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Driving Circular Economy Disclosure: The Strategic Role of Internal Control and Organizational Resources

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Abstract: This study provides empirical evidence on the role of internal control in enhancing the impact of organizational resources on Circular Economy Disclosure. Employing a quantitative approach, the research analyzes panel data from integrated reports of companies operating in circular economy priority sectors listed on the Indonesia Stock Exchange (IDX) during the period 2021–2023. Moderated Regression Analysis (MRA) is used to assess cross-sectional and time-series variations. The results reveal that both internal control and slack resources have a negative effect on CED, indicating that excessive unused resources and rigid control systems may hinder transparency. Managerial ability is found to have no significant effect on CED. However, internal control positively moderates the relationship between slack resources and CED, suggesting that effective control mechanisms can help redirect idle resources toward more strategic and transparent reporting. The implications of this study highlight that managers should strategically reallocate slack resources and implement adaptive internal controls to improve circular economy disclosure. Enhancing transparency through data integration and proactive control is key to improving reporting quality and accountability. Theoretically, the study extends RBV and contingency theory by showing how internal control shapes resource effectiveness in sustainability disclosure.

Keywords: circular economy disclosure, managerial ability, slack resources, internal control.

INTRODUCTION

Industrial activities have significantly contributed to environmental degradation and the excessive exploitation of natural resources. The accumulation of industrial waste serves as clear evidence of how the linear economic system exerts immense pressure on Earth's ecosystems (Geissdoerfer et al., 2017), thereby threatening the long-term sustainability of life on the planet (Kumar et al., 2025). According to (Bittner et al., 2024), these ecological challenges render the linear economic model a failed blueprint for a sustainable future. The dominance of this model has proven unsustainable and has triggered substantial environmental damage (Wang, & Chen, 2023), thus necessitating a paradigm shift toward a more circular economic system (Pasko et al., 2024).

The circular economy (CE) seeks to keep resources in use for as long as possible and to regenerate products and materials at the end of each lifecycle, thereby minimizing waste (Kristoffersen et al., (2020); Geissdoerfer et al., (2017). It is regarded as the antithesis of the linear economic model (Bennett, 1991). According to a study by (Bappenas, 2022), implementing CE in Indonesia holds the potential to generate substantial economic, social, and environmental benefits. However, challenges to CE adoption in Indonesia include inadequate infrastructure, inefficient waste management systems, limited technological investment, and the need for behavioral change among consumers toward greater environmental responsibility (Dwi, (2023); (Velenturf & Purnell, (2021). Rising awareness of CE's importance has led to increasing demand from stakeholders and investors for transparency regarding CE-related practices and policies (Esposito et al., 2023). Studies examining CE disclosures in private-sector sustainability reports by (Opferkuch et al., 2022), Jena, 2023), and Ormazabal et al., 2018) have highlighted that one of the main constraints is the complexity of measuring and monitoring circular activities across the value chain. These challenges stem from the need for advanced data tracking systems and enhanced inter-organizational collaboration.

The circular economy (CE) entails profound changes in corporate managerial practices (Ghisellini et al., 2016). A manager’s strategic decisions are inherently shaped by their cognitive frameworks, values, and personal belief systems (Mason, 1984), and are often measured by the manager's efficiency in utilizing available resources (Demerjian et al., 2011). Variations in managerial attributes have been correlated with differences in information disclosure practices (Abatecola & Cristofaro, 2020). This is supported by the findings of Lee et al., (2023), Daradkeh, et al., (2023), and (Kao et al., (2024), who assert that managerial capabilities positively influence sustainability disclosures. The transition toward a circular economy is fraught with uncertainty and demands managerial willingness to pursue innovative approaches (Vitolla et al., 2023).

The transition towards and operationalization of a circular economy is a path fraught with uncertainty that requires the courage to adopt innovative approaches (Pietrulla, 2022). Innovation necessitates slack resources, as the availability of excess resources provides financial and operational flexibility that enables organizations to allocate funds and time to experimental and exploratory activities inherent in the innovation process (Nohria & Gulati, 1996). Slack resources refer to the surplus of organizational resources beyond the minimum needed to conduct routine operations (Cyert and March, 1963). Unutilized slack resources can alleviate resource constraints in CSR practices, thereby enhancing innovation performance (Ji & Miao, 2020). These findings are supported by (Pertiwi, 2022), and (Alshorman et al., 2024), who explain that slack resources have a positive influence on CSR disclosure.

Internal control, defined as a process designed by management to provide reasonable assurance regarding the achievement of organizational objectives (COSO, 2013), has a significant influence on the quality and extent of corporate information disclosure. An effective internal control mechanism positively impacts the quality and scope of corporate disclosure, including aspects related to sustainability (J. Zhang et al., 2024). (Ashbaughet al., 2009) found that the market reacts negatively to disclosures of internal control weaknesses, indicating that investors value information on the effectiveness of internal control as an indicator of the credibility of financial statements and other information. Furthermore, (Arisandi et al., 2022) demonstrated that companies with strong internal controls tend to have higher quality financial reporting, reflected in more transparent and accurate disclosures. The implementation of effective internal control increases the likelihood of timely, accurate, and high-quality environmental information disclosure, while also serving as a monitoring mechanism for corporate managerial actions (Huang & Huang, 2020). Robust internal control guides companies in implementing CSR, strengthening management, and enhancing financial performance (Zhang & Su, 2023). Social and environmental disclosures can be viewed as an

evolution or expansion of traditional financial reporting practices, which initially focused on the economic aspects of the company (Gray et al., 1995).

Research on the role of internal control in strengthening corporate behavior in circular economy (CE) information disclosure remains scarce. According to (Beasley et al., 2000), strong internal control creates an environment in which management is accountable for the quality of disclosed information. When managers are committed to comprehensive and accurate disclosure, an effective internal control system facilitates the timely and reliable collection, processing, and presentation of such information. Additionally, the (COSO, 2013) framework emphasizes that a sound control culture is influenced by the "tone at the top," or the example set by top management. Without adequate internal controls, slack resources may be misused or fail to be allocated to activities that enhance transparency (Jensen & Meckling, 2012).

Previous studies conducted by Albitar et al., (2020) and (Kristoffersen et al., 2020) Kristoffersen et al. (2020) indicate that the implementation of Circular Economy Disclosure (CED) remains relatively low in developing countries. Moreover, inconsistent findings across studies such as those by (Lee et al., 2023), (Daradkeh et al., 2023), (Kuo & Chang, 2021), (Torsin, 2021), and (Shlash & Al-jawahry, 2025) suggest varying influences of managerial ability on sustainability information disclosure. Similarly, research by (Pasko et al., 2024), (Jia, et al.,, 2025), and (Asamoah, 2019) shows that slack resources can impact sustainability information disclosure. Meanwhile, (Joseph et al., 2024), (J. Zhang et al., 2024), and (Aswar et al., 2021) demonstrate the role of internal control in influencing the quality and extent of sustainability disclosures. This study aims to bridge the gaps in the existing literature by examining the influence of managerial ability, slack resources, and internal control on CED. Specifically, the objectives of this research are to analyze: 1) The influence of managerial ability, slack resources, and internal control on circular economy disclosure; and 2) The moderating role of internal control in strengthening the effect of managerial ability and slack resources on circular economy disclosure.

The Resource-Based View (RBV) was developed by (Wernerfelt, 1984) and popularized by (Barney, 1991), explaining that management's ability to design and implement circular economy strategies is a rare and difficult-to-imitate core competency (Jia et al., 2025). Firms with slack resources are typically more responsive in supporting environmental initiatives (Zhang et al., (2024); Heubeck, L., & Ahrens, (2024); (Shahzad et al., 2016); (Melo, 2012). Moreover, companies with strong internal control systems tend to have more structured and consistent processes for collecting, processing, and reporting sustainability-related information (Vitolla et al., (2023); Arisandi et al., (2022). (Esposito et al., 2023) and (Suangga, et al., 2017) found that control mechanisms significantly influence the disclosure of non-financial information. Latan et al., (2018) and Simons, (1985) emphasize that internal controls play a crucial role in ensuring slack resources are not misallocated but rather utilized for strategically valuable initiatives. Based on this theoretical foundation and prior empirical evidence, the following hypotheses are proposed:

H1: Managerial capabilities have a positive effect on CE Disclosure.
H2: Slack resources have a positive effect on CE Disclosure.
H3: Internal control has a positive effect on CE Disclosure.
H4: Internal control strengthens the relationship between capabilities and CE Disclosure.
H5: Internal control strengthens the relationship between slack resources and CE Disclosure.

METHODS

This research employs an explanatory-causal design using Moderate Regression Analysis (MRA) techniques. The data sources consist of secondary data, including sustainability reports and annual financial statements. The research population comprises companies listed on the

Indonesia Stock Exchange within five priority sectors identified by the government for the implementation of the circular economy (CE) in Indonesia during the period 2021–2023.

Figure 1. Research Model

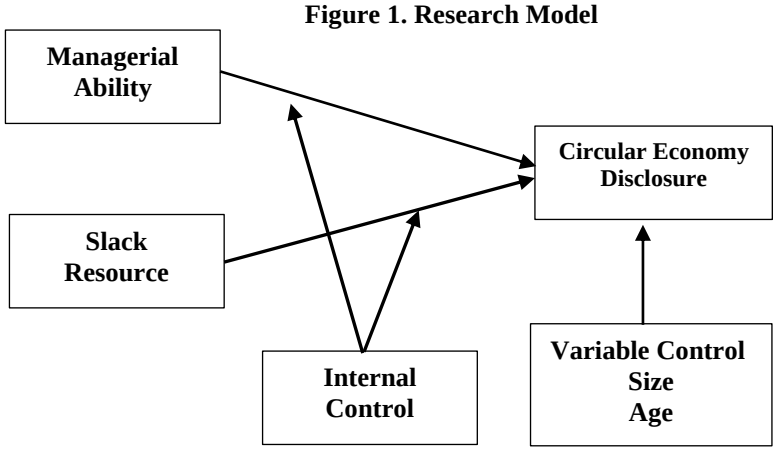


Figure 1 shows that there are three types of variables in this study, namely exogenous variables, consisting of Managerial Ability (X1), Slack Resource (X2), moderating variable internal control (X3), and endogenous variables, namely CED (Y), as well as control variables, including Company Size (X4) and Company Age (X5).

These sectors include food and beverages, packaging and containers, electronics, textiles, and construction and buildings totaling 381 companies. The sampling method applied is purposive sampling, with the criterion being companies that were consistently listed on the Indonesia Stock Exchange throughout the study period. Based on these criteria, a total of 282 companies were selected as the research sample. The sample calculation is detailed as follows:

Table 1. Sample Selection

Sample	Number
Priority Industrial Sectors for the Circular Economy	127
(-) Companies listed only in 2022 and 2023	13
(-) Companies delisted during the research period	5
(-) Companies under suspension	4
(-) Companies that did not provide complete information	11
Total data	94
Total sample (94 x 3 years)	282

The following is a table of variable measurements:

Table 2 Definition and Measurement of Variables

Variabel	Description	Measurement	Scale
CED	Circular Economy Disclosure	Number of CE items disclosed/number of items that should be disclosed (Kuo & Chang, 2021)	Ratio
MA	Managerial ability to manage the organization	Data Envelopment Analysis (DEA) model (Demerjian et al., 2011)	Ratio
SR	Excess resources	Natural Log of Cash and Cash Equivalents (Alshorman, et al., 2022)	Ratio
IC	A series of processes, policies, and procedures implemented by the organization	Number of internal control items disclosed/number of items that should be disclosed (Zhang et al., 2024)	Ratio
AGE	Umur Perusahaan	Difference between the year of the study and the year the company was established (Zhang et al., 2024)	Nominal
SIZE	Market Capitalization		Nominal

	Stock price × number of outstanding shares (Albitar et al., 2020)

The analytical method employed in this study is Moderate Regression Analysis (MRA), which is used to examine the role of internal control in strengthening the influence of managerial ability and slack resources on circular economy (CE) disclosure. The research follows a hypothetico-deductive approach and utilizes panel data consisting of 94 observations over a three-year period. The analysis is carried out in the following steps: 1) Panel data regression, using three alternative estimation techniques: the Common Effect Model or Pooled Least Squares (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM); 2) Model selection through the Chow Test, Hausman Test, and Lagrange Multiplier Test to determine the most appropriate panel data approach; 3) Hypothesis testing, including the t-test (to test the significance of individual variables) and the F-test (to test overall model significance), using a significance level of $p < 0.05$, along with the coefficient of determination test (R^2) to assess model explanatory power.

RESULTS AND DISCUSSION

Table 3. Descriptive Statistics

Variable	Obs	Minimum	Maximum	Mean	Std. Dev.
CIRC_ECO_DISC	282	0.0714	1.0000	0.5572	0.2454
MAN_ABI	282	0.0000	1.0000	0.4220	0.4948
SLACK_RESO	282	0.0000	116.5000	2.2299	9.9577
INTR_CON	282	0.1250	1.0000	0.7675	0.2373
AGE	282	1.0000	45.0000	16.5851	12.1384
SIZE	282	17.4994	32.8599	27.2597	2.9851

Source: Processed Data

From the table above, it can be observed that the managerial ability variable indicates that only 42.2% of managers demonstrate high efficiency, while the remaining 57.8% exhibit low managerial ability. The companies possess substantial slack resources, with an average value of Rp 2.2299 trillion. Meanwhile, internal control is relatively strong, with an average score of 76.75. The level of Circular Economy Disclosure (CED) is moderate, with an average of 55.72%.

The selection of the panel data model was conducted to determine the most appropriate regression technique for the analysis. The Chow Test results yielded a chi-square probability value of 0.533 (> 0.050), supporting the selection of the Common Effect Model (CEM). Subsequently, the Hausman Test produced a chi-square probability value of 0.237 (> 0.050), indicating that the Random Effects Model (REM) would be appropriate. However, the Lagrange Multiplier (LM) Test yielded a Breusch-Pagan cross-section probability value of 0.252 (> 0.050), which further confirms the use of the Common Effect Model (CEM) as the final model for data analysis in this study.

Hypothesis Testing

The hypothesis testing in this study is shown in Table 4 below:

Tabel 4. Uji Hipotesis

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Result
C	0.721964	0.142509	5.066111	0.0000	

MAN_ABI	0.024325	0.099777	0.243795	0.8076	Unsupport
SLACK_RESO	-0.010762	0.004076	-2.640345	0.0088	Support
INTR_CON	-0.208021	0.079705	-2.609896	0.0096	Support
ModMA*IC	0.000667	0.124292	0.005366	0.9957	Unsupport
ModSR*IC	0.019956	0.00805	2.478989	0.0138	Support
SIZE	-0.002072	0.004858	-0.426499	0.6701	
AGE	0.002299	0.00122	1.884058	0.0606	
R-squared	0.067816				
Adjusted R-squared	0.044001				
S.E. of regression	0.239898				
F-statistic	2.847636				
Prob(F-statistic)	0.00698				

Source: Processed data

The regression equation in this study is:

$$Y = 0.721964 + 0.024325X1 - 0.010762X2 - 0.208021X3 + 0.000667X1*X3 + 0.019956X2*X3 + 0.239898$$

The table indicates that the constant value of 0.721964 suggests that, in the absence of the three independent variables, Circular Economy Disclosure (CED) remains at a positive level. The managerial ability variable (X1) has a coefficient of 0.024325, implying that higher managerial ability contributes to an increase in CED. In contrast, slack resources (X2) exhibit a coefficient of -0.010762, indicating that greater slack resources are associated with a decrease in CED. Similarly, internal control (X3) has a coefficient of -0.208021, suggesting a negative effect on CED. The interaction term between managerial ability and internal control (X1X3) has a coefficient of 0.000667, implying that internal control strengthens the positive influence of managerial ability on CED. Additionally, the interaction between slack resources and internal control (X2X3) shows a coefficient of 0.019956, which indicates that internal control also amplifies the effect of slack resources on CED.

The results of Hypothesis 1 testing indicate that managerial ability does not have a significant effect on Circular Economy Disclosure (CED), with a coefficient of 0.024325 and a significance level of 0.8076 (> 0.05). This finding aligns with the research of (Chen & Chen, 2020), which suggests that high managerial ability is not always directed toward sustainable practices but is often focused on achieving short-term financial targets. This result is also supported by (Adams et al., 2005), who found that highly capable managers tend to allocate resources to product innovation and operational efficiency, rather than investing in circular economy initiatives unless driven by strong regulatory incentives. Theoretically, this outcome can be explained through the lens of agency theory (Jensen & Meckling, 2012), which posits that managers, as agents, may prioritize personal interests or short-term financial performance to meet shareholder expectations, thereby neglecting sustainability disclosures such as those related to the circular economy. In addition, (Freeman, 1984) emphasizes that without strong stakeholder pressure, managers may not feel compelled to enhance transparency in circular economy practices. This finding contrasts with the study by (Martínez & Sánchez, 2017), which asserts that high managerial competence is positively associated with environmental disclosure.

The results of Hypothesis 2 testing reveal that slack resources have a negative effect on Circular Economy Disclosure (CED), with a coefficient of -0.010762 and a significance level

of 0.0088 (< 0.05). This finding is consistent with the research of Shahzad et al., (2016), which suggests that companies with excess resources tend to be less transparent in disclosing circular economy practices, as they may perceive less need to obtain additional legitimacy from stakeholders. Similar conclusions were drawn by (Tiscini et al., 2022) and (Wang, Z. and Ren, 2007), who found that an increase in slack resources is associated with a decline in the intensity of CED. Cyert, R. and March, (1963) and (Sari et al., 2022) further explain that firms with abundant resources tend to have lower dependence on external stakeholders, thereby diminishing their motivation for voluntary disclosure. However, this study contradicts part of the findings of (Sari et al., 2022), which reported a positive relationship between slack resources and environmental performance, suggesting that the role of excess resources may be context-dependent and influenced by managerial priorities and institutional pressures.

The results of Hypothesis 3 testing indicate that internal control has a negative effect on Circular Economy Disclosure (CED), with a coefficient of -0.208021 and a probability value of 0.0096 (< 0.05). These findings suggest that overly rigid and bureaucratic internal control systems may hinder the implementation of CED. According to (Huang & Huang, 2020), such systems often prioritize short-term regulatory compliance over fostering sustainable innovation, thereby limiting transparency in circular economy practices. From the perspective of Institutional Legitimacy Theory (Suchman, 1995), strict internal control mechanisms may reduce firms' incentives to engage in CED, as organizational focus shifts from transparency toward compliance. Although internal control is a vital component of corporate governance, an imbalanced or overly conservative design may obstruct efforts to enhance sustainability disclosure. In contrast, (Adams et al., 2005) found that firms with strong internal control systems often exhibit higher levels of sustainability disclosure, suggesting that the effectiveness of internal controls in supporting transparency may depend on how they are structured and implemented.

The results of Hypothesis 4 testing reveal that internal control does not strengthen the influence of managerial ability on Circular Economy Disclosure (CED), with a coefficient of 0.000667 and a significance level of 0.9957 (> 0.05). This suggests that a strict internal control system may actually hinder managerial flexibility in adopting innovative sustainable practices, thereby limiting its role in enhancing the effect of managerial ability on CED.

The results of Hypothesis 5 testing show that internal control does strengthen the influence of slack resources on CED, with a coefficient of 0.00805 and a significance level of 0.0138 (< 0.05). This finding is consistent with prior research by Chen & Chen (2020), which demonstrated that firms with adequate slack resources, when supported by effective internal control systems, tend to disclose higher levels of circular economy-related information. This conclusion is further supported by (Wang, Z. and Ren, 2007), who found that internal control serves as a governance mechanism that enhances the efficient use of slack resources while minimizing the risk of misappropriation. Similarly, Martínez & Sánchez, (2017) found that the interaction between slack resources and internal control contributes to improved quality and quantity in sustainability disclosures.

Additional Test

This study conducts an additional test to identify variations in the effects of variables based on company subgroups categorized by market capitalization. The sample is divided into two panels: Panel Data 1, representing companies with low market capitalization, and Panel Data 2, representing companies with high market capitalization. This segmentation aims to explore the factors that influence circular economy disclosure (CED) within each group. The following table presents the results of the additional test:

Tabel 5. Additional Test

Panel Data	Maket Capitalization	Variable	Coefficient	t-Statistic	Prob.
Panel 1	Low Market Capitalization	C	0.322	2.380	0.023
		MAN_ABI	0.083	0.902	0.374
		INTR_CON	0.230	1.498	0.144
		SLACK_RESO	0.016	3.478	0.002
Panel 2	High Market Capitalization	C	0.759	14.020	0.000
		MAN_ABI	0.011	0.381	0.703
		INTR_CON	-0.275	-4.225	0.000
		SLACK_RESO	-0.003	-2.060	0.041

The results of the panel data analysis reveal differences in outcomes across company groups based on their market capitalization. In Panel Data 1, which represents companies with low market capitalization, slack resources are found to have a significant positive effect on Circular Economy Disclosure (CED). This finding suggests that small to medium-sized enterprises tend to leverage excess resources as a strategic opportunity to increase their engagement in circular economy practices, including aspects of disclosure. Conversely, in Panel Data 2, comprising companies with high market capitalization, both slack resources and internal control exhibit a negative effect on CED. This implies that in large companies, resource abundance does not necessarily translate into greater sustainability transparency. In fact, rigid or overly bureaucratic internal control mechanisms may impede circular economy disclosure. These findings suggest that the potential benefits of slack resources can be undermined by conservative control systems or a dominant profit-driven orientation, ultimately reducing the incentive to enhance CED.

CONCLUSION

Based on the research findings, managerial ability was found to have no significant effect on Circular Economy Disclosure. This result contradicts the Upper Echelons Theory, which suggests that the quality of management should drive the adoption of sustainable practices. In contrast, slack resources were shown to have a negative influence on CE disclosure. Similarly, internal control systems also exhibited a negative effect on CED. Furthermore, the study reveals that internal control does not moderate the relationship between managerial ability and CED. However, internal control does strengthen the negative influence of slack resources on CE disclosure. This study has several limitations. First, the sample includes companies from various industries, which may not fully reflect the specific dynamics of any one sector. Second, the relatively small sample size may limit the statistical power and external validity of the findings. A smaller sample also increases the risk that the results may be influenced by outliers.

Despite these limitations, the study offers important managerial implications. It emphasizes that excess resources alone are not sufficient to drive higher CED levels unless supported by appropriate policies and incentives. Additionally, the findings point to the need for more adaptive governance approaches that prioritize sustainability over rigid compliance. These results also lend support to Contingency Theory, which holds that the effectiveness of organizational resources is significantly influenced by the alignment between control mechanisms and the firm's strategic context.

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