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# The Impacts of Board Characteristics and Size on Risk Disclosure: Evidence from Indonesian Mining Firms

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A R T I C L E I N F O

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A B S T R A C T

*This study examines how board characteristics (gender, education, and age) and board size can impact corporate risk disclosure (CRD) in quantity and coverage. This research differs from previous studies because we use the newest COSO framework (2017) to measure CRD. We analyzed the data using multiple regression analysis. The results show no relationship between the composition of female directors in both CRD coverage and quantity. Board size positively affects CRD coverage and quantity, while board age negatively affects those two types of CRD. However, board education does not influence CRD quantity and coverage. This study also indicates that board size and age substantially impact the level of risk disclosure. For investors, the board's age and size become an essential consideration in investment decisions related to risk information. While policymakers in Indonesia urgently need a further discussion of the implementation of guidelines to promote higher levels of risk disclosure among firms since the difference in the basis for disclosing risk will reduce the company's competitiveness in the same industry.*

A B S T R A K

*Studi ini menguji bagaimana karakteristik dewan (gender, pendidikan, dan usia) dan ukuran dewan dapat mempengaruhi pengungkapan risiko perusahaan. Penelitian ini berbeda dari penelitian sebelumnya karena kami menggunakan kerangka COSO terbaru (2017) untuk mengukur pengungkapan risiko perusahaan. Kami menganalisis data menggunakan regresi berganda. Hasil penelitian menunjukkan bahwa tidak ada hubungan antara komposisi direktur wanita baik pada cakupan dan kuantitas pengungkapan risiko perusahaan. Jumlah anggota dewan direksi berpengaruh positif terhadap pengungkapan dan kuantitas pengungkapan risiko perusahaan, sedangkan umur dewan direksi berpengaruh negatif terhadap kedua jenis pengungkapan risiko perusahaan. Namun, tingkat pendidikan dewan direksi tidak memiliki pengaruh terhadap kuantitas dan cakupan pengungkapan risiko perusahaan. Penelitian ini mengindikasikan bahwa umur dan ukuran dewan berperan penting dalam menentukan tingkat pengungkapan risiko. Untuk investor, ukuran dan umur dewan bisa menjadi pertimbangan penting dalam pengambilan keputusan investasi berdasarkan informasi risiko. Sementar pengambil kebijakan di Indonesia sangat perlu melakukan diskusi lebih lanjut terkait implementasi pedoman untuk meningkatkan level pengungkapan risiko karena perbedaan basis dalam mengungkapkan risiko akan menurunkan daya saing antar perusahaan dalam industri yang sama.*

## 1. INTRODUCTION

In recent years, corporate governance has been a popular research topic for economists as it has several implications for industry and firms' overall performance. Research on board characteristics, particularly gender diversity, has many variations and covers broad characteristics. Previous studies showed that firms with higher gender diversity among their top management teams display fewer risks and more incredible firm performance (Christiansen et al., 2016; Green & Homroy, 2018; Perryman et al., 2016). Another study suggested that female composition on the board significantly affected venturing and performance hazard risk, especially in family-owned enterprises (Poletti-Hughes & Briano-Turrent, 2019). Based on the previous studies, it is clear that board characteristics have a considerable impact on firm performance

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(Ararat et al., 2015; Bernile et al., 2018). One of the factors that enable board members to provide better management and decision-making is Enterprise Risk Management (ERM), as it encourages risk disclosure at the board level, improves transparency, and leads to better management of the business (Brown et al., 2009; Malik et al., 2020). As a result, it attracts us to look further into the relationship between board characteristics and corporate risk disclosure.

In Indonesia, several rules and regulations regarding risk disclosure are enforced by Otoritas Jasa Keuangan (OJK), Indonesia's Financial Services Authority, and DSAK IAI (The Indonesian Financial Accounting Standards Board). OJK has released several regulations, such as circular letter no. 16/SEOJK.04/2021 regarding the form and content of annual reports of issuers or public companies (2021), which includes a list of sections that a publicly listed firm should disclose in their annual report, Financial Services Authority Regulation No. 18/POJK.03/2016 regarding the implementation of risk management for commercial banks (2016), which includes requirements for the implementation of risk management for commercial banks and Financial Services Authority Regulation No. 6/POJK.04/2021 concerning the implementation of risk management for securities companies conducting business activities as underwriters and broker-dealers of securities that are members of the Indonesia Stock Exchange (2021), which includes the requirements for the implementation of risk management specifically for securities companies and underwriters. DSAK IAI (2021) also released PSAK 60, an accounting standard for disclosing financial instruments. It requires companies to disclose credit, liquidity, and market risks in their financial reports. However, there is currently no specific regulatory framework that must be implemented by non-financial firms related to risk management and risk disclosure. Therefore, the nature of risk disclosure in Indonesia is still voluntary and not yet mandatory. Due to its non-mandatory nature, there is also no regulation or law governing the framework that can be used as a guideline for enterprise risk disclosure in Indonesia.

COSO (the Committee of Sponsoring Organizations) 2017 provided an integrated framework for enterprise risk management with strategy and performance (COSO, 2017). It is an update to the previous framework, which was created in 2004. The COSO framework (2017) covers risk management from governance to monitoring, which had not been stated in 2004.

In addition to using the COSO Framework as the dependent variable measurement in this research, we aim to provide a closer look at risk disclosure in the specific industry of Indonesian publicly listed firms. We use the mining industry in our research for two main reasons. First, the Industry Risk Assessment ranks the mining industry as high-risk (Watters, et al., 2021). The mining industry's high-risk nature is one factor that emphasizes the need for and importance of risk disclosure. According to Cabedo & Tirado (2004), the disclosure would aid industry stakeholders (e.g., investors) in determining and assessing their exposure to business-related risks. Risk disclosure would be the tool for communicating the risks to these stakeholders so that they can make decisions. This reason is also aligned with the agency theory. The more risk a business has, the more disclosure needs to be disclosed in the annual report to reduce the information gap (information asymmetry) between the agents and principals. Therefore, the disclosure of risks in high-risk industries is essential.

Second, the mining industry is significant in Indonesia. According to PwC (2019), the PwC's Investment and Taxation Guide (2019) – 11th Edition, "Mining in Indonesia," Indonesia is one of the significant players in the mining industry in the world. The significance of the mining industry's contribution to Indonesia's economic growth can be seen through the total percentage of its contribution to Indonesia's Gross Domestic Product (GDP). Besides GDP, the mining industry also dramatically contributes to government revenues, total exports, employment, and developing remote areas in Indonesia. The significance of Indonesia's coal exports has put Indonesia in a strategic position in the market, where if Indonesia's coal exports are hampered, the world coal market will be disturbed (Setiaji, 2022).

Based on the explanation above, it can be concluded that this research aims to determine whether board characteristics such as gender, age, education, and board size affect corporate risk disclosure (CRD) in Indonesia's mining industry. This research would be slightly different from the others (Allini et al., 2016; Alshirah et al., 2020; Bufarwa et al., 2020; Khandelwal et al., 2020) because of the use of the newest 2017 COSO Framework to measure CRD and its samples are in Indonesia, specifically in the mining industry. Research on board characteristics and risk disclosure has also been conducted in Indonesia using independent variables, such as financial, operational, empowerment, technology and information process,

integrity, and strategic risk (Falendro et al., 2018). To our knowledge, there has not yet been a previous study that uses the COSO framework (2017) concerning disclosure of risk; instead, the previous study used the COSO framework 2004 (Fitania & Firmansyah, 2020; Wijayanti et al., 2022). COSO framework (2017) has five components: governance and culture; strategy & performance objective-setting; performance; review and revision; information, communication, & reporting. Otherwise, the COSO framework 2004 has eight components: internal environment; objective setting; event identification; risk assessment; risk response; control activities; information and communication; and monitoring (Desender & Lafuente, 2009). In short, the 2017 COSO framework has a comprehensive risk framework that focuses on aligning risk with strategy and performance; however, the 2004 COSO framework focused on the internal environment and control of risks.

The current study is interesting for several reasons. First, risk disclosure adheres to the 2017 COSO framework, which aligns risk with strategy and company performance. Consequently, the result of this study can be used to compare risk disclosure based on the mining industry's 2004 and 2017 COSO frameworks. Second, the empirical investigation of this study could provide information regarding the level of risk disclosure to investors, regulators, and other stakeholders. Third, the current study has focused on the mining industry as a research object. Because of the high-risk nature of the mining industry, risk disclosure is critical. Our study contributes to recent literature on risk disclosure by providing insight into the relationship between board characteristics, size, and level of disclosure.

## 2. THEORETICAL FRAMEWORK AND HYPOTHESES

### Agency Theory and Stakeholder Theory

The main theory that can be used to explain the dependent variable of this research is agency theory. Principals in a company choose several agents to act on their behalf, and the agents chosen are referred to as the company's management. Referring to Jensen & Meckling (1976) study, agency risk within organizations happens when these agents do not act in the principal's best interest.

According to Rankin et al. (2017), information asymmetry is a condition where managers in a company have an advantage over other parties (e.g., investors) by holding access to more information about the organization's current condition and prospects. They also have more control over when they choose to publish that information. Well-informed stakeholders would be more confident in their investment decisions and the company, thus emphasizing the importance of minimizing the information asymmetry and using agency theory in this research.

In addition to agency theory, stakeholder theory can also be used to emphasize the importance of risk disclosure for investors and other related stakeholders. Stakeholders are defined as any individual or group who can affect and be affected by a firm's achievement of its objective. Freeman (1984) defines stakeholder theory as a view of capitalism that emphasizes the interconnected relationships between the firm and its customers, suppliers, employees, investors, communities, and others who have a stake in the organization. Stakeholder theory highlights the complex and dynamic relationships between the firm and its surroundings to balance the demands of different stakeholders, not just investors. As information is essential for decision-making purposes, investors and other stakeholders would need to gather the information on risks required to make an informed decision regarding the firm (Amran et al., 2009). In this case, risk disclosure is a tool that can be used for stakeholders to gather information related to risks faced by the firm before making any decisions.

### Gender and Corporate Risk Disclosure

The gender variable refers to the organization's proportion of female board members. As gender has become one topic that caught many researchers' attention, it is interesting to explore it further. Under gender socialization theory (John & Edmeades, 2017), individuals behave in their society based on their gender. The previous studies have mentioned that there was a positive impact of the presence of female board members on risk disclosure, as proven by the higher level of risk disclosure in the companies (Allini et al., 2016; Bufarwa et al., 2020; Khandelwal et al., 2020). According to Khandelwal et al. (2020), this higher level of risk disclosure may be due to the improved effectiveness of the board performance and the enhanced accountability and transparency brought by the presence of women directors on the board. However, a study showed that women's presence might also negatively impact risk disclosure (Allini et al., 2014).

According to Borghans et al. (2009)), women are more risk-averse than men due to risk-related psychological measures. Other studies (Agnew et al., 2008; Hartog et al., 2002) have also mentioned the same result in their research and provided some

explanations regarding the risk aversion in men and women, which are biological reasons related to women's procreation position relative to men that require women to be more averse to risk compared to men. Women pick more risk-averse choices than man. In Indonesia context, the female directors are quiet low numbers, which is only 17 percent compared to male directors of 83 percent. The result shows that female directors does not have the opportunity and ability to disclose company risk information (Pijoh et al., 2022). Based on the aforementioned previous studies, we developed the hypothesis as follows:

**$H_1$**: A higher female proportion on board leads to higher risk disclosure.

**Board Educational Background and Corporate Risk Disclosure**

The board's educational background refers to the proportion of board members with finance and accounting as their educational background. Under upper echelons theory (Hambrick & Mason, 1984), board educational background affects organizational outcomes such as risk disclosure. The educational background of board members may lead to better monitoring and effectiveness (Alshirah et al., 2020). Better monitoring and effectiveness will improve risk disclosure. On the other hand, board expertise in finance and accounting may also lead to a lower level of corporate risk disclosure, as highly educated directors would choose only to disclose an essential risk or to withhold the information as they are aware of the consequences of risk disclosure (Allini et al., 2016; Martikainen et al., 2015).

In the context of Indonesia, the educational background of the board commissioner could not significantly affect risk disclosure due to other factors, such as comprehensive knowledge and experience, which is not only finance or business field (Suhardjanto et al., 2012). There is rarely research that supports the effect of a board educational background on risk disclosure, which is on social responsibility disclosure (Prabowo et al., 2017). Considering the results of most previous studies, we assume that educational background in finance and accounting would lead to a higher level of disclosure as educated board members possess a better understanding of the information about risk that should be disclosed to lessen further the gap caused by information asymmetry.

**$H_2$**: A board of members with education in finance and accounting has a higher risk of disclosure.

**Board Age and Corporate Risk Disclosure**

Age refers to the average age of board members, and the age of board members may represent their practical experience and expertise in the field. Under the upper echelon theory (Hambrick & Mason, 1984), board members' age also carries out risk disclosure to manage company strategy and performance. Older directors are more careful when analyzing information than younger directors (Taylor, 1975). Furthermore, the previous study proved that the higher age of board members leads to higher risk disclosure as older directors are more inclined to improve transparency and reduce information asymmetry (Allini et al., 2016).

On the other hand, a study suggested that older board members would negatively impact risk disclosure due to their reluctance to change in a changing environment (Latif et al., 2013). There is currently no research in Indonesia explaining the relationship between board age and corporate risk disclosure. According to the previous research and theory, we develop our hypothesis that older age leads to a higher risk of disclosure.

**$H_3$**: A board composed of older directors leads to higher risk disclosure

**Board Size and Corporate Risk Disclosure**

Board size refers to the number of board members present in the organization. Based on resource-based theory (Wernerfelt, 1984), the greater the number of boards, the more resources there are to operate the company. According to previous studies, the impact of board size on risk disclosure may be uncertain. A greater number of directors on the board may provide an advantage in terms of diversified knowledge, expertise, and abilities which can lead to higher risk disclosure (Khandelwal et al., 2020). However, many recent studies showed that board size has little to no impact on corporate risk disclosure (Allini et al., 2016; Bufarwa et al., 2020; Khandelwal et al., 2020). This result provides a contrary argument that board size might not reflect the directors' expertise and skills needed to perform their functions effectively (Alshirah et al., 2020). Another study showed that a higher number of board members might be counterproductive to increase risk disclosure as members of larger boards might rely on other members to perform monitoring functions (Alshirah et al., 2020).

In Indonesia, Kurniawanto & Agustiningsih (2017) found that board size does not affect corporate risk disclosure because the more extensive the board size, the higher the chances of internal

conflicts. However, Suhardjanto et al. (2012) found that the bigger the board size, the higher level of risk disclosure due to the board's effective monitoring; therefore board could reinforce management to disclose risk.

Though there were different results regarding the effect of board size on risk disclosure, we stand by the resources-based theory (Wernerfelt, 1984), stating that a bigger board size leads to lower risk disclosure, hence less information to disclose.

**$H_4$**: A bigger board size leads to a lower level of risk disclosure.

Figure 1 shows the research framework used to explore the relationship and effect between corporate governance variables. For the main independent variables, we identify four variables related to board characteristics, like gender (Perryman et al., 2016), education, board age, and board size (Allini et al., 2016), to measure their impact on the dependent variable - corporate risk disclosure. This study includes several control variables that can influence a corporate risks disclosure, such as firm size, liquidity, audit committee member (Khandelwal et al., 2020), ROA (Martikainen et al., 2015), growth (Kim & Yasuda, 2018) and Covid year (Elmarzouky et al., 2021)

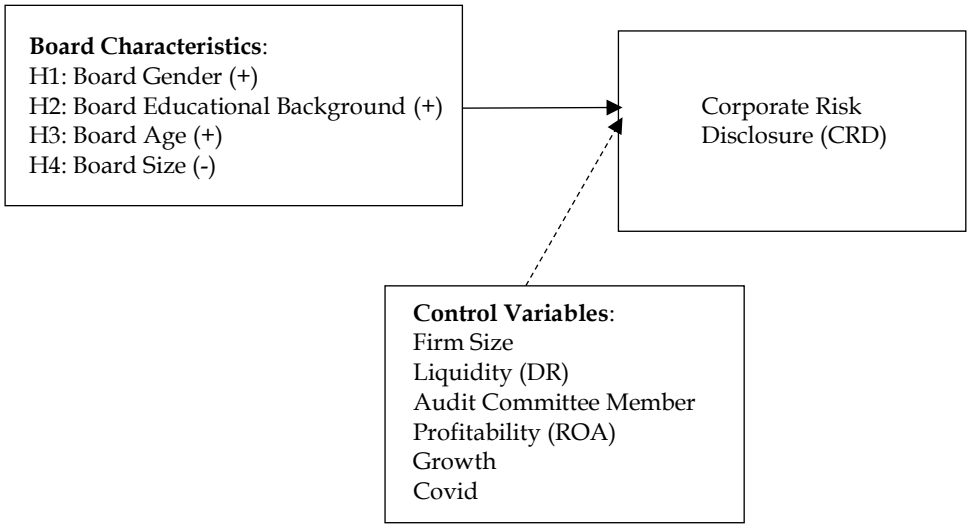


**Figure 1**. Research framework

## 3. RESEARCH METHOD

### Data and Sample

This study's data is obtained from each company's annual reports and Capital IQ. The samples are mining firms listed on the Indonesia Stock Exchange for four years, from 2017 to 2020. This research used a purposive sampling technique in order to select samples. The samples are selected based on the company classification and the completeness of data. The selection started with 47 mining companies listed on the Indonesia Stock Exchange. The companies listed before 2017, not suspended or delisted, and have complete annual reports during 2017-2020, the selected samples used are 40 companies, and the total sample is 160 observations.

### Research Variables and Measurement Scale

The dependent variable in this study is Corporate Risk Disclosure. Corporate risk disclosure refers to the completeness of risk disclosure in a firm's annual report. Corporate risk disclosure in this study will be measured using the number of "risk" associated words in a firm's annual report (quantity) and the weighted score of the firm's corporate risk disclosure index measured by referring to items in the COSO Framework (coverage). The two types of measures used are based on previous studies by Miihkinen (2012), Martikainen et al. (2015), and Hooghiemstra et al. (2015).

Content analysis is conducted to collect the CRD data. The quantity of risk disclosure is measured by computing the logarithm of the total number of risk disclosure words in the firm's annual report (Martikainen et al., 2015; Miihkinen, 2012). The words being counted would be those related directly to the 20 items of principles of ERM in COSO 2017 (see Appendix 1). It is believed that the higher the number of words related to risk disclosed, the higher the corporate risk disclosure is for the firm.

The coverage of risk disclosure captures how evenly corporate risk disclosures are scattered

across different risk topics (Martikainen et al., 2015). It is believed that the higher the number of risk topics disclosed, the higher the corporate risk disclosure is for the firm. While previous studies (Martikainen et al., 2015; Miihkinen, 2012) used the Herfindahl index to measure the concentration of corporate disclosures across risk topics, this time, we would like to use risk topics defined in COSO Framework. Therefore, the coverage of corporate risk disclosure in this research will be measured by each firm's Risk Disclosure Index. The measurement of this index will be referring to Madrigal et al. (2015) journal, where they used a checklist of 23 items based on the key elements of ERM components explained in COSO 2004. However, seeing as there is a newer update on COSO framework, we modified the checklist to use a total of 20 items consisting of the principles of ERM in COSO 2017 (see Apendix 1) with a scoring system based on whether or not company discloses information directly related to the principles [0 - not disclosed; 1 – disclosed] to measure the amount of information that firms disclose in their annual reports. The results of assessment on each principle are then summarized and divided by the number of principles being assessed to get the percentage of RDI.

$$crd\_coverage = \frac{(\sum_{k=1}^{20} rk)}{20} \qquad (1)$$

where *rk: risk item whose value is the sum of Corporate Risk Disclosure Index Score*

The independent variables are female composition in the board of directors, board education, board age, and board size. The control variables are firm size, liquidity, presence of audit committee, and Covid year. The detail of variables measurement is provided in Table 1.

**Table 1.** Variable Measurements

| Variables | Measurement | Reference |
|---|---|---|
| Corporate Risk Disclosure (CRD) | *crd_qty = ln (total number of risk disclosure words)*<br>$\text{crd\_coverage} = \frac{(\sum_{k=1}^{20} \text{rk})}{20}$ | Martikainen et al. (2015)<br>Hernández Madrigal et al. (2015) |
| Female Composition (gender) | gender = Number of female directors | Perryman et al. (2016) |
| Board Education (education) | education =% Board of directors member with Finance & Accounting | Allini et al. (2015) |
| Board Age (age) | age = Average (Age) | |
| Board Size (bsize) | bsize = Number of directors on board | |
| Firm Size (firmsize) | size = Ln(Total assets) | Khandelwal et al. (2020) |
| Liquidity (cr) | $\text{Current Ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$ | |
| Audit Committee (audcom) | audcom = Number of Audit Committee | |
| Growth | Sales growth from the previous year | Kim & Yasuda (2018) |
| Profitability | Return to total assets | Martikainen et al. (2015) |
| Covid | Covid year (dummy variable) 1 for Covid year (2020), 0 for other | Elmarzouky et al. (2021) |

**Research Model**

Martikainen et al. (2015) use multivariate regression analysis as their primary estimation method. This research will also use the same method but with different use of independent variables. The regression equations are as follows:

$$CRD\_QTY_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Education_{it} + \beta_3 Age_{it} + \beta_4 BSize_{it} + \beta_5 FirmSize_{it} + \beta_6 CR_{it} + \beta_7 Audcom_{it} + \beta_8 FirmGrowth_{it} + \beta_9 ROA_{it} + \beta_{10} Covid_{it} + \varepsilon_{it} \qquad (2)$$

$$CRD\_COVERAGE_{it} = \beta_0 + \beta_1 Gender_{it} + \beta_2 Education_{it} + \beta_3 Age_{it} + \beta_4 BSize_{it} + \beta_5 FirmSize_{it} + \beta_6 CR_{it} + \beta_7 Audcom_{it} + \beta_8 FirmGrowth_{it} + \beta_9 ROA_{it} + \beta_{10} Covid_{it} + \varepsilon_{it} \qquad (3)$$

where CRD_Qty = ln (total number of risk disclosure words); CRD_Coverage = weighted sum of Corporate Risk Disclosure Index Score;

## 4. DATA ANALYSIS AND DISCUSSION

### Descriptive Statistics

Table 2 shows the descriptive statistics for this study's dependent and independent variables. Table 2 shows the mean value of crd_coverage is 0.49875, meaning that the firms in the sample disclosed 49.87% of the risks on the CRD index checklist items, or around half of the 20 principles. The minimum value of CRD_Coverage is 0.2, and the maximum is 0.75. These numbers mean that out of 40 firms in the samples, all the firms would, at the very least, disclose 4 out of 20 checklist items and that no firms can disclose more than 15 out of 20 checklist items.

**Table 2**. Descriptive statistics

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| CRD_Qty | 4194.169 | 2557.936 | 296 | 12176 |
| CRD_Coverage | 0.499 | 0.133 | 0.2 | 0.75 |
| BSize | 4.55 | 1.811 | 2 | 11 |
| Age | 52.081 | 4.515 | 39.667 | 65 |
| Gender | 0.099 | 0.158 | 0 | 0.5 |
| Education | 0.3 | 0.264 | 0 | 1 |
| FirmSize | 9.795 | 3.972 | 4.654 | 17.287 |
| CR | 3.418 | 14.392 | 0.02 | 146.13 |
| AudCom | 3.175 | 0.456 | 2 | 5 |
| FirmGrowth | 4.533 | 48.683 | -1 | 613.14 |
| ROA | -0.524 | 44.87 | -352.145 | 281.579 |
| Covid | 0.25 | 0.434 | 0 | 1 |

*Notes: CRD_Qty = total number of risk disclosure words; CRD_Coverage = weighted sum of Corporate Risk Disclosure Index Score; Bsize = number of board members; Age = average number of all board members' age; Gender = percentage of female board members; Education = percentage of board members with accounting/finance education background; FirmSize = natural logarithm of the total assets; CR = current ratio; Audcom = number of audit committee members; FirmgGowth = logarithm of net sales; ROA = return on assets; Covid = dummy variable to measure the effects of the COVID-19 pandemic in 2020*

For the following dependent variable, CRD quantity has a mean value of 4,194. This number is significantly lower than previous research (Martikainen et al., 2015), with a mean value of 6,872. The difference might be attributable to the different basis of measurement used and the samples between the two studies.

The independent variable board size (BSize) shows a mean value of 4.55 which means, on average, each firm has 4 to 5 members on its board of directors. This number is relatively the same compared to the previous research with the sample of Indonesian mining firms (Setiawan et al., 2018). This number means that all firms included in the sample have fulfilled the requirement for a minimum of 2 persons on the board of directors as stated in OJK Regulation No. 33/POJK.04/2014 regarding the board of directors and commissioners of issuers or public companies (OJK, 2014).

The age of board members, as represented by age in the table, shows a mean value of 52. Most of the board members belong to the middle life stage based on Carl Jung's stages of life (Jung et al., 2014). There is a higher chance of adding new board members from a younger age group to face further digital transformation in the mining industry. The same reason can also be used to explain the minimum value of the age of 39 and the maximum value of 65, while in the previous research (Andriani & Winarno, 2021), the minimum value is 31, and the maximum value is 69. The gap between the minimum and maximum value in this research is smaller, which caused the standard deviation to be smaller than in the previous research.

The percentage of female board members (gender) shows a mean value of 0.99 (9.9 percent). This number is slightly lower than the average of women at the C-suite level in American mining firms, which is 13 percent (Ellix et al., 2021). This low number might have been caused by the low number of female board members, as each firm in the sample does not have more than one woman on the board of directors. The minimum value of gender is 0 (0 percent), while the maximum value is 0.5 (50 percent). The fact that there is a firm whose half of the board members are female might seem huge. However, due to the small number of board members, that is the case with PT SMR Utama Tbk (IDX: SMRU), which only has two board members. The main reason women leave the mining industry is that the work is no longer exciting and challenging, and there are fewer advancement opportunities than their male counterparts. The study regarding the lack of women in senior

management positions at mining firms showed that women felt subjected to higher standards for promotion in technical, operational, and executive roles (Ellix et al., 2021). In Indonesia, there is also an issue of loneliness and a lack of interest in women working in an industry dominated by men (Giopani, 2021).

The percentage of board members with accounting and finance backgrounds, as represented by education in the table, has a mean value of 0.3. Thirty percent of the sample board members graduated with a degree in accounting or finance. This number is significantly lower than the previous research (Andira & Ratnadi, 2022) on Indonesian manufacturing firms, with a mean value of 62 percent. According to Mcdivitt (2002), mining engineering is an essential field of study in universities, particularly in developing countries where mining is a significant contributor to the economy, as is the case in Indonesia. Mining firms prioritize graduates from mining programs compared to graduates from accounting, finance, or other educational backgrounds.

The control variable firm size (FirmSize) shows a mean value of 9.795. The Firm growth (FirmGrowth), as measured by the logarithm of the net sales, shows a mean value of 4.533. Profitability, as measured by return on asset (ROA), shows a mean value of -0.524, meaning that there are firms in the Indonesian mining industry that have a high negative return on asset, either due to net loss or total negative assets. This number is significantly lower than the industry average based on the Capital IQ database of 0.026. The Firm liquidity, as measured by the current ratio (CR), shows a mean value of 3.418. Compared to the industry's average of 1.2, this number far exceeds it. The number of audit committee members (AudCom) shows a mean value of 3.175 which means, on average, three audit committee members are in a firm. According to the OJK Regulation No. 55 /POJK.04/2015 Concerning The Establishment And Guidelines For The Implementation Of The Audit Committee's Wor*k* (OJK, 2015), an audit committee should have at least three members from independent commissioners and outside parties of the firm. There were still firms that did not comply with this regulation.

The last variable is covid, a dummy variable to measure the significance of the COVID-19 pandemic in 2020. The mean value shows a value of 0.25 because it measures only 25 percent of the total observation, i.e., only one year out of four years.

**Classical Assumption Test Results**

Before running the regression for the model, the data from the samples used in the research need to go through several classical assumption tests to ensure that the data is normally distributed and free from multicollinearity, heteroscedasticity, and autocorrelation problems. The skewness and kurtosis test showed that the data is normally distributed (Appendix 2). The variance inflation factor (VIF) test also showed no multicollinearity problem among the variables (See appendix 3). The Breusch-Pagan and Cook-Weisberg test showed that the sample for variable CRD_Qty had a heteroscedasticity problem, while the sample for CRD_Coverage was accepted to be homoscedastic (Appendix 4). Lastly, the Wooldridge test showed that the sample for CRD_Qty confirmed an autocorrelation presence, while the sample for CRD_Coverage had no autocorrelation (Appendix 5). To resolve the heteroscedasticity and autocorrelation problem for the first model with the crd_qty dependent variable, we modified the regression command in STATA by adding "cluster (id)". This command produces robust standard error from disturbances like heteroscedasticity and autocorrelation (Hoechle, 2007).

We employ the Ordinary Least Square (OLS) method regression for some reasons. First, a great number of corporate risk disclosure studies use this OLS method as well (Allini et al., 2016; Bernile et al., 2018; Bufarwa et al., 2020). This regression method is employed due to its widespread use and ease in the model assumptions tests (Hutcheson and Sofroniou, 1999). Second, this method provides a higher R2 than the random effect method, which means that the ability of the independent variables to explain the dependent variables is higher. Third, the second model does not meet the heteroscedasticity and autocorrelation problem and the first models have recovered from the problem of classical assumptions. If the assumption of the classical model is met, OLS is the efficient estimator, and inference can reliably proceed along the regression line (Greene, 2020).

**Hypothesis Test Result.**

Table 3 shows the regression results. The result shows that the composition of female board members has no impact on CRD coverage and quantity, and board education background has no impact on CRD quantity and coverage. These results contradict both $H_1$, that female board members lead to higher risk disclosure, and $H_2$, which states that board members with accounting and finance

backgrounds lead to higher risk disclosure. In contrast to the previous research and $H_3$ and $H_4$, the regression results also show that board age negatively impacts CRD quantity and coverage, while board size positively influences CRD quantity and coverage.

**Table 3**. Regression result for OLS method

| | CRD_Qty (1) | CRD_Coverage (2) |
|---|---|---|
| BSize | 0.126** (0.025) | 0.0283*** (0.000) |
| Age | -0.0421* (0.053) | -0.00444** (0.044) |
| Gender | 0.518 (0.442) | 0.0667 (0.279) |
| Education | -0.431 (0.197) | -0.0304 (0.409) |
| FirmSize | 0.00331 (0.898) | -0.00308 (0.208) |
| CR | -0.0112*** (0.000) | -0.00115* (0.071) |
| AudCom | 0.310* (0.057) | 0.0631*** (0.005) |
| FirmGrowth | -0.00232*** (0.000) | -0.000403** (0.028) |
| ROA | 0.00193 (0.176) | 0.000101 (0.620) |
| Covid | 0.0321 (0.636) | -0.0129 (0.528) |
| Constant | 8.876*** (0.000) | 0.443*** (0.004) |
| Observations | 160 | 160 |
| R-squared | 0.347 | 0.357 |
| Adjusted R-squared | 0.303 | 0.314 |
| F | 41.66 | 8.278 |
| p_value | | 0.000 |
| p-values in parentheses<br>* p<0.1, ** p<0.05, *** p<0.01 | | |

**Female Composition and CRD**

According to these results, the composition of female directors has no significant effect on both CRD quantity and coverage. The cause is due to the small number of female directors (averaging 9 percent), which is caused by several reasons like leadership stereotypes and "Leaky Pile Problem". According to International Finance Corporation (2019), leadership stereotypes are still present in corporations, where they prefer masculine traits and qualities over communal traits and qualities that women have. The preference for male workers makes it difficult for female workers to be promoted to upper management. In addition, there is also the "Leaky Pipe Problem". According to International Finance Corporation (2019), this problem occurs when female workers' career progression suffers after returning from maternity leave due to the pressure women face from juggling corporate workload and household responsibilities. Other than the reasons mentioned above, the lack of female composition in the board of directors may also be caused by insufficient regulations to promote board diversity. Thoomaszen, S., & Hidayat (2020) also stated that gender diversity in Indonesia which determines the composition of women's positions in the top management of corporations is yet to be regulated.

A male-dominated industry like a mining company may cause a small number of women on board. Meanwhile, the lack of women in the mining industry may be attributed to the traits and characteristics of women toward risk. According to (Faccio et al., 2016), women are more risk-averse in dealing with risks. Hence, women tend to avoid risks and take more precautions in selecting jobs and the companies where they work. As previously mentioned, the mining industry falls into a high-risk category (Watters et al., 2021). This fact makes women would be more reluctant to work in mining companies, resulting in less gender diversity in the mining companies.

We mentioned before that the 9 percent average female composition on the company board is s, and it. It means that the companies do not make diverse and male-dominated. Based on Thoomaszen & Hidayat (2020), gender diversity in the company can help reduce the negative impact of one gender's traits on the company. As both females and males have different traits, the positive traits of each gender can complement each other and counters the negative effect of the other gender's traits. In other words, a company dominated by one gender is not better off than a diversified one.

The critical mass theory by Rosabeth Moss Kanter explains why a 9 percent average female board composition does not significantly affect corporate risk disclosure. Based on Kanter (1977), a small number of a minority in a group will be underestimated and seen as incompetent - but when a minority group reaches a particular abundance in number, the behavior of a group as a whole will

qualitatively change following the traits of the minority group as the influence of the minority grows significantly. The threshold where a minority group begins to significantly influence a group is called "critical mass" (Kanter, 1977). Konrad et al. (2008) stated that the critical mass of female composition on the board of directors is three people at minimum, while Joecks et al. (2013) stated that the critical mass for female directors is 30 percent in order to have a significant influence. Based on European Commission's Press release titled Commission welcomes political agreement on Gender Balance on Corporate Boards, a listed company's board of directors can be considered balanced when each gender constitutes at least 40 percent of the board composition (Europen Commission, 2022).

By using the aforementioned figures as a benchmark, the 9 percent average of female directors' composition can be considered too little to have any significant impact. To support our result, other similar research in Indonesia has the same findings as ours. Ramadhani & Adhariani (2014) found an average of 6.38 percent and 5.93 percent on female board composition in their first and second research models while getting the same insignificant result as our research. In comparison, Manita et al. (2018) show an average of 15.85 percent on female board members and no significant effect.

**Board Education and CRD**

The board education variable showed no impact on CRD quantity and coverage, which means that the board members' educational background does not affect the coverage of the risk disclosure based on the COSO framework. This result is also in line with previous studies (Falendro et al., 2018; Koufopoulos et al., 2008; Soebyakto et al., 2018).

The insignificant impact of board education on corporate risk disclosure may be due to OJK having regulated information to be disclosed in the company's annual report. OJK Circular Letter No. 16 /SEOJK.04/2021 contains lists and sections that must be disclosed in the company's annual report. Several COSO principles intersect with the list of annual report formats in SEOJK, while the remaining COSO principles that are not included in SEOJK are voluntary. These voluntary items affect our regression result on board education's insignificance towards CRD.

**Board Age and CRD**

Board age negatively affected the CRD quantity and coverage, which contradicted the hypothesis and previous findings (Allini et al., 2016). Younger directors are more inclined to reveal more information than older directors. Although older board members had much experience, they might be more opposed to adjusting to a changing environment (Latif et al., 2013). The reluctance to adopt new ideas and behaviors is also found in Koufopoulos et al. (2008). In current situations with the changing environment, younger board members might be preferable, particularly in digital transformation, with which younger board members are more familiar than older board members. The negative impact of age on risk disclosure can also be justified through the relationship between board age and firm performance. Younger board members have specific characteristics such as risk takers, quicker and more confident in decision-making than older board members, and firm growth and performance with younger board members tend to be higher (Koufopoulos et al., 2008; Latif et al., 2013).

Older board members are found to be less confident in their decisions and more prone to change them when faced with unfavorable consequences, which can be attributed to decision-making experience (Taylor, 1975). Other than that, the behaviors of older board members when making decisions may also influence the risk information disclosed. These behaviors include requiring more information and time to make decisions, but older board members still fail to use the larger amount of information effectively in decision-making (Taylor, 1975). The lack of ability for effective decision-making is further proved by the findings where older board members had difficulty in integrating the information gathered as part of the information processing into an accurate decision, despite having the ability to distinguish the value of information more accurately than younger board members (Taylor, 1975).

**Board size and CRD**

Board size variable positively and significantly impacted CRD quantity and coverage. This result implies that a larger board would be more open to revealing information about the firm's strategic objectives and other useful information for various stakeholders. The reason for the positive relationship between board size and risk disclosure can be found in several studies. Larmou & Vafeas (2010) implied a potential benefit of keeping a larger board size, i.e., gaining more knowledge, expertise, and capacity for monitoring and sharing the workload among more directors. In this case, this

would imply that as the number of individuals on the board increases, the different perspectives of each director would increase risk disclosure.

When the number of individuals on the board increases, the different perspectives of each director will lead to an increase in risk disclosure; the positive relationship between board size and risk disclosure can also be linked with the agency theory. Higher risk disclosure information would imply that the board of directors is effectively doing its role in reducing information asymmetry, which is linked with the monitoring costs incurred by the shareholders to reduce agency risks (Jensen & Meckling, 1976). Rooly (2021) has shown that a larger board size would reduce agency costs, as a larger board size would imply that a larger number of directors would be able to monitor the actions of the firm's management. Coles et al. (2008) have also found that more directors on the boards tend to be used to provide monitoring and advisory functions in larger, diversified firms

**Control Variables**

Meanwhile, the control variables also showed similar results compared to previous research (Khandelwal et al., 2020), in which variables such as liquidity and firm growth showed a negative and significant relationship towards risk disclosure. However, the variable influence of the audit committee (AudCom) in this research showed a positive and significant relationship in which a higher number of audit committee members would also lead to higher risk disclosure. Our results also differ from Khandelwal et al. (2020) and Allini et al. (2015), as firm size in this research does not show a positive and significant impact in this research. It would suggest that firm size has nothing to do with risk disclosure of the firm and that smaller firms might disclose more information than larger firms and vice versa. Profitability, as measured by return on assets, also showed the same result: it does not impact risk disclosure. Lastly, this research added a dummy variable to test the impact of the COVID-19 pandemic in 2020 on risk disclosure. The results showed no change in corporate risk disclosure quantity and coverage during 2020. It might be because the CRD index used does not have an item dedicated solely to unexpected force majeure such as this pandemic; therefore, the additional information on COVID-19 risks and mitigation does not hugely impact the measurement for corporate risk disclosure.

## 5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

This research was directed to identify the variables related to board characteristics and the degree of their impact on corporate risk disclosure. Based on the regression results, we have come to some interesting findings. First, we have determined that variable gender, as measured by female composition on the board of directors, has no significant impact on CRD quantity and coverage. The second variable, board education, as measured by board members with accounting/finance education backgrounds, has a negative and significant impact on CRD quantity but no impact on CRD coverage. The third variable, board age (age), significantly impacted CRD quantity and coverage. The last variable, board size (BSize), as measured by the number of board members, has a significant positive association with CRD quantity and coverage.

There are some implications of this study. The findings would be useful to investors when determining candidates for board members to minimize agency costs. Moreover, the different basis of measurements on risks used by the firms would lessen the comparability of the firms within the same industry. Therefore, we believe that the findings would be valuable for standard makers when discussing the implementation of guidelines to further promote higher levels of risk disclosure in the context of Indonesia's publicly listed firms.

Similar to other previous research, this research also had several limitations, such as the limited number of samples on just one specific industry due to difficulty in obtaining the data and the time required to obtain the said data. Further research on other industries and other countries can be done as a comparison to the current findings in this research.

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**APPENDIX 1**

Risk Disclosure Item Checklist Base on COSO 2017

| **Risk Disclosure Items** | |
|---|---|
| **I. Governance & Culture** | |
| 1. | **Exercises board risk oversight**<br>The board of directors provides oversight of the strategy and carries out governance responsibilities to support management in achieving strategy and business objectives. |
| 2. | **Establishes operating structures**<br>The organization establishes operating structures in the pursuit of strategy and business objectives. |
| 3. | **Defines desired culture**<br>The organization defines the desired behaviors that characterize the entity's desired culture. |
| 4. | **Demonstrates commitment to core values**<br>The organization demonstrates a commitment to the entity's core values. |
| 5. | **Attracts, develops, and retains capable individuals**<br>The organization is committed to building human capital in alignment with the strategy and business objectives. |
| **II. Strategy & Performance Objective-Setting** | |
| 6. | **Analyzes business context**<br>The organization considers potential effects of business context on risk profile. |
| 7. | **Defines risk appetite**<br>The organization defines risk appetite in the context of creating, preserving, and realizing value. |
| 8. | **Evaluates alternative strategies**<br>The organization evaluates alternative strategies and potential impact on risk profile. |
| 9. | **Formulates business objectives**<br>The organization considers risk while establishing the business objectives at various levels that align and support strategy. |
| **III. Performance** | |
| 10. | **Identifies risk**<br>The organization identifies risk that impacts the performance of strategy and business objectives. |
| 11. | **Assesses severity of risk**<br>The organization assesses the severity of risk. |
| 12. | **Prioritizes risks**<br>The organization prioritizes risks as a basis for selecting responses to risks. |
| 13. | **Implements risk responses**<br>The organization identifies and selects risk responses. |
| 14. | **Develops portfolio view**<br>The organization develops and evaluates a portfolio view of risk. |

| | |
|---|---|
| **IV. Review & Revision** | |
| 15. | **Assesses substantial change**<br>The organization identifies and assesses changes that may substantially affect strategy and business objectives. |
| 16. | **Reviews risk and performance**<br>The organization reviews entity performance and considers risk. |
| 17. | **Pursues improvement in enterprise risk management**<br>The organization pursues improvement of enterprise risk management. |
| **V. Information, Communication, & Reporting** | |
| 18. | **Leverages information and technology**<br>The organization leverages the entity's information and technology systems to support enterprise risk management. |
| 19. | **Communicates risk information**<br>The organization uses communication channels to support enterprise risk management. |
| 20. | **Reports on risk, culture, and performance**<br>The organization reports on risk, culture, and performance at multiple levels and across the entity. |

Source: COSO 2017. These 20 principles of ERM components are useful as a checklist to measure Risk Disclosure Index in various research such as this one.

## APPENDIX 2

Normality Test Result for crd_qty

Skewness/Kurtosis tests for Normality

| Variable | Obs | Pr(Skewness) | Pr(Kurtosis) | adj_chi2(2) | Prob>chi2 |
|---|---|---|---|---|---|
| error | 160 | 0.031 | 0.698 | 4.880 | 0.087 |

Normality Test Result for crd_coverage

Skewness/Kurtosis tests for Normality

| Variable | Obs | Pr(Skewness) | Pr(Kurtosis) | adj_chi2(2) | Prob>chi2 |
|---|---|---|---|---|---|
| error1 | 160 | 0.910 | 0.001 | 10.450 | 0.054 |

**APPENDIX 3**

Multicollinearity Test Result for crd_qty

Variance inflation factor

| | VIF | 1/VIF |
|---|---|---|
| bsize | 1.448 | .691 |
| audcom | 1.352 | .74 |
| age | 1.267 | .789 |
| education | 1.221 | .819 |
| gender | 1.221 | .819 |
| firmsize | 1.22 | .82 |
| roa | 1.089 | .919 |
| cr | 1.076 | .929 |
| covid | 1.026 | .974 |
| firmgrowth | 1.023 | .978 |
| Mean VIF | 1.194 | . |

Multicollinearity Test Result for crd_coverage

Variance inflation factor

| | VIF | 1/VIF |
|---|---|---|
| bsize | 1.448 | .691 |
| audcom | 1.352 | .74 |
| age | 1.267 | .789 |
| education | 1.221 | .819 |
| gender | 1.221 | .819 |
| firmsize | 1.22 | .82 |
| roa | 1.089 | .919 |
| cr | 1.076 | .929 |
| covid | 1.026 | .974 |
| firmgrowth | 1.023 | .978 |
| Mean VIF | 1.194 | . |

**APPENDIX 4**

Heteroskedasticity Test Result for crd_qty

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of crd_qty
chi2(1) = 10.10
Prob > chi2 = 0.0015

Heteroskedasticity Test Result for crd_coverage

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of crd_coverage
chi2(1) = 0.14
Prob > chi2 = 0.7087

**APPENDIX 5**

Autocorrelation Test Result for crd_qty

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F( 1, 39) = 23.729
Prob > F = 0.0000

Autocorrelation Test Result for crd_coverage

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F( 1, 39) = 0.001
Prob > F = 0.9789