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Green Logistic and Absorptive Capacity on Business Sustainability: The Mediating Role of Circular Economy Implementation

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Abstract:

Purpose: This study examines and analyzes whether: (a) Green logistics is positively related to circular economy implementation, (b) Absorptive capacity is positively related to circular economy implementation, (c) Circular Economy (CE) implementation is positively related to Business Sustainability, (d) the role of CE implementation in mediating the influence of Green logistics on Business Sustainability, and (e) the role of CE Implementation in mediating the influence of Absorptive capacity on Business Sustainability

Design/methodology: This study uses a quantitative approach. The population is all natural-colored batik SMEs in the Provinces of Central Java and West Java. Respondents are owners/managers of batik SMEs with a target sample of 250 SMEs. After the data is collected, 228 questionnaires are returned and can be processed further. The statistical technique employed is partial least squares with structural equation modeling.

Findings: According to this study, there is a significant positive influence of: (a) Green logistics for circular economy implementation, (b) Absorptive capacity for circular economy implementation, (c) CE implementation for Business Sustainability. Furthermore, CE implementation mediates Green logistics for Business Sustainability, and (e) CE implementation mediates Absorptive capacity on Business Sustainability

Research limitations/implications: In the SMEs under investigation, the circular economy is being implemented in a simple manner. The role of mediation can consider other variables that are no less important in the context of batik SMEs that use natural colors. Respondents are only represented by SME groups in associations in the Klaten (Central Java) and Ciwaringin (West Java) regions, thus it is feared that the results would not be adequate to be generalized for the natural dye batik SME population in Indonesia. It is recommended that future studies consider longitudinal approach to ensure and obtain a more robust data.

Managerial Implication: Business processes in SMEs which use natural dye should consider green logistics aspects as it will have positive impact in the long term, especially on Business Sustainability. In improving SMEs business sustainability, it is necessary to conduct absorptive capacity consistently, continuously, persistently. This is crucial to do in order to raise the competence of SMEs. When all resources are good, CE implementation can be implemented better by integrating the existing business processes.

Theoretical Implication: This study provides enrichment to the literature on circular economy implementation in SMEs that are influenced by green logistics and absorptive capacity. It can make a significant contribution to help boost the sustainability of businesses (business, social, and environmental performance).

Originality/value: This study has its originality due to the lack of study examining circular economy implementation in the context of SMEs which is influenced by green logistics and absorptive capacity. This study also offers a significant contribution to improve business sustainability (business, social, and environmental performance). Likewise, it also examines the mediating role of CE implementation between Green Logistics and Business Sustainability, as well as the mediating role of CE Implementation between Absorptive Capacity and Business Sustainability.

Keywords: green logistics, absorptive capacity, circular economy implementation, business sustainability

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1. Introduction

The implementation of the circular economy currently becomes an emerging strategic issue, especially in the context of SMEs. Circular economy can be used to realize successful green management programs in companies. The company's green management strategy through a circular economy can be used to increase business sustainability and green competitive advantage through environmental preservation, waste reduction, the increase of energy efficiency, resource depletion prevention, and sustainable economic development (Ozkan-Ozen, Kazancoglu & Mangla, 2020; Prieto-Sandoval, Jaca & Ormazabal, 2018; Bastein, Roelofs, Rietveld & Hoogendoorn, 2013). When a company implements a circular economy, it is expected to have benefits from supply chain aspects, competitive pricing, more sustainable products in the long term, and new business opportunities for companies (Khan, Daddi & Iraldo, 2020; Kirchherr, Reike, & Hekkert, 2017). Regarding the supply chain management (SCM), companies need to manage green logistics and absorptive capacity so that CE implementation run as expected (Marrucci, Iannone, Daddi & Iraldo, 2021; Schmitt & Hansen, 2018; Sun & Li, 2021).

Graham, Graham and Holt (2018) stated that one of the factors considered to be the cause of environmental damage is the production process in the industry, namely logistics. Logistic activities lead to increase air pollution, such as greenhouse gases, global warming, and others. In this matter, support from absorptive capacity is needed as it can strengthen, complement, or focus the organizational knowledge base (Lane, Koka & Pathak, 2006), especially in SMEs. Organizational knowledge is needed for SMEs so that they keep follow the developments in the highly competitive business world (Muafi & Sulistio, 2022; Velasquez, Esquer., Munguia & Maoure-Eraso, 2011). Absorptive capacity in general is still dominated by large companies, while its implementation in SMEs are still underexplored (Mustafa-Kamal & Flanagan, 2012). Meanwhile, green logistics is the initial trigger when circular economy/CE practices are implemented by companies (Seroka-Stolka & Ociepa-Kubicka, 2019; Ormazabal, Sandoval, Jaca & Santos, 2016; Ćirović, Pamučar & Božanić, 2014). This requires optimizing absorptive capacity (Marrucci et al., 2021). Therefore, green logistics and absorptive capacity are used as the basis for implementing CE in increasing the business sustainability of SMEs. Business sustainability is the ability of companies that are pro-environmentally oriented, pro-social, as well as pro-profit (Das & Singh, 2016; Velasquez et al., 2011).

Indonesia has set a target of becoming the country with the fifth largest economic growth in the world by 2045. Therefore, it is necessary to develop a strategy in facing the challenges of climate change into an opportunity to increase significant economic growth in order to achieve prosperity in the long term while also preserving the environment. Low carbon development and circular economy implementation are strategies that can be used by Indonesia (Kementerian Perencanaan Pembangunan Nasional/Bappenas, 2022). This study focuses on batik SMEs that are oriented towards natural dye for its production process, which is located in the Provinces of Central Java and West Java. The SMEs studied have associations, each of which is managed with a commitment to

environmental preservation. Since established, they have a commitment from the beginning of production to the finished material using a natural coloring process by utilizing the basic ingredients of wood, leaves, and roots coloring, thus it does not damage the environment. This study is conducted to fill research gaps and become research updates for the following reasons;

1. Study on CE implementation in SMEs context in Indonesia is still rarely conducted especially when it is associated with green logistics and absorptive capacity (Marrucci et al., 2021; Seroka-Stolka & Ociepa-Kubicka, 2019; Ćirović et al., 2014) which be an antecedent of CE implementation. This aspect is expected to become a crucial aspect because SMEs are more focused on using an environmental approach.
2. There are study findings which conclude implementation of SCM cannot directly affect sustainable organizational performance (Yang, Sun, Zhang & Wang 2020: Ormazabal et. al., 2016., Chin, Tat & Sulaiman, 2015). Likewise, Kostopoulos, Papalexandris, Papachroni and Ioannou (2011) and Lane et al. (2006) found that absorptive capacity has not been able to explore the reciprocal relationship with financial performance. Therefore, the role of other variables is still needed as a mediator or moderator.
3. The implementation of CE by Batik SMEs is still rarely performed optimally due to the limited ownership of human resources, technology, and other resources. Nonetheless, their CE practices are expected to increase business sustainability in terms of business performance (Prieto-Sandoval, Torres-Guevara, Ormazabal & Jaca, 2021; Kristoffersen, Mikalef, Blomsma & Li, 2021; Kwarteng, Simpson & Agyenim-Boateng, 2021; Jabbour, Seuring, Jabbour, Jugend, Fiorini, Latan et al., 2020), environmental performance (Harris, Martin & Diener, 2021; Lazarevic & Valve, 2017), and social performance (Mies & Gold, 2021; García-Muiña, Medina-Salgado, González-Sánchez, Huertas-Valdivia, Ferrari & Settembre-Blundo, 2021).
4. Currently, SMEs must deal with extremely hostile and volatile batik market competition. Some batik SMEs have started to switch to synthetic coloring where the production process requires raw materials that are easier, cheaper, and faster so that they can produce in large quantities. The natural color batik SMEs studied in Central Java and West Java put forward strategies that are oriented towards green management in order to be more resilient in the long run. Green logistics and absorptive capacity (AC) are crucial aspects of CE implementation which are anticipated to increase corporate sustainability (Marrucci et al., 2021; Seroka-Stolka & Ociepa-Kubicka, 2019; Ćirović et al., 2014; Harris et al., 2021; Lazarevic & Valve, 2017; Mies & Gold, 2021; García-Muiña et al., 2021).
5. The role of natural color batik SMEs in boosting the image, value, and uniqueness of batik market to become one of the superior products is expected to increase economic growth and welfare of the surrounding community as well as helping the government to reduce carbon emissions, provide employment, and contribute to state division (Muafi & Uyun, 2018).

The urgency of this study is also conducted in order to participate in the success of the Nine Nawa Cita agenda of the President of the Republic of Indonesia and UII research strategic planning 2021-2025 namely inclusive development to create a civilized and sustainable society (*baldatun thoyibatun wa-robbun ghofur*) facing the Industrial Age 4.0 and Society 5.0 in Indonesia. Specifically, this study aims to investigate and evaluate the impact of green logistics and absorptive capacity on business sustainability mediated by CE implementation in natural-colored batik SMEs in Central Java and West Java Provinces.

2. Literature Review

2.1. Green Logistic and Circular Economy Implementation

The current concern for the environment is directing companies to switch on green logistics practices (de Souza, Kerber, Bouzon & Rodriguez, 2022). Green logistic reduces greenhouse gas emissions, the use of fossil fuels, and recycle items after their life cycle. According to Seroka-Stolka & Ociepa-Kubicka (2019), the current green logistic practices are the beginning of the circular economy development, while also reducing the environmental impact using an environmental perspective in logistics (Ćirović et al., 2014). Green logistic includes product acquisition, production, distribution, consumption, and product recycling. Alshubiri (2017) stated that the main goal of green

logistics is to lessen the damaging impact of business on the environment, minimize production costs, increase product value, reduce logistics costs, and increase profits. All of which are directed at the company's efforts to maintain sustainable development. Green logistic is aimed at ensuring the logistics process in the company runs properly, and it has minimal negative impact on the environment.

Green logistic has various aspects, such as green production methods, supplier selection, green certification, and strategic partnerships with suppliers These various aspects are seen as influencing company performance in implementing circular economy (Khan, Razzaq, Yu & Miller, 2021; Jinru, Changbiao, Ahmad, Irfan & Nazir, 2021; Bag & Pretorius, 2020). The implementation of a circular economy is more than merely recycling garbage and renewable resources that can be recycled without harmful external impacts, but it exists with the ultimate goal of supporting environmental sustainability (Jinru et al., 2021). Green logistic practices help companies engage in the circular economy implementation effectively through various activities related to reducing emissions, saving energy, and using green operational resources (Zhang, Zhang, Zhang, Zhou & Zhang, 2020; Bressanelli, Adrodegari, Perona & Saccani, 2018). Jinru et al. (2021) examined the influence of green logistics on circular economy implementation in manufacturing companies in China. The finding shows that green logistic is important in organizations to facilitate the production process of green and sustainable products, so that they are able to put a circular economy in place in their businesses. Sun and Li (2021) also added that the development of green logistics is an important component of implementing a circular economy in companies. In line with this, green logistics is seen as a prerequisite and can act as the basis for implementing a circular economy.

H1. Green logistic has positive effect on circular economy implementation

2.2. Absorptive Capacity and Circular Economy Implementation

Circular economy is a manufacturing process (Shahzad, Du, Khan, Shahbaz, Murad & Khan, 2020) that encourages sustainable consumption while directing organizations to achieve sustainability and economic growth (Akram, Chen, Khalid, Huang & Irfan, 2021). The circular economy is the idea that value may be created by using resources wisely, utilizing alternative energy sources, recycling waste, and reducing the usage of hazardous materials across the whole product life cycle (Jinru et al., 2021; Khan et al., 2021; Seroka-Stolka & Ociepa-Kubicka, 2019). The initial concept of absorptive capacity is brought by Cohen and Levinthal (1990) as the business's capacity to appreciate the value of new knowledge from external sources, then assimilate and use it as the capacity or capability of the recipient, namely an individual or an organization. Carayannis (2012) stated that absorptive capacity is the capacity of companies or individuals to assimilate values and use knowledge transferred to them. Absorptive capacity is often seen through how organizations collect new knowledge and turn it into a competitive advantage (Marrucci et al., 2021).

When it conducts routinely, organizations can generate dynamic organizational capacities through acquiring, assimilating, modifying, and utilizing knowledge (Zahra & George, 2002), so as improve organizational performance and innovation (Mei & Nie, 2007; Cohen & Levinthal, 1990). When it is related to circular economy implementation, Schmitt and Hansen (2018) emphasized that absorptive capacity that develops from individual to organization can lead to organizational success in implementing circular economy through a continuous learning process. Marrucci et al. (2021) conducted a study on six SMEs in Italy, and found that absorptive capacity contributes to how SMEs are implementing a circular economy. Schmitt & Hansen (2018) added that ACAP's theory with the fundamental procedures of identification, assimilation, and application provide a way to peek inside business processes for circular innovation. This is also a challenge for the company to produce company CE product innovations.

H2. Absorptive capacity has positive effect on circular economy implementation

2.3. CE Implementation on Business Sustainability

The circular economy is a theory that is established with two main goals, namely maintaining economic prosperity and environmental quality (Prieto-Sandoval et al., 2021; Kirchherr et al., 2017; Merli, Preziosi & Acampora, 2018). The circular economy idea makes sense intuitively to keep resources flowing through economic operations, reduce wastage of resources on earth, and reduce the impact of extraction, emission and waste disposal (Prieto-Sandoval

et al., 2021; Lazarevic & Valve, 2017; Harris et al., 2021). Kristoffersen et al. (2021) and Bastein et al. (2013) stated that CE implementation has an immediate influence on the business performance of a corporation. These findings are also corroborated by Jabbour et al. (2020), Khan (2020), Shahzad et al. (2020) and Yu, Khan and Liu (2020) who discovered that the use of the economy can affect not only how well businesses succeed but also how well the environment and society perform.

Companies can operate efficiently (Kwarteng, 2021) by conducting several activities such as reusing raw materials, conducting recycling processes, and recovering resources used in business processes from upstream to downstream. Several studies agree that implementing a circular economy improves environmental performance (Schwarz, Ligthart, Bizarro, De Wild, Vreugdenhil, & Van Harmelen, 2021; Harris et al., 2021; Marrucci et al., 2021; Sparrevik, De Boer, Michelsen, Skaar, Knudson & Fet, 2021; Khan et al., 2021). Circular economy is able to reduce the adverse impact of business operations on the environment. Several studies also prove that the circular economy improves societal performance (Padilla-Rivera, Russo-Garrido & Merveille, 2020; Korhonen, Honkasalo & Seppälä, 2018). García-Muiña et al. (2021) and Moreau, Sahakian, van Griethuysen and Vuille (2017) recommended integrating social dimensions in circular economy implementation for the purpose of fostering positive social and environmental performance. Das and Singh (2016) and Velasquez et al. (2011) reinforced that companies who have a strong commitment to environmental management will correlate their business performance and social performance. This indicates that the business has a vision and mission for business continuity.

H3. CE implementation has positive effect on Business Sustainability

H4. CE implementation mediates the inflluence of Green logistic on Business Sustainability

H5. CE implementation mediates the inflluence of Absorptive capacity on Business Sustainability

3. Research Method

This study is carried out on SMEs which produced natural-dyed batik in Central Java and West Java Provinces. These two provinces have large and well-known natural-yed batik SMEs in their respective regions. The province of Central Java is represented by natural-dyed batik SMEs which are included in the Kebon Indah batik community. Meanwhile, West Java Province is represented by natural-dyed batik SMEs which are included in the Ciwaringin batik community. With the positivism approach applied, this study attempts to ascertain the pattern of relationships between green logistic, absorptive capability, CE Implementation, and business sustainability (Hair, Risher, Sarstedt & Ringle, 2019).

The participants in this study are all owners or managers or concurrent managers of batik SMEs in Central Java and West Java Provinces. The SMEs in the batik industry have shown resiliency in facing Covid-19 outbreak. In order to do this, a sample of a portion of the population, namely some SMEs in Central Java and West Java Provinces is taken using a 250-respondent target sample. The following criteria are used for the purposive sample method: (1) SMEs which are using natural dyes from wood, leaves and wood roots; (2) SMEs which has owners/managers with at least high school education; and (3) SMEs which generates a monthly net income of at least $5 million. A questionnaire and interviews with representative SMEs are used in this study to gather data. 228 respondents (91% response rate) provided a complete response which can be used for further analysis.

The six variables employed are the focus of the study topics namely; green logistics (GL), Absorptive capacity (AC), CE implementation (CEI), business performance (BP), environmental performance (EP), and social performance (SP). The Likert scale used for the answer options ranges from 7 (strongly agree) to 1 (very strongly disagree) for GL, AC, and CE variables. As for the BP, EP, and SP variables, Respondents are asked to compare their performance with that of competitors during the last three years, with answer options ranging from 7 (extremely strongly high) to 1 (very strongly not high). The variable measurements are explained as follows:

1. Green logistic (GL), uses 5 items modified from de Souza et al. (2022), Seroka-Stolka and Ociepa-Kubicka (2019) and Alshubir (2017).
2. Absorptive capacity (AC), uses 6 modified items from Marrucci et al. (2021) and Schmitt and Hansen (2018).

3. Implementation of circular economy (CEI) uses 9 items modified from Kirchherr et al. (2017) and Merli et al. (2018)
4. Business Performance (BP) uses 5 modified items from Muafi and Kusumawati (2021).
5. Environmental performance (EP) using 4 items modified from Schwarz et al. (2021), Harris et al. (2021), Marrucci et al. (2021), Sparrevik et al. (2021) and Khan et al. (2021).
6. Social Performance (SP) uses 4 items modified from Padilla-Rivera et al. (2020) and Korhonen et al. (2018).

Meanwhile, hypothesis testing is carried out using Partial Least Square. Validity and reliability testing and model testing use goodness of fit criteria (Hair et al., 2019). A more detailed explanation is presented in Table 1.

No.	Variables	Operational definition	Indicators/Items	Source
1.	Green Logistic (GL)	SME activities in conducting product acquisition, production, distribution, consumption, and recycling of products with the aim of minimizing production costs and adverse environmental effects, increasing product value, reducing logistics costs, and increasing profits as an effort to achieve a sustainable business.	1. Using transportation methods that reduce emissions 2. Giving the utilization of recyclable and reuse raw materials top priority 3. Promoting the use of recyclable and reused raw materials in product packaging. 4. Increasing knowledge sharing from environmental information aspects through a network of logistic associations for the acquisition of green production 5. Monitoring and evaluating the environmental policies and practices	Adopted and modified from Seroka-Stolka and Ociepa-Kubicka (2019), Alshubiri (2017), Khan et al. (2021), Jinru et al. (2021), Bag and Pretorius (2020)
2.	Absorptive capacity (AC)	The ability of SMEs to recognize the significance of novel knowledge acquired from outside the company, integrate, and utilize it to produce dynamic organizational capabilities in improving organizational performance and sustainable competitive advantage	1. Using intensive interactions with stakeholders, especially customers and suppliers to gain new knowledge and produce new products/services 2. Responding to new opportunities to meet customer needs quickly 3. Considering changes in market demand for new product introductions regularly 4. Introducing the use of our new products and services to customers so that customers immediately have knowledge regarding products/services quickly 5. Holding discussions for the creation of our new items, as well as processes of organizational innovation regularly 6. Responding to customer complaints quickly	Adopted and modified from Cohen and Levinthal (1990), Carayannis (2012), Marrucci et al. (2021)
3.	Business performance (BP)	SME's current business performance compared to competing companies over the last 3 years	1. Our company has increased sales compared to 3 years ago 2. Our company has experienced an increase/additional employee compared to 3 years ago 3. Our company has increased market compared to 3 years ago 4. Our company has increased profits compared to 3 years ago 5. Our company has experienced an increase in customer service speed compared to 3 years ago	Adopted and modified from Muafi and Kusumawati (2021), Mwita (2019)

No.	Variables	Operational definition	Indicators/Items	Source
4.	Environmental Performance (EP)	SME's current environmental performance compared to competitors over the last 3 years	1. Our company reduces energy consumption 2. Our company reduces landfill waste 3. Our company reduces atmospheric pollution 4. Our company lower operational costs by using natural color raw materials	Adopted and modified from Muafi and Uyun (2021), Lucato, Costa & Neto (2017).
5.	Social Performance (SP)	The social performance produced by Batik SMEs is compared to competing companies in the last 3 years	1. Our company is responsible for increasing stakeholder satisfaction 2. Our company has complied with government regulations and policies 3. Our company conduct social activities every year by sharing healthy food with neighbors 4. Our company routinely provide school scholarships for underprivileged children	Adopted and modified from Muafi & Uyun (2021), Kraus, Burtscher, Niemand, Tierno and Syrjä (2017), Eggers, Kraus, Hughes, Laraway and Snycerski (2013)
6.	Implementation of circular economy (CEI)	Utilizing natural resources through reducing natural resource consumption, environmental pollution, emissions, and waste by putting sustainable concepts into practice, which is good for enhancing circularity and reducing energy use. It is a key principle for sustainable resource preservation.	1. Using virtual services to cut down on product sampling to customers. 2. Offering maintenance and repair services for out-of-date goods as a sales approach 3. Applying a results-based business approach to products with a natural ingredient 4. As a sort of business strategy, offering services on how to maintain natural products to make them last longer 5. Using non-toxic natural dyes which result in harm to humans and the environment 6. Producting natural dye products which is safer and cleaner because they are more efficient in energy, water , and raw materials 7. Processing the leftover natural material waste from the preceding production process as an input. 8. Conducting initiatives to improve and lengthen the life cycle of natural dye goods repairment, and maintainance (for instance, by fixing faulty goods). 9. Providing activities to accommodate our waste products 10. Offering activities that help natural dyes remain longer so that these materials are more robust and long-lasting.	Adopted and modified from Muafi (2021), Kristoffersen et al. (2021), Prieto-Sandoval et al. (2021)

Table 1. Variables, Operational Definitions, Indicators and Measurement Scales

4. Results

4.1. Characteristics and Profile of Respondents

Respondents' characteristics based on gender, manager's age, company's age, education, monthly turnover, and number of employees can be seen in Table 2.

Table 2 reveals that the vast majority of responders in this study are female of 225 people (98.7%). Most respondents aged 43-51 years as many as 88 people (38.6%). The majority of companies have been operating for 5 years as many as 210 SMEs (92.1%). The respondents, based on their degree of education, are high school graduates, namely 211 people (92.5%). Based on the number of employees, it can be seen that the majority have 3 people (89.9%).

Respondent Profile		Frequency	Percentage (%)
Gender	Man Woman	3 225	1.3 98.7
Manager's age	24 - 32 years old 33 - 41 years old 42 - 50 years old 51 – 59 years old 60 - 68 years old	25 67 88 31 17	11.0 29.4 38.6 13.6 7.5
Company's age	2 years 3 years 4 years 5 years	4 4 10 210	1.8 1.8 4.4 92.1
Education	Diploma Senior High School	17 211	7.5 92.5
Employee Size	1 person 2 persons 3 persons	10 13 205	4.4 5.7 89.9
	Total	**228**	**100,0**

Table 2. Respondent Characteristics

4.2. Research Model Analysis with Partial Least Square (PLS)

The SmartPLS tool and PLS analysis approach, version 2.0, are used in this work.

4.3. Measurement Model Evaluation (Outer Model)

The measurement model evaluation aims to evaluate indicator variables (observed variables) that represent a latent variable or construct that cannot be measured directly. The convergent validity of each indicator is examined in order to evaluate latent variable measurement models with reflecting indicators. The size of the outer loading of each indicator on its latent variables can be used to determine convergent validity testing in PLS. Although factor loading values between 0.50 and 0.60 can still be tolerated, outer loading above 0.70 is strongly advised.

4.4. Validity Test and Reliability Instrument

The measurement model, also known as the outer model, evaluates the accuracy and dependability of study variables.

4.4.1. Discriminant Validity

Table 3 displays discriminant validity using cross loading.

Items \ Var	AC	CEI	GL	BS
ac1	0.758	0.647	0.476	0.641
ac2	0.797	0.687	0.429	0.534
ac3	0.651	0.564	0.415	0.457
ac4	0.761	0.632	0.458	0.563
ac5	0.707	0.611	0.389	0.506
ac6	0.385	0.294	0.290	0.279
gl1	0.584	0.657	0.810	0.745
gl2	0.202	0.236	0.398	0.228
gl3	0.374	0.457	0.714	0.550
gl4	0.355	0.393	0.643	0.509

Items \ Var	AC	CEI	GL	BS
gl5	0.281	0.326	0.593	0.381
cei1	0.594	0.696	0.610	0.684
cei10	0.412	0.431	0.451	0.312
cei2	0.610	0.715	0.535	0.585
cei3	0.555	0.682	0.394	0.521
cei4	0.615	0.738	0.495	0.489
cei5	0.513	0.629	0.261	0.334
cei6	0.459	0.560	0.208	0.392
cei7	0.510	0.572	0.316	0.407
cei8	0.331	0.375	0.344	0.268
cei9	0.642	0.752	0.537	0.599
bp1	0.168	0.165	0.441	0.522
bp2	0.463	0.493	0.656	0.805
bp3	0.257	0.303	0.535	0.583
bp4	0.480	0.446	0.598	0.709
bp5	0.548	0.550	0.583	0.737
ep1	0.6	0.659	0.616	0.775
ep2	0.648	0.682	0.551	0.769
ep3	0.552	0.528	0.669	0.768
ep4	0.420	0.404	0.529	0.580
sp1	0.615	0.680	0.573	0.741
sp2	0.704	0.699	0.499	0.694
sp3	0.506	0.514	0.645	0.788
sp4	0.415	0.498	0.565	0.717

Details: AC/ACAP: Absorptive Capacity; GL: Green Logistics;
CEI: Circular Economy Implementation; BS: Business Sustainability
(BP: Business Performance, EP: Environmental Performance,
SP: Social Performance)

Table 3. Cross Loading Result

Table 3 shows that each indicator for the variable in question has a cross loading value that is higher than the cross loading of other variables, indicating that the indicator has good discriminant validity.

4.4.2. Convergent Validity

Furthermore, as can be observed from the outer loading, convergent validity is utilized to assess the reliability of indicators as a measure of the construct. An outer loading value of 0.50 to 0.60 can still be allowed with a statistical t value over 1.96 or a p-value of 0.05. An indicator is regarded valid if it has an outer loading value above 0.70, which is strongly advised. Table 4 displays the findings of the analysis and assessment of the measurement model for each research variable.

On the basis of Table 4, it is clear that the latent variable measurement model of the study shows that all indicators are valid for use in measuring the reflector latent variable because it has a value greater than 0.5 and a significant p-value at a significant level of 95 percent. It reflects that the correlation of all positive and significant variable indicators in the analysis of research variables.

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)	Sig.
ac1 ← AC	0.758	0.751	0.073	0.073	10.428	0.000
ac2 ← AC	0.797	0.788	0.052	0.052	15.347	0.000
ac3 ← AC	0.651	0.634	0.092	0.092	7.079	0.000
ac4 ← AC	0.761	0.748	0.076	0.076	10.062	0.000
ac5 ← AC	0.707	0.707	0.073	0.073	9.641	0.000
ac6 ← AC	0.385	0.356	0.179	0.179	2.148	0.033
gl1 ← GL	0.810	0.821	0.048	0.048	16.819	0.000
gl2 ← GL	0.398	0.387	0.136	0.136	2.932	0.004
gl3 ← GL	0.714	0.675	0.180	0.180	3.965	0.000
gl4 ← GL	0.643	0.606	0.181	0.181	3.547	0.000
gl5 ← GL	0.593	0.559	0.185	0.185	3.200	0.002
cei1 ← CEI	0.696	0.712	0.078	0.078	8.972	0.000
cei10 ← CEI	0.431	0.386	0.202	0.202	2.138	0.034
cei2 ← CEI	0.715	0.714	0.081	0.081	8.781	0.000
cei3 ← CEI	0.682	0.674	0.086	0.086	7.922	0.000
cei4 ← CEI	0.738	0.716	0.095	0.095	7.799	0.000
cei5 ← CEI	0.629	0.620	0.087	0.087	7.254	0.000
cei6 ← CEI	0.560	0.553	0.147	0.147	3.808	0.000
cei7 ← CEI	0.572	0.560	0.144	0.144	3.959	0.000
cei8 ← CEI	0.375	0.342	0.164	0.164	2.285	0.023
cei9 ← CEI	0.752	0.743	0.069	0.069	10.877	0.000
bp1 ← BS	0.522	0.485	0.184	0.184	2.840	0.005
bp2 ← BS	0.805	0.785	0.121	0.121	6.677	0.000
bp3 ← BS	0.583	0.554	0.160	0.160	3.639	0.000
bp4 ← BS	0.709	0.695	0.099	0.099	7.138	0.000
bp5 ← BS	0.737	0.727	0.091	0.091	8.078	0.000
ep1 ← BS	0.775	0.761	0.071	0.071	10.899	0.000
ep2 ← BS	0.769	0.760	0.076	0.076	10.152	0.000
ep3 ← BS	0.768	0.736	0.137	0.137	5.592	0.000
ep4 ← BS	0.580	0.558	0.140	0.140	4.146	0.000
sp1 ← BS	0.741	0.733	0.081	0.081	9.128	0.000
sp2 ← BS	0.694	0.691	0.087	0.087	8.010	0.000
sp3 ← BS	0.788	0.756	0.131	0.131	5.992	0.000
sp4 ← BS	0.717	0.694	0.125	0.125	5.756	0.000

Details: AC/ACAP: Absorptive Capacity; GL: Green Logistics; CEI: Circular Economy Implementation; BS: Business Sustainability (BP: Business Performance, EP: Environmental Performance, SP: Social Performance)

Table 4. Outer Loading of Research Variable Indicators

4.5. Composite Reliability

Furthermore, the dependability value between the indicators of the produced structures is tested using composite reliability. Table 5 displays the findings of the evaluation of the measurement model's composite dependability.

Based on Table 5, the composite reliability value of research variable is greater than 0.75; and has an AVE value of around 0.4 to 0.5. This indicates that the variables' composite dependability is generally good. It can be inferred that the indicators as a measure of latent variables are valid and reliable based on the findings of the convergent and discriminant validity evaluations of the indicators as well as the construct reliability for the indicators. Therefore, by assessing the inner model, the goodness of fit model can be determined.

Variable	AVE	Composite Reliability
Absortive Capacity (AC)	0.477	0.840
Circular Economy (CE)	0.393	0.862
Green Logistic (GL)	0.418	0.774
Business Sustainability (BS) (consists of Business Performance-BP, Environmental Performance-EP, Social Performance-SP)	0.507	0.929

Table 5. Instrument Reliability Test Results

4.6. Goodness of Fit Model Test

4.6.1. Predictive Relevance Models (Q^2)

The Q2 predictive relevance of the model, which gauges how effectively the observed value is generated by the model, is considered while evaluating the structural model. The coefficient estimates of all dependent variables form the basis of Q2. The range of the magnitude of Q2 is 0 to Q2 1, and the closer the value is to 1, the more accurate the model is. There are four endogenous variables in this structural model, namely Organizational Learning, Environment Performance, Social Performance, and Religious Performance. Table 6 shows the four endogenous variables' coefficients of determination (R2).

Structural Model	Endogen Variable	R-square
1	Circular Economy Implementation (CEI)	0.772
2	Business Sustainability (ST) (consists of Business Performance-BP, Environmental Performance-EP, Social Performance-SP)	0.582

Table 6. Goodness of Fit Test Results

Following the calculation, Q2 can be determined based on the value of the coefficient of determination (R2):

$$\begin{aligned} Q^2 &= 1 - \{(1 - 0.772)\ (1 - 0.582)\} \\ &= 1 - \{(0.228)(0.418)\ \} \\ &= 1 - 0.095 \\ &= 0.905 \end{aligned}$$

The predictive relevance value of $Q^2 = 0.905$ or model's capacity for prediction reaches 90.5% while the remaining 9.5% is brought about by factors not included in the model.

4.7. Quality Indexes

PLS can also pinpoint global optimization standards to determine the model's goodness of fit (GoF).

Table 7 shows that the model's GoF value reaches 0.551, which is higher than 0.36, therefore places it in the large category.

Variable	R Square	Communality
Absortive Capacity (AC)		0.477
Circular Economy Implementation (CEI)	0.772	0.393
Green Logistic (GL)		0.418
Business Sustainability (ST) (consists of Business Performance-BP, Environmental Performance-EP, Social Performance-SP)	0.582	0.507
Mean	0.677	0.449
GoF		0.551

Table 7. GoF results

4.8. Inner Model Testing and Research Hypothesis

In order to determine whether a model is inner or structural, the coefficient values of the path parameters of the relationship between latent variables. Based on the conceptual framework of this study, testing the relationship model and hypotheses between variables can be conducted in two stages, namely:

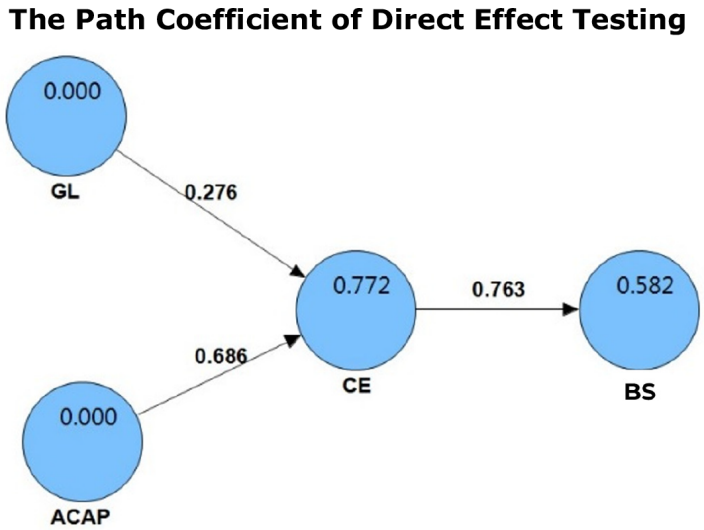

Figure 1. Path Coefficient Diagram and Direct Effect Hypothesis Testing

Hypothesis	Path	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics (| O/STERR |)	Sig.
1	GL → CEI	0.276	0.288	0.074	3.708	0.000
2	AC → CEI	0.686	0.675	0.064	10.700	0.000
3	CEI → BS	0.763	0.780	0.040	19.149	0.000

Table 8. Inner Model Test Results

The results of the direct effect hypothesis testing in Table 8 can be explained as follows:

1. Green Logistics (GL) positively and significantly influence Circular Economy Implementation (CEI) with a path coefficient of 0.276 with a t-value of 3.708 and significance level of 0.000 which is smaller than (0.05). According to this positive coefficient, growing Green Logistics (GL) will promote growing the Circular Economy Implementation (CEI). The first hypothesis, according to which Green Logistics (GL) has a positive and considerable impact on the Circular Economy Implementation (CEI), is therefore proven.

2. Absortive Capacity (AC) positively and significantly influence influence Circular Economy Implementation (CEI) with a path coefficient of 0.686 with a t-value of 10.700 and a significance level of 0.000 which is less than (0.05). This positive coefficient shows that raising Absortive Capacity (AC) will lead to raising Circular Economy Implementation (CEI). As a result, the second hypothesis which states that the Absortive Capacity (AC) has a favorable and considerable impact on the Circular Economy Implementation (CEI) is supported.
3. Circular Economy Implementation (CEI) positively and significantly influence Business Sustainability (BS) with a path coefficient of 0.763 with a t-value of 19.149 and a significance level of 0.000 which is smaller than (0.05). This positive coefficient indicates that an increase in Circular Economy Implementation (CEI) will encourage an increase in Business Sustainability (BS). Thus, the third hypothesis which states that Circular Economy Implementation (CEI) has positive and significant effect on Business Sustainability (BS) is proven.

4.9. Testing the Path Coefficient of Indirect Effect (Mediation)

The magnitude of an exogenous construct's indirect effect on an endogenous construct is determined by another endogenous construct. In the path analysis model, there are three indirect effects as described in Table 9.

Hypothesis	Exogenous	Mediation	End	Sobel Test (a x b)			Decision
				axb	Z-test	p-value	
4	GL	CEI	BS	0.210	3.641	0.000	mediate
5	AC	CEI	BS	0.329	3.635	0.000	mediate

Table 9. Mediation Effect Path Coefficient and Hypothesis Testing

Based on Table 9 it can be concluded that:

1. The indirect effect of Green Logistics (GL) on Business Sustainability (BS) mediated by Circular Economy Implementation (CEI) has path coefficient of 0.210 with z count of 3.641 and significance of 0.000 which is smaller than (0.05). This means that the Circular Economy Implementation (CEI) mediates the effect of Green Logistics (GL) on Business Sustainability (BS).
2. The indirect effect of Absortive Capacity (AC) on Business Sustainability (BS) mediated by Circular Economy Implementation (CEI) has path coefficient of 0.329 with z count of 3.635 and significance of 0.000 which is smaller than (0.05). This means that the Circular Economy Implementation (CEI) mediates the effect of Absortive Capacity (AC) on Business Sustainability (BS).

It can be concluded that the entire hypothesis proposed is accepted**.**

5. Discussion

The findings demonstrate that the adoption of the circular economy is significantly impacted favorably by green logistics (H1 is accepted). This outcome validates the theory and previous studies from de Souza et al. (2022), Jinru et al. (2021), Sun and Li (2021), Seroka-Stolka and Ociepa-Kubicka (2019), Ćirović et al. (2014), Khan et al. (2021), Bag and Pretorius (2020), Zhang et al. (2020) and Bressanelli et al. (2018).

In Indonesia, in its first Nationally Determined Contribution (NDC) statement for 2016, the Republic of Indonesia pledged to reducing greenhouse gas emissions by 11% by 2030 for the energy sector including the transportation sector. Transportation is one of the sectors with the highest energy consumption, which is around 40% worldwide which also contributes about a quarter of total CO_2 emissions. Old and non-standard vehicles should be exchanged for more environmental friendly to have a higher efficiency. Indonesia is a major trading partner in the ASEAN region and the world so that it has implications for the high volume of imported and exported goods which then causes high demand for logistics services which are more than 90% dominated by land transportation. Green

Logistic policies in sustainable development is one of which can be introduced with digital-based technology projects in solving social problems and achieving decarbonization.

It is just that at the SMEs level, they still face real challenges in increasing the implementation of the circular economy, including; (1) availability of environmental friendly vehicle technology, (2) availability and guarantee of sustainable supply of environmental friendly raw materials for the manufacture of natural color batik, (3) the number and distribution of environmental friendly facilities and infrastructure are still limited, including the availability of capital, (4) the understanding and competency of SMEs regarding the concept and application of green logistics and CE is still relatively limited. Consumers as part of society contribute the implementation of green logistics and CE by consuming eco-friendly SME products. Currently, it is not only SMEs that play a role but other stakeholders need to get used to the 3R behavior (reduce, reuse, and recycle) for activities and products that are used daily with the aim of reducing CO_2 emissions. This is reinforced by Sun and Li, (2021) and Seroka-Stolka and Ociepa-Kubicka (2019) that green logistics is an important and strategic requirement when CE is implemented by companies.

The findings demonstrate that absorption capacity has a considerable favorable impact on the adoption of the circular economy (H2 is accepted). These findings back up the notion and earlier research from Cohen and Levinthal (1990), Carayannis (2012), Schmitt and Hansen (2018). Absorptive capacity should be conducted routinely by batik SMEs in Bayat and Ciwaringin. This aims to be able to acquire, assimilate, changing, and utilizing knowledge to produce dynamic organizational capabilities. The Batik SMEs Association has the facilities and infrastructure to actively hold regular meetings which are held every two weeks. This is done so that each actor provides accurate information to each other regarding natural color raw materials, consensus on market prices and marketing. Some new knowledge can be obtained by them not only on raw materials, prices, and marketing but also important strategic issues such as producing products that are efficient and pro-nature. These processes and activities should not only be conducted sporadically but must continuously (Schmitt & Hansen, 2018). The effective adoption of CE both today and in the future is significantly impacted by the innovation process, both in terms of product and process innovation (Marrucci et al., 2021), especially in the context of natural-colored batik SMEs in Indonesia.

The findings demonstrate that implementing CE has a favorable impact on business sustainability (business, environmental, and social performance) (H3 is accepted). In the context of batik SMEs that use natural colors in Indonesia, they have tried to use rational resources with the principles of caution and efficiency because of the various limitations and problems encountered. This batik SMEs also avoids chemical waste and does not use hazardous materials in every business activity and product life cycle it produces. This indicates that it support the hypothesis from Jinru et al. (2021), Khan et al. (2021), Seroka-Stolka and Ociepa-Kubicka (2019) and Ormazabal et. al. (2016). Likewise, SMEs Batik in natural colors can maintain the circulation of resources in economic activities which indirectly reduces the wastage of resources on earth and reduces the impact of extraction, emissions, and waste disposal. This also supports the theory and concept of CE from Lazarevic and Valve (2017) and Harris et al. (2021).

Shahzad et al., (2020) and Akram et al. (2021) emphasize that the Circular economy encourages sustainable consumption while directing organizations to achieve business sustainability and being able to help the government to increase economic growth. Besides that, it can increase environmental preservation, reduce waste, increase energy efficiency, prevent resource depletion, have a green competitive advantage (Ozkan-Ozen et al., 2020; Prieto-Sandoval et al., 2018; Bastein et al., 2013) and increase in company business performance (Kristoffersen et al., 2021). There are several other benefits that can be obtained including: efficiency and at each stage of activity in the supply chain, batik prices can be more competitive, products last a long time, company reputation increases (Khan et al., 2020; Kirchherr et al., 2017). Increasing economic prosperity and environmental quality for a nation's population's welfare is the primary goal of CE implementation (Muafi, 2021; Kirchherr, et al., 2017).

A business plan that can substitute the idea of "the end" with practical and realistic reductions and later is expected to have an effect on the state of the environment, economic prosperity, and social justice for both current and future generations to achieve Sustainable Development (SD) (Marino & Pariso, 2016). The study's findings have significance and provide evidence for Schwarz et al. (2021), Harris et al. (2021), Marrucci et al. (2021), Sparrevik et

al. (2021) and Khan et al. (2021). When natural color batik SMEs implement CE properly, it could improve business performance and will correlated with environmental performance and social performance (Das & Singh, 2016; Velasquez et al., 2011). This finding simultaneously supports H4 and H5 which say that CE implementation mediates the effect of Green logistics on Business Sustainability. Similarly, CE implementation mediates the impact of Business Sustainability on Absorptive Capacity.

6. Theoretical and Managerial Implications

This study contributes to the enrichment of the circular economy implementation literature which is influenced by green logistics and absorptive capacity. Furthermore, the circular economy's implementation has a significant impact on increasing business sustainability (business, social, and environmental performance). As it is known that this literature is still rarely found in social sciences, especially in management science, especially when it is associated with the context of SMEs in Asia, especially in Indonesia.

Furthermore, managerial implication provides good benefits to batik SMEs. From the aspect of green logistics, SMEs can apply their business processes, especially in production with green logistics. Absorptive capacity can be conducted by SMEs continuously and sustainably and must have target outcomes that can increase the skills and knowledge and abilities of batik makers and SME actors that can have an impact on sustainable performance in the long term. Furthermore, CE implementation can be practiced in a more ideal and perfect manner so that every green business activity and green behavior can be applied to daily habits with the aim of reducing hazardous waste so that nature can be more sustainable and people can be more prosperous (Kristoffersen et al., 2021; Ozkan-Ozen et al., 2020; Prieto-Sandoval et al., 2018; Bastein et al., 2013).

7. Limitations of Research and Future Research

Examining and analyzing the relationship pattern between green logistics, absorptive capacity, circular economy implementation, and business sustainability is the main goal of this study. This study's limitation is that it solely considers the mediation role in relation to the adoption of the circular economy in SMEs which is still practiced in a simple manner and far from ideal conditions. In the future, it is better to identify SMEs in Indonesia that have implemented CE implementation ideally and perfectly. Likewise, considering other variables that can indeed be considered as mediation such as business strategy, dynamic capabilities, ambidexterity, and other mediation roles.

Longitudinal studies are also recommended so that study is able to test and analyze variables with: High validity because data collection is done repeatedly over a long period of time, identifies trends that are currently happening, predicts trends that will occur in the future, obtains qualitative data, and quantitatively over a long period of time. In addition, longitudinal research data are collected contemporarily rather than retrospectively so as to avoid the problem of false or selective memory. The research sample is too narrow because it is only collected from the Kebon Indah Klaten SMEs Association in Central Java Province and Ciwaringin Cirebin in West Java Province.

Eventhough these two associations have large natural-colored batik SMEs, in the future, it is better to expand other geographic areas so that they can more generalize the population. Furthermore, this research uses the perceptions of SME actors in answering the questionnaire for each variable so that there is concern about bias, especially when respondents are asked about business sustainability (business, social, and environmental performance). Eventhough SMEs have compared the performance of competitors over the last 3 years, they are still self-reported, so they are worried about being subjective. For future research, researchers can use the perspective of multiple respondents such as employees, peer groups, customers and other stakeholders so that they can be more objective.

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