

Implementation of enterprise risk management (ERM) in the Indonesian manufacturing industry: analysis of factors affecting implementation and disclosure

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ABSTRACT

This study aims to review the aspects that influence the implementation of Enterprise Risk Management (ERM) in the manufacturing industry in Indonesia. In particular, it is expected to know the effects of aspects of independent commissioners, auditor reputation, Risk Management Committee (RMC), ownership control and company scale on ERM implementation and reporting. The sample in the study consisted of publicly listed manufacturing companies on the IDX for the period 2020-2021. The sample was determined based on purposive sampling technique and obtained 90 companies that fit the criteria with a total of 180 annual reports. Multiple linear regression models were used as the basis of analysis. The study findings prove that jointly independent commissioners, auditor reputation, RMC, ownership control, and company scale have a positive influence on ERM implementation and transparency. Partially, auditor reputation, RMC, ownership control, and company scale have a positive influence on the implementation and transparency of ERM reporting, while independent commissioners have no effect. The implication of these results is the importance of paying attention to factors that influence the implementation of ERM to increase the transparency and accountability of companies in managing risk. This is because manufacturing companies in Indonesia face many challenges and risks so it is hoped that ERM implementation can help manage these risks better. However, in this case the implementation of ERM in manufacturing companies in Indonesia also experiences various obstacles and challenges that must be overcome so that ERM implementation can be truly effective and provide the expected benefits in managing risks comprehensively.

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1. Introduction

In the increasingly complex and dynamic contemporary business landscape, risk management has become a vital component for corporate survival and success. Rapid technological developments, economic globalization, and rapid regulatory changes have created a challenging operating environment for business entities in various sectors. In this context, the ability to effectively identify, assess, and manage risks is key to maintaining competitiveness and ensuring long-term sustainability (C. I. Sari, 2022; R. P. Sari, 2022). Modern business history has witnessed a number of cases of large corporations collapsing or experiencing significant crises due to failure to manage risk. Emblematic cases such as Enron (2001) and WorldCom (2002) in the United States have been a stark reminder of the fatal consequences of poor risk management practices and weak corporate governance. The Enron accounting scandal involving financial statement manipulation and misleading off-balance-sheet practices, not only destroyed one of the largest energy companies in the US, but also resulted in the collapse of the accounting firm Arthur Andersen and the loss of public confidence in the integrity of corporate financial statements (Iqrom, 2021). Similarly, the bankruptcy of WorldCom, then the second largest telecommunications company in the US, was revealed to involve \$3.8

billion worth of accounting fraud. This case further underscores the importance of strict oversight and strong internal control systems in managing financial and operational risks.

The 2008-2009 global financial crisis also highlighted systemic weaknesses in risk management practices in the financial sector. The failure of major financial institutions such as Lehman Brothers and Bear Stearns revealed that even institutions considered "too big to fail" could collapse if they failed to manage their risk exposures appropriately. This crisis triggered extensive regulatory reforms in the global financial sector, including the implementation of Basel III for banks and Solvency II for insurance companies that emphasized the importance of comprehensive and integrated risk management (Annisa & Alyani, 2021; Fadilla & Ismawati, 2021). In recent years, a number of other large companies have also experienced collapses or major crises due to failures in managing various types of risks. Some prominent examples include Petrobras (Watts, 2017), British Home Stores (Butler and Bashir, 2016), Sears Holdings (Sibagariang & Sitorus, 2022), Hertz (Anggraini & MY, 2021) and Latam Airlines (Denovis, 2022). In the manufacturing sector, the most prominent case is the crisis faced by the Boeing company in the United States. The world's largest aircraft manufacturer experienced the biggest crisis after two fatal tragedies on the 737 MAX aircraft, killing a total of 346 people. Investigations found design flaws in the automatic flight control system (MCAS) and weaknesses in the safety certification process. The case resulted in a global recall of the 737 MAX fleet, a temporary production halt, a loss of public trust, and billions of dollars in financial losses. The Boeing crisis highlights the importance of product risk management, regulatory compliance, and effective crisis communication in an industry with high safety standards (Wahyuningtyas & Fatmawati, 2021). The series of cases above reaffirm the urgency of effective, comprehensive, and anticipatory risk management in maintaining business continuity in an era of uncertainty. Enterprise Risk Management (ERM) has emerged as a holistic approach widely adopted by global companies to manage a broad spectrum of risks in an integrated manner.

Enterprise Risk Management (ERM) is a comprehensive concept applied by companies to identify, assess, manage, and monitor risks that can affect the achievement of their respective goals. ERM does not just focus on risk mitigation, but on utilizing the opportunities that arise from these risks to increase the overall value of the company as well. ERM is an organization-wide process designed to identify potential events that could affect business entities, manage risks to tolerable limits, and provide adequate assurance that company goals will be achieved (Otero González et al., 2020; Ricardianto et al., 2023). In line with The Committee of Sponsoring Organizations of the Treadway Commission (COSO), ERM is a process that gains influence from the presence and activities of the board of commissioners, directors/management, and other personnel applied to setting strategies throughout the organization (Anton & Nucu, 2020). The main objective of ERM is to improve the company's ability to manage risk effectively and efficiently, and to ensure that the risks faced by the company are managed within acceptable limits. Some specific objectives of ERM include (Anton and Nucu, 2020): increase the level of business performance of the company, provide protection for the company from various unfavorable economic risks, maintain the level of income earned by the company, keep the financial plan running smoothly, make management more proactive in minimizing risks. ERM implementation provides various benefits for companies, including (Anton & Nucu, 2020; Otero González et al., 2020; Ricardianto et al., 2023): (a) Efficiency and Effectiveness: ERM helps companies utilize resources more efficiently and effectively based on the identification and management of risks that can cause waste and inefficiency. (b) Better Decision Making: ERM provides accurate and comprehensive information about risks, thus helping companies make more informed and lower-risk decisions. (c) Investor and Stakeholder Confidence: ERM increases investor and stakeholder confidence by demonstrating that the company has an effective risk management system. (d) Better Internal Oversight and Control: ERM strengthens internal oversight and control by reviewing weaknesses and deficiencies in the organization.

The ERM process involves several key steps, namely (Klučka & Grünbichler, 2020; Yun, 2023): Establishing an Appropriate Risk Analysis Model: Selecting a risk analysis model that suits the company's needs. Identifying Risks: Documenting material threats to the achievement of organizational goals. Analyzing and Quantifying Risks: Calibrate and, where possible, create probability distributions of outcomes for each material risk. Integrate Risks: Aggregate the entire risk distribution, reflecting correlations and portfolio effects. Assess and Prioritize Risks: Determine the contribution of each risk to the aggregate risk profile and prioritize accordingly. Managing and Exploiting Risk: Develop strategies to control and exploit various risks. Monitor and Review: Measure and monitor the risk environment and the performance of risk management strategies on an ongoing basis.

ERM differs from traditional risk management in terms of scope and approach. Traditional risk management typically focuses on day-to-day operations within a particular department or functional area, whereas ERM takes a holistic approach that considers risks throughout the organization (Anton & Nucu,

2020). ERM also involves high-level executives and the board in the risk-related decision-making process, and creates an integrated risk framework that is aligned with overall business objectives (Shatnawi et al., 2022). ERM is thus a more modern and comprehensive approach to managing enterprise risk, which not only aims to protect the company from losses, but also to capitalize on opportunities that arise from such risks to increase the value and sustainability of the company. ERM offers a framework that allows companies to identify, assess, and manage risks holistically in the organization from operational to strategic levels. This approach helps companies not only in mitigating risks, but also in optimizing opportunities that arise from uncertainty. Effective ERM implementation can improve strategic decision-making, increase operational efficiency, and ultimately create value for stakeholders (Otero González et al., 2020). However, although the benefits of ERM have been widely recognized, the level of adoption and quality of implementation still vary across countries and industries. In Indonesia, which is the largest emerging economy, ERM disclosure by publicly listed companies is still limited and it is interesting to examine it further. Factors that influence the level of ERM implementation and disclosure in Indonesian companies are an important area of research, given the crucial role of risk transparency in attracting investment and building stakeholder trust.

Several theories underlie the importance of ERM disclosure in the context of corporate governance. Agency theory, built by Jensen and Meckling (1976), highlights the potential conflict of interest between the owner (principal) and management (agent) of the company. Within this framework, comprehensive ERM implementation and disclosure can serve as a mechanism to reduce information asymmetry and agency costs and improve oversight of corporate risk management. Signaling theory, developed by Spence (1973) in the context of labor markets and subsequently adapted to the corporate finance literature, suggests that firms may use voluntary disclosures as signals to the market about the quality of management as well as their respective future prospects. In that context, detailed and transparent ERM implementation and disclosure can be a positive signal about a company's commitment to good governance practices and effective implementation of risk management. Various studies have attempted to identify aspects that influence the implementation of ERM in various national and industry contexts. However, the results obtained are still mixed and sometimes contradictory, indicating the complexity of this issue and the possibility of contextual factors influencing the relationship.

Given the importance of the manufacturing sector in the Indonesian economy and the significant risk exposures faced by firms in this sector (e.g., supply chain risks, raw material price fluctuations, technological changes, and environmental regulations), this study focuses on manufacturing industries that are listed on the Indonesia Stock Exchange. The main objective is to re-examine the influence of several key factors on ERM implementation, including independent commissioners, auditor reputation, Risk Management Committee (RMC) existence, ownership control, and company scale. Based on the conceptual framework that has been described, several temporary conjectures can be proposed as follows: Hypothesis 1: There is a positive influence of various factors, including independent commissioners, auditor reputation, Risk Management Committee, ownership control, and business scale on the implementation and disclosure of risk management. Hypothesis 2: The existence of independent commissioners has a positive impact on the disclosure of corporate ERM information. Hypothesis 3: Auditor credibility contributes positively to the level of corporate ERM disclosure. Hypothesis 4: The existence of a Risk Management Committee (RMC) has a positive influence on the level of corporate risk management disclosure. Hypothesis 5: Ownership concentration has a positive impact on corporate ERM disclosure. Hypothesis 6: Company size has a positive effect on corporate ERM disclosure.

In this study, it is estimated that there is a positive relationship between a number of key factors and ERM implementation in terms of information disclosure related to the implementation of corporate risk management. These factors include the presence of independent commissioners, the reputation of the auditor used, the existence of a Risk Management Committee, the level of ownership concentration, and the size of the company itself. More specifically, it is estimated that the presence of Independent Commissioners in the corporate governance structure will encourage increased transparency in terms of risk management. Similarly, companies that use the services of reputable auditors tend to be more open in disclosing information related to their respective risk management. It is also expected that companies that have established a Risk Management Committee will show a higher level of disclosure in terms of risk management and a more concentrated ownership structure will be positively correlated with the level of risk management disclosure. It is expected that the higher the scale of a company's business, the higher the disclosure aspect in terms of risk management. This is due to the possibility of greater demands by various stakeholders on large-scale companies (Judijanto et al., 2024).

Through testing these hypotheses, it is expected to be able to know more about the aspects that affect the practice of risk management implementation and risk management disclosure among companies.

The selection of these variables is based on theoretical and empirical considerations. Independent commissioners are considered an important oversight mechanism that can encourage transparency and accountability of management. Auditor reputation, especially Big Four auditors, is associated with higher audit quality and the potential to encourage more comprehensive disclosure. The existence of an RMC signals the firm's formal commitment to risk management. Ownership concentration can affect incentives for disclosure, while company size is often associated with the complexity of operations and resources available for ERM implementation (Jairin, 2021). Using annual report data from the manufacturing sector on the IDX for the period 2020-2021, this study aims to provide relevant insights into ERM disclosure practices in the manufacturing sector in Indonesia. The findings of the study are expected to contribute and provide a better understanding related to the implementation of risk management.

2. Research Method

This study uses a quantitative and qualitative approach and utilizes secondary data in the form of annual financial reporting documents of manufacturing companies that are listed on the IDX in 2020-2021. The initial research sample consisted of 143 companies. The sample was selected by purposive sampling following various specific criteria, in this case, companies that sequentially publish complete annual reports, have a financial year ending December 31, use Rupiah denominations, and have relevant data. In the end, 90 companies that met these criteria were selected, with a total of 180 annual reports analyzed. The dependent variable in the model used is the implementation and disclosure of ERM as measured by 108 disclosure indicators based on the COSO ERM Framework. The independent variables include the proportion of independent commissioners (IC), auditor status (expressed by dummy 1 if examined by Big Four KAP) (KAP), presence of RMC (expressed by dummy 1 if the company has RMC), ownership control (percentage of largest ownership) (OC), and company scale (log total assets) (SP). Multiple linear regression models are used as the basis of analysis through tests conducted at the 5% significance level.

3. Results And Discussions

The statistical description of the sample studied is presented in Table 1.

Table 1. Sample Description Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ERM	180	.18	.93	.5279	.12369
IC	180	24	82	38.99	9.674
KAP	180	0	1	.44	.489
RMC	180	0	1	.63	.478
SP	180	888123460	15279200000000	5721112656173.44	162095927903.281
OC	180	21.74	98.99	56.7552	18.98752

Descriptive statistics show that the average ERM disclosure is 52.79%, independent commissioner 38.99%, auditor reputation 44%, RMC institutional 63%, ownership concentration 56.76%, and company scale 12.76. Classical assumption testing indicates that the data follows a normal distribution, there are no multicollinearity, autocorrelation, and heteroscedasticity problems.

Table 2. F-statistic Test Results

Model	Sum of Squares	Df	Mean Square	F	Significance
1 Regression	.649	5	.130	14.098	.000 ^a
Residual	1.645	174	.009		
Total	2.294	179			

The F test results indicate that independent commissioners, auditor reputation, RMC, ownership control, and company scale together have a positive influence on ERM reporting. This means that ERM disclosure has a relationship with GCG implementation, external supervision from reputable auditors, the presence of RMC, pressure from majority shareholders, and large company scale.

Table 3. Test Results of t-statistics

Unstandardized Coefficient				
Model	Beta	Standard Error	T	Significance

1 (Constant)	.378	.035	10.215	.000
IC	.001	.001	.298	.766
KAP	.054	.021	3.796	.001
RMC	.059	.027	3.992	.001
SP	1.169E-15	.000	2.679	.012
OC	.002	.000	3.306	.002

The t test results indicate that individually, independent commissioners have no influence on ERM reporting. This can be due to the low proportion of independent commissioners so that they have not effectively supervised management. Meanwhile, auditor reputation, RMC, ownership concentration, and company scale are proven to have a positive influence. Big Four auditors encourage better risk disclosure. The existence of RMC increases the effectiveness of risk management and supervision. Majority shareholders demand high transparency. Large companies also tend to make deeper ERM disclosures to maintain reputation and stakeholder trust.

Manufacturing companies in Indonesia face a variety of complex and diverse risks. To effectively manage these risks, companies need to develop and implement a comprehensive risk management strategy, including identification, assessment, mitigation and continuous monitoring of risks. By doing so, companies can improve the resilience and sustainability of their respective businesses amidst a dynamic and challenging environment.

Manufacturing companies in Indonesia face various risks that can affect their operations, finances and business sustainability. Here are some of the main risks faced by manufacturing companies in Indonesia:

1. **Operational Risk:** Operational risk covers various aspects that can disrupt production processes and day-to-day operations. Some examples of operational risks include:
 - a. **Equipment Failure:** Damage or failure of production machinery and equipment can cause production disruption and decreased productivity (N. M. D. A. Sari et al., 2020).
 - b. **Human Error:** Errors made by employees, such as mistakes in weighing raw materials or operating machinery, can lead to product defects or production disruptions (N. M. D. A. Sari et al., 2020).
 - c. **Work Accidents:** The manufacturing industry has a high risk of occupational accidents, which can cause serious injuries to workers and operational disruptions (Muhammad & Susilowati, 2021).
2. **Raw Material Supply Risk:** Dependence on a stable and quality supply of raw materials is crucial for manufacturing companies. Risks associated with raw material supply include:
 - a. **Delivery Delays:** Delays in the delivery of raw materials can disrupt production schedules and cause delays in the delivery of finished products (N. M. D. A. Sari et al., 2020).
 - b. **Raw Material Quality:** Raw materials that do not meet quality standards can affect the quality of the final product and the company's reputation (N. M. D. A. Sari et al., 2020).
3. **Financial Risk:** Financial risk includes various aspects that can affect the company's financial stability, such as:
 - a. **Currency Exchange Rate Fluctuations:** Fluctuations in currency exchange rates can affect the cost of imported raw materials as well as revenue from exports (Lestari & Husaini, 2024).
 - b. **Debt Policy (Leverage):** Excessive utilization of debt can increase financial risk, especially if the company cannot meet its commitments to repay interest and principal (Riyadi & Rustan, 2018).
4. **Environmental Risks:** Manufacturing companies also face environmental risks that can impact their operations and reputation such as:
 - a. **Environmental Pollution:** Failure to manage waste and emissions can lead to environmental pollution and sanctions from regulators (Liyundira et al., 2023).
 - b. **Natural Disasters:** Natural disasters such as floods, earthquakes, and fires can destroy production facilities and disrupt company operations (Liyundira et al., 2023).
5. **Regulatory Risk:** Changes in government regulations and policies can affect the operations and business strategies of manufacturing companies. Regulatory risks include:
 - a. **Regulatory Changes:** Changes in environmental, safety, and tax regulations can require operational adjustments and additional compliance costs (Patah et al., 2023).
 - b. **Compliance with Standards:** Failure to comply with industry standards and regulations can result in fines, sanctions, and reputational harm (Iswajuni et al., 2018).
6. **Technology Risk:** With increasing digitization in the manufacturing industry, technology risks are becoming increasingly relevant, including:
 - a. **Cyber Security:** Cyberattacks can disrupt a company's information systems and digital operations, and cause financial and reputational losses (Faiq & Septiani, 2020).

- b. Technology Failures: Failures in information technology systems and automation can disrupt production and operational processes (Damayanti & Venusita, 2022).
7. Market Risk: Manufacturing companies also face market risks that can affect the demand and sales of their respective products such as:
 - a. Changes in Consumer Demand: Changes in customer preferences and behavior can affect product demand and require adjustments to marketing strategies (Damayanti & Venusita, 2022).
 - b. Market Competition: Very strong competition with other companies can affect the acquisition of market share and company profitability (Nugroho, 2014).

The implementation of Enterprise Risk Management (ERM) in the manufacturing sector in Indonesia involves various elements and factors that affect the success of its implementation. The following are some aspects regarding ERM implementation practices in the manufacturing sector in Indonesia according to the results of relevant studies and case studies.

Factors that influence the implementation of ERM include:

1. Company Size: Research indicates that company scale has implications for ERM implementation. Larger companies tend to have more adequate resources to implement ERM effectively. However, some studies also show that company size is not always the main determining factor in ERM implementation (Ariyanto et al., 2021).
2. Industry Type and Company Complexity: The type of industry as well as the complexity of company operations also affect the implementation of ERM. Manufacturing companies that have complex operations and various types of risks tend to need a comprehensive ERM system in order to manage these risks (Ariyanto et al., 2021).
3. Ownership Concentration and Governance Structure: Ownership concentration and corporate governance structure, including the existence of a risk management committee and auditor reputation, have a positive influence on ERM disclosure and implementation. Companies with concentrated ownership tend to have stricter oversight of risk management (F. J. Sari, 2013; Sitompul, 2022).

Based on a review of the disclosure of ERM practices presented by manufacturing companies in Indonesia, the ERM implementation process in manufacturing companies in Indonesia usually involves several main steps:

1. Risk Identification: Identify all risks that could potentially arise in the company's operations. This includes market risk, operational risk, financial risk, and strategic risk.
2. Risk Assessment: Assessing the risks that have been identified in order to determine the severity and probability of the risk occurring.
3. Risk Mitigation Strategy Development: Developing strategies to manage and reduce the impact of risks. This could involve diversification, insurance, internal controls, and other mitigation measures.
4. Implementation and Monitoring: Implementing risk mitigation strategies and monitoring their effectiveness on an ongoing basis. This monitoring is important to ensure that the strategies implemented are on track and can be adjusted if needed.
5. Reporting and Disclosure: Disclose risk management-related information in the company's annual report. This disclosure is important to provide transparency to stakeholders and increase investor confidence (Faiq & Septiani, 2020; F. J. Sari, 2013; Sitompul, 2022).

The implementation of Enterprise Risk Management (ERM) in the manufacturing sector in Indonesia faces various challenges that can affect the effectiveness and efficiency of its implementation. The challenges faced by manufacturing companies in Indonesia in implementing ERM include:

1. Lack of Awareness and Understanding: One of the main challenges is the lack of awareness and understanding of the importance of ERM among management and employees. This can hinder the effective implementation of ERM (C. I. Sari, 2022).
2. Limited Resources: ERM implementation requires significant resources, including time, effort, and cost. Companies that have limited resources may face difficulties in implementing ERM thoroughly (Salaudeen, 2024).
3. Operational Complexity: Manufacturing companies often have complex operations, which can make the risk identification and assessment process more complicated. This complexity requires a more structured and integrated approach to effectively manage risks (Ariyanto et al., 2021).
4. Determining the Value, Risks, and Costs of ERM: One of the biggest challenges is determining the value, risks, and costs associated with ERM implementation. Many companies struggle to quantify the benefits gained from investing in ERM, so management often doubts whether the investment provides the expected protection (Iswajuni et al., 2018).

5. Difficulty in Predicting Market Demand: Difficulty in predicting market demand is a challenge often faced by manufacturing companies. The inability to accurately predict demand can lead to production that does not match market needs, which in turn increases operational risk (Wardani & Yudhistira, 2021).
6. Difficulty in Controlling Inventory: Managing inventory effectively is another challenge faced by manufacturing companies. Errors in inventory management can lead to overstocking or understocking, which can negatively impact the company's operations and finances (Dewi et al., 2023).
7. Diversity of Risk Assessment Methods: There are many methods for conducting risk measurement, and choosing the right one can be challenging. Companies need to develop assessment criteria that are consistent and applicable across operating segments to ensure accurate and comprehensive risk assessment (Muriyana et al., 2023).
8. Integration with Existing Systems and Processes: Integrating ERM with existing systems and processes within the company can be challenging. Companies need to ensure that ERM is not just an add-on, but is well integrated into existing business processes to improve the effectiveness of risk management (Chairudin et al., 2023).
9. Data and Information Management: The management of data and information related to risk is also a challenge. Data that does not have high accuracy or is not comprehensive can hinder the risk identification and assessment process, and reduce the effectiveness of risk mitigation strategies (Warisno & Husaini, 2024).

ERM implementation in manufacturing companies in Indonesia involves various factors and complex processes. Despite the challenges, effective ERM implementation can provide significant benefits, including improved company performance, reduced risk, and increased company value. Companies need to develop a comprehensive and sustainable strategy to effectively manage risks and to take advantage of opportunities that arise from these risks.

4. Conclusion

In accordance with the research findings, it can be concluded that independent commissioners, auditor reputation, RMC, ownership control, and company scale together have a positive influence on the implementation and reporting of ERM carried out by manufacturing companies on the IDX in 2020-2021. Individually, each variable of auditor reputation, RMC, ownership concentration, and company scale also has a positive influence, while independent commissioners have no significant effect. The implication of this research is the need for efforts to increase the effectiveness of independent commissioners in encouraging risk management transparency. Companies also need to consider the use of reputable auditors, the formation of RMC, communication with majority shareholders, and the development of a qualified risk management system according to the scale of their business. For regulators and other stakeholders, this study reinforces the urgency of implementing improved governance and risk management to ensure transparency and accountability of public companies. ERM implementation in the manufacturing sector in Indonesia faces various complex challenges. To overcome these challenges, companies need to develop a comprehensive strategy, increase awareness and understanding of the importance of ERM, and ensure that sufficient resources are available to support the effective implementation of ERM. By doing so, companies are able to manage risks relatively well and improve their overall performance and value. This study is limited to manufacturing companies listed on the IDX during 2020-2021, which may not capture the broader trends across different sectors or time frames. Future research should consider a more diverse sample, including companies from various industries and regions, to enhance the generalizability of the findings. Additionally, longitudinal studies examining the long-term impact of these variables on ERM implementation could provide deeper insights into their effectiveness and evolution over time.

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