International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

Circular Economy Practices and Material Flow Cost Accounting: Toward Sustainable Development Through Green Intellectual Capital

Meidah Fadjrihana[1)], Windu Mulyasari[2)]
[1,2)] Accounting Study Program, Faculty of Economics and Business, Sultan Ageng Tirtayasa University, Indonesia

Coresponding Author :
Email : meidahfadjrihanaa@gmail.com[1)], windumulyasari@untirta.ac.id

Abstract

This research explores how manufacturing companies listed on the Indonesia Stock Exchange based on the Jakarta Stock Exchange Industry Classification (JASICA) from 2020 to 2023 can implement circular economy practices and material flow cost accounting in their activities, which not only prioritize profit but also care about environmental impact and achieve sustainable development with green intellectual capital as mediation. Referring to the resource-based view theory and the triple bottom line. Using a quantitative method with purposive sampling technique involving 109 manufacturing industry companies with 436 observations over 4 years. The findings of this study used STATA 14 and selected the random effects model (REM), which resulted in circular economy practices and green intellectual capital impacting sustainable development. However, circular economy practices do not impact green intellectual capital. Material flow cost accounting also does not impact sustainable development or green intellectual capital, and green intellectual capital cannot mediate the relationship between circular economy practices and material flow cost accounting. However, circular economy practices and material flow cost accounting have a significant simultaneous impact on sustainable development. The implication of this research is the need for companies to efficiently and comprehensively implement these practices simultaneously in achieving sustainable development. It is hoped that this research can make a fair contribution to sustainable development efforts in the manufacturing industry and other industries.

Keywords: Circular Economy Practices, Material Flow Cost Accounting, Sustainable Development, Green Intellectual Capital, Manufacturing Industry

INTRODUCTION

Government Regulation No. 28 of 2021 on the Implementation of Sustainable Development is a strategic legal foundation effort that integrates economic, social, and environmental aspects into national development. The regulation states that every development process must consider the balance between economic growth, social equity, and environmental sustainability, with the main goal of creating development that is just, efficient, and environmentally friendly. Through this regulation, the government strives to achieve development that meets the needs of the current generation without compromising the ability of future generations.

The National Waste Management Information System (SIPSN) states that the type of waste produced by the manufacturing industry is food waste, which contributes approximately 46.75% of the total waste generated in Indonesia. In 2023, paper waste was 10.94%, metal waste was 3.24%, and food waste reached 39.67%. Presidential Regulation No. 111 of 2022 regulates the government's efforts to reduce waste and improve its management sustainably, emphasizing collaboration between the government, companies, and society to achieve sustainable development. The manufacturing industry has a complex supply chain and uses significant resources, making it potential to implement innovations for efficiency and waste reduction through circular economy practices and material flow cost accounting to support sustainable

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

development. The implementation of green intellectual capital enhances the competitiveness and image of the company. By optimizing material flows and reducing waste, companies can save costs and contribute to sustainability and social welfare. Circular economy practices have been introduced in government policies since 2017, with the manufacturing industry prioritized in the National Roadmap & Action Plan Circular Economy Indonesia 2025-2045.

Previous research by (Appiah et al., 2023; Damayanti & Harti Budi Yanti, 2023; Garcia-Saravia Ortiz-de-Montellano et al., 2023; Pratiwi & Kusumawardani, 2023) shows that the circular economy has a significant impact on products/materials, while sustainable development focuses on people and the environment. Green intellectual capital has a positive influence on circular economy practices and acts as a mediator. Material flow cost accounting contributes to the reduction of production costs and the enhancement of sustainable development, with green intellectual capital strengthening that influence. However, (Mufti, 2021) research found that material flow cost accounting can cause losses in the production process, while variables such as green accounting and environmental cost do not significantly affect sustainable development, thus creating a research gap in this study. Muafi., (2021) also proved that green intellectual capital can moderate the relationship between green culture and green strategy with circular economy practices, focusing on Batik SMEs in Yogyakarta.

Thus, this research differs from previous studies and develops the works of Muafi (2021) and Jakubelskas & Skvarciany (2023) by replacing the variables of green culture and green strategy with circular economy practices and material flow cost accounting, and adding sustainable development as the dependent variable and green intellectual capital as the intervening variable, focusing on the manufacturing industry in Indonesia. This initiative is part of a global effort to address environmental challenges and climate change. Society needs to understand the basic concepts of economics to allocate income, set priorities, and make appropriate decisions in utilizing limited resources to meet needs (Ldra Wahyuni et al., 2024).

Circular economy practices aim to create efficiency in the use of raw material resources, minimize waste, and reduce carbon emissions, thereby decreasing the environmental impact caused by company activities. The concept of circular economy practices is implemented with several basic principles of 4R, namely reduce, reuse, recycle, recover (Gebhardt et al., 2022; Okorie et al., 2018), and with the existence of this concept, circular economy practices are related to sustainable development (Kirchherr et al., 2017). This research uses circular economy practices at the macro level, referring to government policies on the implementation of circular economy practices at the national level, developed with special attention to the interaction between materials, the environment, and the economy at the national level. The government plays a significant and active role in facilitating collaboration among stakeholders, such as industries, consumers, and research institutions, to align the goals and processes of implementing circular economy practices (Musyarofah et al., 2023) while being mindful of the environmental impacts caused by corporate activities.

Material flow cost accounting supports sustainable development by helping management decision-making that focuses on resource efficiency and environmental sustainability (Kokubu et al., 2023). Material flow cost accounting uses indicators such as production costs and raw material costs to encourage sustainable practices. Encouraging the use of the most efficient materials and helping to reduce waste and emissions. This method helps companies reduce waste, increase cost efficiency, and maximize the use of raw materials

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

(Selpiyanti & Fakhroni, 2020), thereby increasing profits while minimizing environmental impact (Marota, 2017).

Intellectual capital increases business value, supports production processes, and strengthens competitiveness (Windu Mulyasari et al., 2019). Green Intellectual Capital plays a crucial role in environmental compliance, organizational value creation, and meeting consumer demand for green concepts (Huang & Kung, 2018). It encompasses intangible assets such as knowledge, expertise, experience, and innovations related to environmental protection, which consist of green human capital, green structural capital, and green relational capital (Chen & Chen, 2008). The management of unique and valuable resources using the resource-based view (RBV) theory, the manufacturing industry in Indonesia can achieve sustainable competitive advantage. Companies can create added value and develop unique products by utilizing various resources, as well as internal capability development, such as employee skills, innovation, and technology, thereby enhancing operational efficiency and keeping up with globalization changes. Emphasizing the importance of maintaining and protecting resources that are difficult for competitors to imitate to ensure the company remains competitive in the market (Aslamiyah et al., 2024). The Triple Bottom Line theory measures a company's success not only from an economic aspect but also from its concern for environmental and social issues (Elkington, 1997). Helping companies build competitive advantages as part of their business strategy (Porter & Kramer, 2006).

This research focuses on the manufacturing industry listed on the Indonesia Stock Exchange based on the Jakarta Stock Industrial Classification (JASICA) for the years 2020–2023. The manufacturing industry is prioritized in the implementation of circular economy practices in Indonesia according to the National Roadmap & Action Plan Circular Economy Indonesia 2025–2045 issued by Bappenas due to its complex supply chain and significant resource usage. Therefore, the implementation of circular economy practices and material flow cost accounting to support sustainable development. In addition, green intellectual capital is used as a mediating variable to assess the role of knowledge and environmentally friendly innovations in enhancing the competitiveness of the company, making it important in promoting environmentally friendly innovations. The manufacturing industry in this study aims to examine the impact of these three variables on achieving sustainable development and the urgency related to the environmental impact caused by the company's activities, so that the company can be sustained not by focusing on profit, but by paying attention to the environmental impact caused by the company's activities.

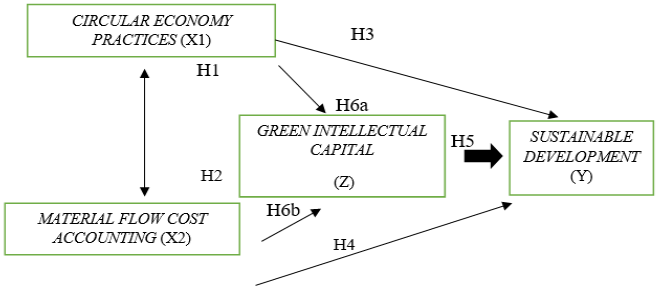
RESEARCH METHODS

In this study, there are dependent variables, namely sustainable development, independent variables, namely circular economy and material flow cost accounting, and a mediating variable, namely green intellectual capital. The type of research uses quantitative methods. Conducting panel data regression analysis techniques using STATA 14 analysis tools and secondary data sources obtained from annual reports, financial statements, and sustainability reporting in the manufacturing industry listed on the Indonesia Stock Exchange based on the Jakarta Stock Industrial Classification (JASICA) for the years 2020–2023, and accessing the United Nations Development Programme (UNDP) Indonesia or the National Development

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 E-ISSN: 2964-1977

Planning Agency (Bappenas) website for official information related to circular economy practices in Indonesia. A population of 186 was obtained, and the sample was taken using the purposive sampling method, where the sample was selected based on characteristics relevant to the objectives of this research, with time series and cross-sectional data from 109 manufacturing industry companies. Thus, it resulted in 436 data over 4 years from 2020-2023. The research model in this study is as follows.



source: researcher, 2025

The macro-level circular economy index is used as a reference in this study because its indicators align with the data system in Indonesia and support government regulations in addressing global environmental issues. This index integrates economic, social, and environmental aspects, including energy, land, and pollution, to promote sustainable economic benefits (Musyarofah et al., 2023).

Circular Economy Practices = Economy+Social+Energy+Land+Pollutant

Economy is in the annual report under the notes to the financial statements in the general and administrative expenses group related to salary costs or expert services and production costs in the cost of revenue group. Social is in the annual report under the notes to the financial statements in the general and administrative expenses group related to insurance. Energy is in the environmental aspect in POJK 51/OJK.03/2017 and the GRI content index. land is in the social and community aspect in POJK 51/OJK.03/2017 and/ GRI content index, then pollutant is in the water and emissions aspect in POJK 51/OJK.03/2017 and/ GRI content index. If identified, input the value of the keyword result and then sum it up, whereas if not identified, assign a value of 0 or leave it blank.

According to Dhahi & Abdullah (2023) and Kokubu et al. (2023), material flow cost accounting measures raw materials in terms of financial value and physical units, including material costs, energy, systems, and waste management. As a management tool, MFCA encourages efficient use of materials and helps reduce waste, emissions, and toxic substances. Material flow cost accounting is considered capable of providing waste information to make waste management decisions, thereby achieving sustainable development(Maulana et al., 2024).

Material Flow Cost Accounting =

Cost of Raw Material Usage+Cost of Using Other Materials

Total Production Cost

The cost of raw materials, the cost of other materials, and the total production cost found in the annual report in the notes to the financial statements in the cost of goods sold/revenue section. If identified, input the value of the target keyword result, then add the cost of raw materials and the cost of other materials, and divide by the total production cost. If not identified, assign a value of 0 or leave it blank.

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

Sustainable development integrates cross-sector planning, promotes sustainable technological innovation, and coordinates policies between central and regional governments. The goal is to meet current needs without compromising future generations. This concept, introduced in Our Common Future by the Brundtland Commission, highlights five main dimensions: economic, social, ecological, environmental, and resource use efficiency. Sustainable development is not only profit-oriented but also considers the social and environmental impacts of business activities. Fakhroni (2020) and Maulana et al. (2024) emphasize the importance of companies in maintaining and enhancing human welfare, both in the present and in the future.

Sustainable Development = Economy+Social+ Enviroment+Technology

Economy is found in the annual report on the statement of financial position and the statement of profit or loss and other comprehensive income, such as investments (investments in subsidiaries, joint ventures, and associates as well as other investments found in the asset group on the statement of financial position); net profit (current year profit found in the statement of profit or loss and other comprehensive income); sales (selling expenses or net sales found in the statement of profit or loss and other comprehensive income). Social is found in the annual report in the notes to the financial statements under the general and administrative expenses group, related to benefits, employee salaries or expert services, and pensions in the post-employment benefit program group in the notes to the financial statements. Environment is included in the sustainability reporting section on occupational health and safety (K3) and maintenance and repair costs are found in the annual report under the notes to the financial statements in the general and administrative expenses group. Technology is included in the sustainability reporting under the environmental cost group, covering training and certification costs, as well as advertising/promotion/public relations costs in the annual report, which are found in the notes to the financial statements under the general and administrative expenses group. If not identified, it is given a value of 0 or left blank.

According to Chen & Chen (2008) and Huang & Kung (2012), green intellectual capital (GIC) consists of three dimensions. Green human capital includes the knowledge, skills, and competencies of employees in environmental issues, including green management and innovation. Green structural capital includes the systems, structures, and policies of the company that support environmentally friendly practices, such as green technology and production efficiency. Green relational capital relates to the company's external relationships, such as partnerships with green suppliers and its reputation as an environmentally friendly entity. These three dimensions are interconnected and contribute to sustainable development. This research refers to the indicators and dimensions of GIC developed by Huang & Kung (2012). The measurement of content analysis of green intellectual capital in this study refers to Huang & Kung (2012) to analyze each item disclosed by the company.

Dimension	***Indicator***
Green Human Capital (GHC)	The company involves employees in positive productivity for environmental protection.
	Sufficient competence for company employees regarding environmental protection (certification).
	The company's employees provide high-quality, environmentally friendly products and services.

International Journal of Economic Research and Financial Accounting
International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 E-ISSN: *2964-1977*

	The cooperation among employees in environmental protection is very good. The manager strongly supports the company's employees to achieve their goals and align with environmental protection.
Green Structural Capital (GSC)	The company's management system is very good regarding environmental protection. The company formed a committee to advance the main issue of environmental protection. The company has regulations regarding environmental protection. The company invests adequately in environmental protection facilities. The company has a high ratio of employees who understand environmental management and protection to the total number of employees. The entire operational process of the company related to environmental protection runs smoothly. The company's knowledge management system works well to collect and share knowledge about environmental protection management. The reward system for achieving environmental protection has been established by the company.
*Green Relational Capital (*GRC)	The company produces environmentally friendly goods and services. Consumers respond positively to the company's environmental protection efforts. The company's relationship with suppliers is stable regarding environmental protection. The company's relationship with clients is stable regarding environmental protection. The company's relationship with its partners is stable regarding environmental protection.

GIC = $\frac{n}{k}$**.** Explanation: GIC, which stands for Green Intellectual Capital; N, which is the number of disclosed indicator items; K, which is the number of GIC indicator items. If there are no target keywords or those to be identified, then it is given a value of 0 or left blank.

The regression model is tested through model testing first to obtain the optimal regression model among the Common Effect Model, Fixed Effect Model, and Random Effect Model. The panel data regression model used in this study is as follows:

$$Yit = \alpha + \beta 1CEPit + \beta 2MFCAit + \beta 3GICit + e \quad (1)$$

$$Zit = \alpha + \beta 1CEPit + \beta 2MFCAit + e \quad (2)$$

Keterangan:

Zit = *Green Intellectual Capital*
a = Constanta
$\beta_{1,2,3}$ = Regression coefficient variables
CEP***it*** = *Circular Economy Practices*
MFCA***it*** = *Material Flow Cost Accounting*
e = *Error*

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

RESULTS AND DISCUSSION

After conducting a panel data regression test using STATA 14, the best method in this study is the Random Effect Model. According to Gujarati & Porter (2009), panel data estimation with the Random Effect Model (REM) uses the Generalized Least Squares (GLS) method, which automatically meets the classical assumptions, thus not requiring classical assumption tests. In the selection of the panel data regression model, this study applies the Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test based on the research by Gujarati & Porter (2012), as cited by Virna et al. (2019). The test results in this study are as follows.

TABLE 1. PANEL DATA REGRESSION MODEL

UJI CHOW	Prob > F = 0.0000 < 0.05, then the selected FEM
UJI HAUSMAN	Prob > chi2 = 0.0000 < 0.05, then the selected FEM
UJI LEGRANGE MULTIPLIER	Chibar2 (01) = 307.56 Prob > chibar2 = 0.0000, **then the selected REM**

Sumber: hasil output program STATA 14, 2025

TABLE 2. MULTIPLE LINEAR ANALYSIS RESULTS RANDOM EFFECT MODEL (REM)

SUSTAINABLE DEVELOPMENT	COEFFICIENT	STD. ERR	Z	P > (Z)
CIRCULAR ECONOMY PRACTICES	0.7184596	0.0358696	20.03	0.000
MATERIAL FLOW COST ACCOUNTING	-0.0624105	0.0822812	-0.76	0.448
GREEN INTELLECTUAL CAPITAL	0.00107769	0.00005426	1.98	0.047
CONS.	5.135111	1.004239	5.11	0.000
R-SQUARE				0.8075
PROB. > CHI2				0.0000
WALD CHI2				401.47

Source: STATA 14 program output results, 2025

In accordance with the information in table 2, the results of the F test are obtained: Fhitung 401.47> 8.53 Ftable value. With Sig value. 0.000 <0.05, then circular enonomy practices and material flow cost accounting simultaneously have a significant effect on sustainable development. In addition, the R2 test produces 0.8075 which has the conclusion that circular enonomy practices and material flow cost accounting on sustainable development have a significant effect simultaneously with a value of 80.75% and the rest is in variables not examined by this study. Then the model equation is obtained, as follows.

$$Yit = 5.135111 + 0.7184596CEP_{it} - 0.0624105\ MFCA_{it} + 0.0010769GIC_{it} + e \quad (1)$$

$$Zit = 5.135111 + 0.7184596CEP_{it} - 0.0624105\ MFCA_{it} + e \quad (2)$$

Circular Economy Practices on Sustainable Development

Circular economy practices act as an instrument to achieve sustainable development (De Sousa et al., 2023). With the resource-based view approach, a company's internal resources and capabilities, such as recycling technologies and waste management systems, become the key to

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

sustainable competitive advantage (Barney, 1991). The triple bottom line theory emphasizes that the success of a company is not only measured by its financial performance, but also by its impact on the environment and society (Elkington, 1997). Circular economy practices that apply the 3R principles (reduce, reuse, recycle) can improve resource efficiency, reduce waste, and provide economic and social benefits (Kirchherr et al., 2017). Thus, reduce emphasizes reducing the use of resources and energy and minimizing waste, thereby reducing production costs, improving operational efficiency, and reducing the exploitation of natural resources and greenhouse gas emissions. Reuse focuses on reusing products that still have value, reducing the need to produce new goods, and opening up market opportunities for used goods, which in turn reduces the amount of waste. Meanwhile, recycle involves processing waste into new products, extending the life of materials, and supporting the growth of the recycling industry by creating jobs.

Based on the value of this study, circular economy practices with a t-count value (20.03) > t-table (1.97) with Prob. (0.000) < (0.05). This proves that circular economy practices have a significant positive effect on sustainable development. The results of the study are in line with De Sousa et al., (2023), Jakubelskas & Skvarciany, (2023) Garcia-Saravia Ortiz-de-Montellano et al., (2023) that circular economy practices are a renewable effective strategy to achieve sustainable development by emphasizing resources to the environment and implementing the 3Rs (reduce, reuse, recycle) in a company activity or on a country scale.

Material Flow Cost Accounting on Sustainable Development

Material flow cost accounting allows companies to reduce waste, increase efficiency in resource use, and reduce negative impacts on the environment by applying the principles of sustainable development (Maulana et al., 2024). Companies can not only increase profitability (Profit), but also play a role in maintaining environmental sustainability (Planet) and social welfare (People) like the triple bottom line theory. By balancing economic, social, environmental, and technological aspects, companies can improve overall performance and strengthen their business sustainability (Fakhroni, 2020). Material flow cost accounting focuses on material efficiency and environmental cost reduction by identifying and measuring material flows and production costs. Its application helps reduce costs, reduce waste, and increase environmental awareness. In the context of sustainable development, material flow cost accounting contributes to three main aspects: economic, by reducing material costs and improving profitability; environmental, by managing and reducing production waste; and social, by increasing employee awareness of material efficiency and environmental responsibility. Overall, material flow cost accounting supports sustainability through resource optimization and environmental impact reduction. (Kokubu et al., 2023; Maulana et al., 2024; Schmidt & Nakajima, 2013; Tran, 2022; Tran & Herzig, 2020).

However, Mufti's research, (2021) found losses in the company based on the analysis of the production process using material flow cost accounting. In addition, Jasmine, (2025) found that material flow cost accounting has no effect on sustainable development because it is suspected that cost inefficiencies in implementing MFCA are still high, so it has not been able to reduce production costs and increase profits. The recapitulation of MFCA costs, including energy, labor, and waste management, has not contributed enough to the sustainability of the company. The average production costs (IDR 1.9 trillion), production material flow (IDR 1.1 trillion), and production output (IDR 144.7 billion) show that the proportion of material flow cost accounting is still low, so it has not had a significant impact on sustainable development. In this study, material flow cost accounting has no effect on sustainable development. Based on the

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

value of this study, material flow cost accounting with a t-count value (-0.76) > t-table (1.97) with Prob. (0.448) > (0.05). Thus, the results of this hypothesis test are unable to prove the effect of material flow cost accounting in the manufacturing industry on sustainable development. The application of material flow cost accounting in manufacturing companies in this study is still not optimal. Other factors that hinder the effectiveness of MFCA include difficulties in measuring material flow, environmental impacts, and limited data and monitoring.

Circular Economy Practices on Green Intellectual Capital

Green intellectual capital plays an important role in the implementation of circular economy as an intangible knowledge asset that includes skills, competencies, and capabilities to improve environmental performance. In addition, it strengthens the company's impact in economic, social, and environmental aspects through sustainability practices such as reuse, reduce, and recycle (Appiah et al., 2023). Based on the triple bottom line theory, circular economy practices improve environmental, social, and economic performance. Meanwhile, the resource-based view theory emphasizes that unique green intellectual capital management provides a competitive advantage in circular economy practices. Circular economy practices are often considered to improve corporate sustainability through resource efficiency and waste reduction.

Based on the value of this study, circular economy practices with t-count (-1.48) > t-table (1.97) with Prob. (0.138) > (0.05). This proves that circular economy practices have no effect on green intellectual capital. The effect on green intellectual capital is not significant because circular economy practices focus more on operational aspects (reuse, reduce, and recycle) while green intellectual capital includes intangible elements such as sustainability knowledge and skills. Mohd et al. (2019) showed that the relationship between sustainability efforts and green intellectual capital may vary depending on how and where the practices are implemented. Meanwhile, Chen (2008) emphasized that green intellectual capital is more related to innovation and human resource management than operational practices. Muafi (2021) points out that although circular economy practices can improve environmental aspects, their direct relationship with green intellectual capital is not always significant due to differences in orientation between the two.

Material Flow Cost Accounting on Green Intellectual Capital

Material flow cost accounting and green intellectual capital have a simultaneous significant relationship in supporting sustainable development (Himmah et al., 2024). Material flow cost accounting focuses on production cost efficiency by identifying material flows and potential savings through reducing waste and emissions. Meanwhile, green intellectual capital consisting of green human capital, green relational capital, and green structural capital plays a role in innovation and sustainability-based environmental management.

From a triple bottom line perspective, material flow cost accounting improves green human capital by providing training on resource efficiency, strengthens green relational capital through collaboration with stakeholders, and supports green structural capital through the implementation of more environmentally friendly systems (Pratiwi & Kusumawardani, 2023). Based on the resource-based view theory, effective management of green intellectual capital provides a competitive advantage for companies in the implementation of material flow cost accounting in an effort to achieve sustainable development. However, research (Yusoff et al., 2019) shows that the relationship between sustainability efforts and green intellectual capital can vary depending on how and where the practice is implemented.

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

Based on the value that this study has, material flow cost accounting with a t-count value (1.72) < t-table (1.97) with Prob. (0.086) > (0.05). This proves that material flow cost accounting has no effect on green intellectual capital. The effect on green intellectual capital is not significant because material flow cost accounting's main focus is on managing costs and resource efficiency in the production process, which is more technical and operational in nature. Meanwhile, green intellectual capital includes intangible elements such as knowledge, innovation and skills needed to support environmental sustainability. Thus, material flow cost accounting does not directly affect the development of green intellectual capital. Research by Himmah et al. (2024) showed that although material flow cost accounting has a positive impact on firm performance, the direct relationship between material flow cost accounting and green intellectual capital was not found to be significant, indicating that other factors may be more dominant in influencing the development of green intellectual capital.

Green Intellectual Capital* on *Sustainable Development

Green intellectual capital plays an important role in supporting sustainable development by encompassing knowledge, innovation and expertise focused on environmental sustainability (Martínez-Falcó et al., 2023). Green intellectual capital consists of three main dimensions: green human capital, creating employees committed to green practices through training and certification; green structural capital, enabling organizations to develop new skills and respond to environmental challenges with efficient systems; and green relational capital, strengthening relationships with stakeholders to support green innovation (Chen & Chen, 2008; Huang & Kung, 2012). Astuti et al. showed that GHC and GSC have a significant positive relationship with sustainable development, while GRC has a significant positive relationship with the economic aspects of sustainable development but does not show a significant influence in environmental aspects (Astuti et al., 2023).

However, based on the value of this study, green intellectual capital with a t-count (1.98) > t-table (1.97) with Prob. (0.047) < (0.05). This proves that green intellectual capital has a significant positive effect on sustainable development. Thus, green intellectual capital plays an important role in sustainable development by integrating environmentally-based knowledge, innovation, and expertise. Green human capital builds employee awareness of sustainability through training and certification, green structural capital supports the development of environmentally friendly systems and policies, and green relational capital can strengthen relationships with stakeholders to encourage green innovation. The three dimensions of green intellectual capital can increase the competitiveness of the company while ensuring economic, social and environmental sustainability in the long term to achieve sustainable development.

Green Intellectual Capital mediates the relationship between Circular Economy Practices and Material Flow Cost Accounting on Sustainable Development

Muafi (2021) shows that although circular economy practices can improve environmental aspects, their direct relationship with green intellectual capital is not always significant due to differences in orientation between the two. Mufti, (2021) found losses in the company based on the analysis of the production process using material flow cost accounting. Mohd et al. (2019) showed that the relationship between sustainability efforts and green intellectual capital can vary depending on how and where the practices are implemented. This mismatch of orientation focus on the manufacturing industry may result in green intellectual capital not having a significant role in mediating the impact of circular economy practices on achieving sustainable development.

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

Based on the value of this study, circular economy practices with a P-value (0.23477481) > (0.05), proving that green intellectual capital is not able to mediate the relationship of circular economy practices to sustainable development. In material flow cost accounting, the P-Value (0.1937713) > (0.05), proving that green intellectual capital is unable to mediate the relationship between material flow cost accounting and sustainable development. Muafi (2021) shows that although green intellectual capital has the potential to support sustainability, it is unable to strengthen the relationship between green culture and circular economy practices, indicating that other factors may be more relevant in this context.

CONCLUSION

This research was conducted using secondary data and quantitative methods with data obtained from annual reports, financial statements, and sustainability reports of manufacturing industry companies listed on the Indonesia Stock Exchange based on the Jakarta Stock Industrial Classification (JASICA) for 2020-2023 and accessing the United Nations Development Programme (UNDP) Indonesia website or the Ministry of National Development Planning / National Development Planning Agency (Bappenas). A population of 186 was obtained and sampling using purposive sampling method, where samples were selected based on characteristics relevant to the objectives of this study with time series data and cross section data of 109 manufacturing industry companies. This resulted in 436 data for 4 years in 2020-2023. Based on the results of this study, it is concluded that:

1. Circular economy practices affect sustainable development.
2. Green intellectual capital affects sustainable development.
3. Circular economy practices and material flow cost accounting have a significant effect simultaneously on sustainable development.
4. Material flow cost accounting has no influence on sustainable development.
5. Circular economy practices have no influence on green intellectual capital.
6. Material flow cost accounting has no influence on green intellectual capital.
7. Green intellectual capital cannot mediate the relationship between circular economy practices and material flow cost accounting.

The limitations of this study, which only include manufacturing industry companies listed on the Indonesia Stock Exchange based on the Jakarta Stock Industrial Classification (JASICA) in 2020-2023. The variable measurement items that have been disclosed by manufacturing industry companies obtained from the reference journal are not always complete, perhaps because the company does not disclose them and the need for other measurements that are suitable for all companies as research objects. In addition, this research is still rarely researched in Indonesia. This research implies that companies need to improve efficiency and implement a comprehensive strategy to achieve sustainable development. In addition, this research is expected to contribute broadly in supporting sustainable development efforts, both in the manufacturing industry and other sectors equally. Therefore, with the limitations of the study, future researchers can examine with different sectors or industries. Furthermore, it can collaborate the variables in this study with other variables and / or add control variables, and

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

further researchers are expected to be able to create or obtain measurement items that are more capable of developing sustainability for all companies as research objects.

REFERENCES

Appiah, M. K., Sam, A., Osei-Agyemang, V., & Nsowah, A. (2023). Green culture, environmental innovativeness, green intellectual capital and circular economy implementation behaviour: A sequential mediation model. *Cogent Engineering*, *10*(1). https://doi.org/10.1080/23311916.2023.2220496

Astuti, P. D., Datrini, L. K., & Chariri, A. (2023). *AN EMPIRICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN GREEN INTELLECTUAL CAPITAL AND CORPORATE SUSTAINABLE DEVELOPMENT*. *4*(2), 48–58. https://doi.org/10.22495/cbsrv4i2art5

Damayanti, R. S., & Harti Budi Yanti. (2023). Pengaruh Implementasi Green Accounting Dan Material Flow Cost Accounting Terhadap Sustainable Development. *Jurnal Ekonomi Trisakti*, *3*(1), 1257–1266. https://doi.org/10.25105/jet.v3i1.16014

De Sousa, N. M., Oliveira, C. B., & Cunha, D. (2023). Photovoltaic electronic waste in Brazil: Circular economy challenges, potential and obstacles. *Social Sciences and Humanities Open*, *7*(1). https://doi.org/10.1016/j.ssaho.2023.100456

Garcia-Saravia Ortiz-de-Montellano, C., Samani, P., & van der Meer, Y. (2023). How can the circular economy support the advancement of the Sustainable Development Goals (SDGs)? A comprehensive analysis. *Sustainable Production and Consumption*, *40*(March), 352–362. https://doi.org/10.1016/j.spc.2023.07.003

Gebhardt, M., Spieske, A., & Birkel, H. (2022). The future of the circular economy and its effect on supply chain dependencies: Empirical evidence from a Delphi study. *Transportation Research Part E: Logistics and Transportation Review*, *157*(October 2021). https://doi.org/10.1016/j.tre.2021.102570

Jakubelskas, U., & Skvarciany, V. (2023). *OeconomiA copernicana*. *14*(3). https://doi.org/10.24136/oc.2023.025

JASMINE, K. (2025). Pengaruh Implementasi Green Accounting dan Material Flow Cost Accounting Terhadap Sustainable Development. *Pengaruh Implementasi Green Accounting Dan Material Flow Cost Accounting Terhadap Sustainable Development*, *12*(1), 1–21. https://e-jurnal.lppmunsera.org/index.php/Akuntansi/article/view/8049

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, *127*(September), 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005

Kokubu, K., Kitada, H., Nishitani, K., & Shinohara, A. (2023). How material flow cost accounting contributes to the SDGs through improving management decision-making. *Journal of Material Cycles and Waste Management*, *25*(5), 2783–2793. https://doi.org/10.1007/s10163-023-01696-7

Kompetitif, K., Daya, S., Bisnis, S., & Global, P. *PENDEKATAN RESOURCE-BASED VIEW (RBV) DALAM MANAJEMEN BISNIS : STRATEGI UNTUK KEUNGGULAN*. *1*, 176–183.

Marota, R. (2017). Green Concepts and Material Flow Cost Accounting Application for Company Sustainability. *Indonesian Journal of Business and Entrepreneurship*, *3*(1), 43–

International Journal of Economic Research and Financial Accounting

International Journal of Economic Research and financial Accounting (IJERFA)
Volume 3, Number 3, April 2025, Page. 656 - 668 **E-ISSN: *2964-1977***

51. https://doi.org/10.17358/ijbe.3.1.43

Mufti. (2021). *ANALISIS EFISIENSI PRODUKSI MENGGUNAKAN FRAMEWORK MATERIAL FLOW COST ACCOUNTING (MFCA) PADA INDUSTRI BATIK (Studi Kasus di Batik Sekarniti)*. *75*(17), 399–405. https://doi.org/https://doi.org/10.22146/abis.v9i2.65900

Musyarofah, S. A., Tontowi, A. E., Masruroh, N. A., Wibowo, B. S., Mada, U. G., Ayu, I. D., Warmadewanthi, A., Nasution, A. H., & Bhawika, G. W. (2023). *DEVELOPING A CIRCULAR ECONOMY INDEX TO MEASURE THE MACRO LEVEL OF CIRCULAR ECONOMY IMPLEMENTATION IN INDONESIA*. *0*. https://doi.org/10.2478/mspe-2023-0022

Okorie, O., Salonitis, K., Charnley, F., Moreno, M., Turner, C., & Tiwari, A. (2018). Digitisation and the circular economy: A review of current research and future trends. *Energies*, *11*(11), 1–31. https://doi.org/10.3390/en11113009

Pratiwi, L. R., & Kusumawardani, N. (2023). Green Intellectual Capital, Environmental Cost, dan Material Flow Cost Accounting Terhadap Sustainable Development. *Economics and Digital Business Review*, *5*(1), 13–21. https://doi.org/10.37531/ecotal.v5i1.798

Selpiyanti, S., & Fakhroni, Z. (2020). Pengaruh Implementasi Green Accounting dan Material Flow Cost Accounting Terhadap Sustainable Development. *Jurnal ASET (Akuntansi Riset)*, *12*(1), 109–116. https://doi.org/10.17509/jaset.v12i1.23281

Windu Mulyasari., & . E. M. (2019). Intellectual Capital, Competitive Advantage, Financial Performance and Company Value Among Banking Industries in Indonesia. *Advances in Social Sciences Research Journal*, *6*(4), 78–89. https://doi.org/10.14738/assrj.64.6419

Yusoff, Y. M., Omar, M. K., Kamarul Zaman, M. D., & Samad, S. (2019). Do all elements of green intellectual capital contribute toward business sustainability? Evidence from the Malaysian context using the Partial Least Squares method. In *Journal of Cleaner Production* (Vol. 234, pp. 626–637). https://doi.org/10.1016/j.jclepro.2019.06.153