), Random Effect Model (REM), and

Common Effect Model (CEM). It is necessary to examine several model tests between the three models by conducting the Hausman Test, Chow Test, and Lagrange Multiplier Test to determine the best model that suits the research model. From the series of tests, it was found that the best regression model for this study was the Random Effect Model (REM). According to Gujarati & Porter (2009), the classical assumption test is unnecessary if the Random Effect Model (REM) is the best. Table 4 presents the results of determining the method of estimating panel data regression. Furthermore, Table 5 shows the regression analysis results with a Random Effect Model (REM).

Table 4
Determination of panel data regression estimation methods

No	Test	Common Effect Model	Fixed Effect Model	Random Effect Model
1.	Chow Test		✓	
2.	Hausman Test			✓
3.	Lagrange Multiplier Test			✓
Selected models				✓

Table 5
Panel Data Regression Results

EM	Coef.	Std.Err.	t-value	p-value	[95% Conf	Interval]	Conclusion
ERP	-0.084	0.042	-1.990	0.047**	-0.167	-0.001	H1 Accepted
BOC	-0.212	0.106	-2.000	0.046**	-0.420	-0.004	
ERP*BOC	0.237	0.109	2.180	0.029**	0.024	0.450	H2 Accepted
OCF	-0.492	0.050	-9.940	0.000***	-0.589	-0.395	
SalesGrowth	0.001	0.010	0.120	0.901	-0.019	0.021	
Constant	0.140	0.041	3.410	0.001***	0.059	0.220	
Mean dependent var		0.034	SD dependent var			0.099	
Overall r-squared		0.225	Number of obs			331	
Chi-square		106.813	Prob > chi^2			0.000	
R-squared within		0.282	R-squared between			0.178	

Note: significant at ****p<.01, ** p<.05*

Table 5 shows that the results of the F-test are significant as the Prob > chi^2 value of 0.000 (<0.05). The results indicate that the independent and control variables affect the dependent variables. The results of the R^2 test in Table 5 show that the overall R-squared value is 0.225 or 22.5%, which means that the ERP system as an independent variable and the Independent Board of Commissioners as a moderation variable can only influence changes in earnings management by 22.5% and 77.5% explained by other variables.

The results in Table 5 show that ERP negatively affects earnings management. This can be seen from the value of the coefficient, which has a negative value (-0.084) and a p-value below 0.05 (0.047). Thus, hypothesis 1 (H_1) states that implementing an ERP system negatively affects earnings management is accepted. The results of this study are consistent with the research of Dehning *et al*. (2017); Morris & Laksmana (2010); Tsai *et al*. (2012), as well as Patnaik *et al*. (2019) that state companies that

implement ERP systems are less likely to engage in earnings management. According to Lata & Lata (2021); Nur & Irfan (2020), implementing an enterprise resource planning system affects the quality of information. The quality of information referred to in this study is the availability of complete, relevant, accurate, and real-time information. Suhaimi *et al*. (2016) also supported the results of this study, stating that the enterprise resource planning system could help management identify waste early so that it can be overcome immediately. In addition, the study provides evidence that with information systems, accountants use their time more to conduct financial analysis and decision-making than data entry.

Table 5 also shows that the Independent Board of Commissioners has positively and significantly modified the relationship between implementing enterprise resource planning systems and earnings management. This is indicated by a coefficient value 0.237 and a p-value below 0.05 (0.029). Therefore, hypothesis 2 (H_2) is supported or able to be proven by the data in this study. The results of the positive coefficient indicate that the Independent Board of Commissioners strengthens the implementation of the enterprise resource planning system in reducing earnings management so that quality information can be obtained. This is possible because the Independent Board of Commissioners seeks to maintain its reputation as an expert decision-maker. This result is consistent with Alzoubi's (2019) argument that internal control reduces earnings management. An Independent Board of Commissioners can oversee and scrutinize financial reporting practices in this case. This can deter management from attempting to manipulate earnings, even with the complexities of an ERP system.

CONCLUSIONS, LIMITATIONS, AND SUGGESTIONS

This study examines the effect of implementing an enterprise resource planning system on earnings management. In addition, we look more at how the Independent Board of Commissioners moderated the two variables. The test results were conducted to provide empirical evidence related to earnings management in Indonesian companies that implement an enterprise resource planning system. This research proves that the enterprise resource planning system negatively influences earnings management. This research also confirmed that the Independent Board of Commissioners as a moderation variable strengthens the relationship. The existence of moderation variables can degrade the management of carried-out earnings. This is possible because the Independent Board of Commissioners seeks to maintain its reputation as an expert decision-maker.

Our results carry several important implications: First, the result indicates that adopting ERP systems can effectively reduce the manipulation of earnings, enhancing earnings quality. This research contributes to assisting management decisions regarding the implementation of information systems in their companies. Second, the

increasing quality of earnings information due to ERP systems implementation enhances the usefulness of financial information for investors' considerations related to investment decisions. Third, this research also contributes theoretically by providing empirical evidence on the effect of implementing the enterprise resource planning system on earnings management and the role of moderation variables from the Independent Board of Commissioners.

Limitations and Suggestions for further research

Apart from the contributions, the results of this study should be carefully generalized as this study has some limitations. The limitations of this study include: 1) We only measure the application of the enterprise resource planning system from information in the annual report with dummy variables, and 2) This study used a sample from the period 2017-2020. Therefore, we have not examined the effect of the COVID-19 pandemic that started in 2020. Based on the limitations, our study provides an area for further study. First, further exploration is needed regarding the disclosure of the application of the enterprise resource planning system by analyzing the content of the annual report or other media. Second, it is recommended that other moderation variables be added in future studies. Finally, the effect of the COVID-19 pandemic on this relationship provides further valuable issues to be explored.

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