LINKING ENVIRONMENTAL MANAGEMENT SYSTEMS AND CIRCULAR ECONOMY PERFORMANCE: THE MEDIATING ROLE OF CIRCULAR ECONOMY CAPABILITIES IN INDONESIA'S COURIER SECTOR

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ABSTRACT

Introduction/Main Objectives: The surge in online purchases has been accompanied by a significant rise in unmanaged waste, including packaging materials, plastics, bubble wrap, tapes, and cardboard. This situation negatively impacts the environment and calls for sustainable solutions. One promising approach is the circular economy, which aims to minimize waste while maximizing the efficiency of resource utilization. This study aims to examine the effect of Environmental Management Systems (EMS) on the implementation of the circular economy among courier express parcel companies in Indonesia.
Background Problems: The rapid growth of the courier industry driven by e-commerce has intensified environmental pressure. However, there remains limited understanding of how EMS contributes to environmental and financial performance through the adoption of circular economy principles.
Novelty: While prior research has explored the effect of EMS on performance, few studies have empirically examined the mediating role of Circular Economy Capabilities (CEC) in service-oriented sectors such as logistics and courier companies in developing countries. This study fills that gap by testing how CEC strengthens the relationship between EMS and firm performance.
Research Methods: This study employs a quantitative descriptive method. Data were collected through an online questionnaire distributed to middle and top management respondents from

courier express parcel companies in Indonesia. The data were analyzed using SMART PLS to evaluate both direct and mediated relationships between variables.
Findings/Results: The results reveal that EMS has a negative relationship with environmental performance; however, when mediated by CEC, this relationship becomes positive. In contrast, EMS positively affects financial performance. The findings confirm that CEC partially mediates the relationship between EMS and performance outcomes.
Conclusion: Circular economy capabilities play a crucial role in enhancing the effectiveness of EMS, transforming environmental initiatives into improved performance outcomes. This highlights the importance of developing internal capabilities alongside institutional systems to achieve sustainability goals.
Implementation Potential: The findings provide practical guidance for logistics and courier companies in adopting circular economy practices. Strengthening CE capabilities can help firms improve resource efficiency, reduce waste, and achieve long-term financial and environmental benefits.

Keywords: circular economy performance; circular economy capability; environmental management system; courier express parcel company.
JEL Classification: (list the relevant JEL codes separated by commas, refer to https://www.aeaweb.org/jel/guide/jel.php)

1. INTRODUCTION

The advancement of internet technology in Indonesia has significantly transformed consumer behavior, particularly in shopping activities. The emergence of e-commerce platforms has made online shopping more convenient and accessible, offering a wider range of choices. Along with the rise in online shopping, the use of delivery service couriers has increased sharply-by nearly 80%. (Bayu, 2020). However, this surge also brings environmental challenges, such as rising transport emissions and severe packaging waste, mainly from plastics, bubble wrap, adhesives, and cardboard. In 2020, packaging waste, increased by 96% in 2020 (LIPI, 2020), while data show that plastic waste accounts 18.41% of total waste, ranking second after food waste at 41.94% (Kehutanan, 2023).

The ongoing use of plastic-based packaging materials without adequate waste management systems has worsened environmental degradation. In this context, the Circular Economy (CE) which emphasizes extending product lifecycles through the principles of reduce, reuse, and recycle (3R) becomes critically important for implementation (Geissdoerfer et al., 2017, 2018; Khan et al., 2020; Yuan et al., 2006). Adopting CE principles enables firms to minimize resource consumption

and close material loops, thus reducing unmanaged waste and promoting sustainable operations. Moreover, the implementation of CE in courier express parcel companies is particularly important, given their significant role in logistics activities such as packaging, warehousing, labeling, and transportation mode selection, which can generate considerable environmental impacts if not properly managed. This aligns with recent findings that emphasize the importance of sustainable supply chain and logistics models in Indonesia's business sectors (Kurniawati et al., 2020).

However, to effectively implement a circular economy, organizations require a system that supports and monitors environmental performance. The Environmental Management System (EMS) has the potential to fulfill this role by identifying and addressing environmental impacts caused by company activities. This system provides a structured approach that includes planning, assessment, and implementation of actions to protect the environment (Feng & Wang, 2016; Zhu, Sarkis, et al., 2013). The environmental performance of an organization does not immediately improve upon EMS implementation; it still requires strong top management commitment and internal organizational support (Wicaksana & Hatini, 2014). In the Indonesian context, the commitment to green logistics and environmental management has been recognized as a growing but still underdeveloped practice among logistics service providers (Suraharta et al., 2023). In addition, companies need to develop circular economy capabilities (CEC) by applying the 3R principles reduce, reuse, and recycle as previous studies have confirmed that circular economy capabilities positively influence circular economy performance (Bag et al., 2021; Zeng et al., 2017).

Recent studies have further highlighted that while environmental management system frameworks are instrumental in promoting sustainability, their direct influence on circular economy implementation especially in highly service-oriented and asset-light industries such as courier express parcel companies remains unexplored. The mechanism through which environmental management system translates into circular economy performance is still not fully understood. Organizational capabilities such as knowledge integration, process redesign, and employee engagement may serve as critical mediators in this relationship, yet empirical studies validating this link remain limited. Addressing this gap, this study investigates how EMS influences CE performance among courier express parcel companies in Indonesia, with a particular

focus on the mediating role of CEC. Indonesia presents a relevant context due to rapid logistics growth, fragmented regulations, and rising demand for sustainable business practices. Unlike developed economies, Indonesian firms must balance environmental commitments with profitability and operational efficiency.

Theoretically, this research contributes to the dynamic capabilities perspective by examining how EMS enables the development of organizational capabilities required for CE implementation. Using structural equation modeling (SEM), it tests an integrated model linking EMS, CEC, and CE performance. Therefore, this study aims to (i) examine the direct impact of EMS on CE performance and (ii) assess the mediating effect of CEC in the Indonesian courier express parcel industry. The findings are expected to offer both theoretical contributions to sustainability research and managerial implications for logistics firms seeking to strengthen environmental and financial performance through circular practices.

2. LITERATURE REVIEW

Therefore, based on those explanations, a further study is necessary to provide empirical evidence of how environmental management system affects circular economy performance, mediated by circular economy capabilities. Furthermore, the result of this study is expected to provide valuable insight for governments, companies, and other stakeholders in their transition toward a circular economy.

The environmental management system (EMS) is both a system and a managerial tool focusing on identifying, managing, and mitigating the negative environmental impacts caused by a company's activities. It provides a structured approach, starting from planning and assessment to the implementation of environmental protection measures (Feng & Wang, 2016). Having a well-implemented EMS can influence a company in multiple dimensions economic, environmental, and operational which, in this study, are collectively referred to as circular economy performance (Feng & Wang, 2016; Jain et al., 2020; Steurer et al., 2005; Wang et al., 2018; Zhu et al., 2012; Zhu, Sarkis, et al., 2013). Additionally, the effectiveness of an EMS can be enhanced by innovation within the organization, which serves as an enabling factor for achieving sustainable outcomes (Iraldo et al., 2009).

In contrast, other studies have reported that EMS adoption does not automatically lead to improved firm performance. These studies suggest that companies must ensure stakeholder awareness and engagement during EMS implementation, as such awareness can influence purchasing interest and, over the long term, affect firm performance (Eng Ann et al., 2006). Moreover, previous research emphasizes that to achieve effective environmental performance, organizations should adopt international standards for instance, ISO 9000, which focuses on quality and financial performance, and ISO 14001, which focuses on environmental performance (Steurer et al., 2005). Based on the description, the hypotheses in this study are the following:

H1: environmental management system affects environmental performance

H2: environmental management system affects financial performance

H3: environmental management system affects circular economy capabilities

The capabilities of a company to implement a concept depend on the competencies and resources it possesses, as these help the company achieve superior performance (Hart, 1995). This research adopts the dynamic capabilities theory as the main theoretical framework for the capability variable. Within the context of a circular economy, organizations require specific capabilities namely, the ability to reduce, reuse, and recycle (3R) as these principles represent the foundation of CE success. To strengthen circular economy capabilities, organizations should select suppliers who prioritize environmental considerations and exhibit green behavior (Zeng et al., 2017). This aligns with prior research, which found a positive correlation between circular economy capabilities and circular economy performance (Bag et al., 2022; Del Giudice et al., 2020; Fernandez de Arroyabe et al., 2021; Zeng et al., 2017; Zhu, Cordeiro, et al., 2013).

Other studies examining capability-performance relationships though in the context of digital transformation capabilities also found a positive correlation (Sousa-Zomer et al., 2020). However, having capabilities does not always improve performance. Previous studies have examined the correlation between capabilities in carrying out digital transformation and its effect on company performance. It is found that both variables have a negative correlation, and in fact companies that have capabilities in digital transformation, around 60% - 85% of them experience failure in performance (Saldanha, 2019). Based on the description, the hypotheses in the study are the following:

H4: circular economy capabilities affect environmental performance

H5: circular economy capabilities affect financial performance

The development of the circular economy capabilities variable hypothesis as a mediating variable is taken by tracing the capabilities variable in general and its correlation to performance. Therefore, based on previous research it is found that capabilities partially mediates the correlation between intellectual capital and employee performance and the correlation between relational capital and performance, and fully mediates the correlation between structural capital and performance (Hsu & Wang, 2012). In terms of capabilities, one of the factors that affects it is the environmental management system owned by the organization. In implementing a circular economy, organizations need certain capabilities, such as to reduce, reuse and recycle (3R). 3R is the main principle in the successful rate of implementing a circular economy. Based on this description, the hypotheses in this study are the following:

H6: Circular economy capabilities mediate the correlation between environmental performance and environmental performance.

H7: Circular economy capabilities mediate the correlation between environmental performance and financial performance

3. METHOD

This study adopts a descriptive verification approach, aiming to describe key variables while confirming the findings of previous studies (Sekaran & Bougie, 2016). The research focuses on courier service companies located on Java Island, Indonesia, which were selected due to their significant contribution to the country's logistics and e-commerce activities.

Data were collected using a stratified random sampling technique, which ensures representation from each important segment within the population (Cooper & Schindler, 2017; Sekaran & Bougie, 2016). The minimum sample size was determined based on the rule of ten times the number of variables used in the study. With four variables examined, at least 40 responses were required. In total, 82 valid responses were obtained, meeting the recommended sample range of 30–500 for most behavioral research (Sekaran & Bougie, 2016). cross-sectional survey design was employed, where data were collected at a single point in time to address the research objectives.

The questionnaire was distributed online using Microsoft Office Forms, targeting middle and top management respondents. All items were measured using a seven-point Likert scale, ranging from 1 ("strongly disagree") to 7 ("strongly agree").

For data analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied using SmartPLS software. This method was chosen because it is suitable for predictive and exploratory research, allowing the testing of theoretical models in emerging research domains (Hair, 2017; Hair et al., 2019). Reliability, validity, and model fit were assessed following the recommendations of (Hair et al., 2021) to ensure the robustness of the findings.

4. RESULTS AND DISCUSSION

Prior to hypothesis testing, the measurement model was evaluated to assess construct reliability and validity. For a manifest variable to serve as a valid indicator of a latent construct, both the loading factor (LF) and average variance extracted (AVE) must exceed 0.70 and 0.50, respectively. The composite reliability (CR) for each construct was also above 0.70, confirming internal consistency.

Table 1. Convergent Validity and Reliability

Variables	Code	Loading Factor	AVE	CR
Circular economy capability (CAP)	CAP1	*0,917*	0,71	0,90
	CAP 2	*0,927*		
	CAP 3	*0,915*		
	CAP 4	*0,580*		
Environmental management system (EMS)	EMS1	*0,524*	0,78	0,95
	EMS2	*0,571*		
	EMS3	*0,592*		
	EMS4	*0,474*		
	EMS5	*0,512*		
	EMS6	*0,487*		
Financial performance (FP)	FP1	*0,745*	0,82	0,95
	FP2	*0,775*		
	FP3	*0,804*		
	FP4	*0,835*		
	FP5	*0,610*		
Environmental performance (EP)	EP1	*0,629*	0,81	0,92
	EP2	*0,635*		
	EP3	*0,642*		

The Fornell-Larcker Criterion (FLC) was applied to ensure discriminant validity among constructs. The results show that each construct's AVE was higher than its squared correlations with other constructs, indicating sufficient discriminant validity.

Table 2. Fornell Lacker Criterion (FLC)

	HOOD	FP	EP	EMS
HOOD	0,847			
FP	0,838	0,906		
EP	0,706	0,805	0,901	
EMS	0,597	0,646	0,473	0,887

The structural model results are summarized in Tables 3 and 4. EMS positively affects both environmental and financial performance, as well as circular economy capabilities. Similarly, CEC positively affects environmental and financial performance.

Table 3. Direct Hypothesis Results

	T Statistics (|O/STDEV|)	P Values	Hypothesis Testing Result
EMS -> EP	4,456	**0,000**	Accepted
SML -> FP	6,465	**0,000**	Accepted
SML -> CAP	4,989	**0,000**	Accepted
CAP -> EP	5,189	**0,000**	Accepted
CAP -> FP	7,087	**0,000**	Accepted

The mediation analysis further shows that CEC partially mediates the relationship between EMS and both environmental and financial performance.

Table 4. Indirect hypothesis results

	T Statistics (|O/STDEV|)	P Values	Hypothesis Testing Result
EMS -> CAP -> EP	4,043	**0,000**	Partially mediates
EMS -> CAP -> FP	5,038	**0,000**	Partially mediates

The **R^2 values** (Table 5) indicate strong explanatory power for each endogenous construct, with all values above 0.35 (Hair et al., 2021).

Table 5. R Square

Path	R Square	Criteria
EMS -> FP **CAP -> FP**	0,735	Strong
EMS -> CAP	0,355	Strong
CAP -> EP **EMS -> EP**	0,502	Strong

Predictive relevance was confirmed through blindfolding tests, as all Q^2 values were greater than zero (Table 6), indicating that the model possesses good predictive capability.

Table 6. Blindfolding

	Q^2	Note
HOOD	0,551	**Reliable**
FP	0,720	**Reliable**
EP	0,591	**Reliable**
EMS	0,691	**Reliable**

The first hypothesis (H1) proposed that the Environmental Management System (EMS) significantly affects environmental performance. The results in Table 3 indicate a positive and significant relationship between EMS and environmental performance ($t = 4.456 > 1.96$; $p = 0.000$), confirming the hypothesis. This finding implies that when courier express parcel companies implement an effective and well-monitored EMS, their environmental performance improves accordingly. This outcome supports the previous studies by (Feng & Wang, 2016; Iraldo et al., 2009), which suggest that EMS enhances environmental and technical performance through structured environmental planning, monitoring, and innovation processes. EMS acts as a framework that institutionalizes sustainability practices, helping organizations monitor emissions, manage waste, and use resources efficiently.

In the Indonesian context, this result demonstrates that firms adopting EMS are beginning to operationalize sustainability commitments, even in highly competitive logistics markets. The implementation of EMS provides a foundation for aligning operational practices with environmental goals, such as reducing emissions from delivery vehicles and minimizing packaging waste. However, the success of EMS depends heavily on top management commitment, resource allocation, and the establishment of measurable performance indicators. Managerially, courier companies should integrate EMS objectives into corporate strategy, ensure that employees at all levels understand their environmental responsibilities, and formalize environmental targets in their key performance indicators (KPIs). Furthermore, obtaining ISO 14001 certification will enhance credibility and ensure systematic improvement, as it requires continuous monitoring and third-party validation. However, since EMS implementation requires considerable investment, government intervention through fiscal incentives or tax exemptions is vital to help logistics firms transition toward greener operations.

The second hypothesis (H2) tested the relationship between EMS and financial performance. The findings indicate a positive and significant effect ($t = 6.465 > 1.96$; $p = 0.000$), confirming that firms with effective environmental systems also achieve better financial results. This supports the studies by (Eng Ann et al., 2006) in Malaysia (Fitriaty et al., 2021) in Indonesia, which both concluded that EMS adoption enhances profitability through operational efficiency, cost reduction, and brand differentiation. In the long term, EMS can reduce waste and energy costs, strengthen stakeholder trust, and improve a firm's competitiveness in the logistics market.

From a theoretical standpoint, this finding reinforces the resource-based and dynamic capabilities perspectives, suggesting that EMS constitutes a valuable, rare, and inimitable organizational capability that contributes to sustained competitive advantage. It also demonstrates how environmental management can transition from being a compliance requirement to becoming a strategic resource that improves firm performance. Practically, EMS implementation can help logistics companies access new markets that prioritize environmental compliance and improve relationships with eco-conscious clients. In addition, adopting ISO 9001 (quality management) in conjunction with ISO 14001 (environmental management) creates synergy between quality assurance and environmental sustainability (Steurer et al., 2005). This integrated approach ensures

that environmental initiatives are not treated as separate programs but as part of a company's operational excellence framework.

The third hypothesis (H3) posited that EMS influences circular economy capabilities (CEC). The results show that EMS has a positive and significant impact on CEC ($t = 4.989 > 1.96$; $p = 0.000$), thereby supporting the hypothesis. This relationship illustrates that firms with structured environmental systems develop the internal competencies required for effective circular economy implementation. EMS provides the governance, monitoring, and learning mechanisms necessary to develop and refine CE-related skills and knowledge within the organization.

This finding aligns with prior studies that emphasized EMS as a precursor to the development of environmental and circular capabilities (Irawati & Andrian, 2018; Kuslantasi et al., 2022; Rohmah & Nazir, 2022). In the logistics sector, this means that an effective EMS enables courier firms to identify inefficiencies in resource use, redesign packaging and delivery processes, and strengthen supplier collaboration for recyclable materials. Managerially, firms should integrate environmental targets with capability-building programs, such as employee training on 3R practices, supplier engagement in eco-packaging, and digital tracking systems for waste reduction. EMS thus acts as a catalyst for fostering learning, process innovation, and knowledge sharing all of which are essential for achieving circularity. In the Indonesian context, where regulations on waste management and sustainability are still evolving, developing strong internal capabilities provides firms with a proactive advantage in adapting to future environmental policies.

The fourth hypothesis (H4) stated that circular economy capabilities affect environmental performance. The results confirm this positive relationship ($t = 5.189 > 1.96$; $p = 0.000$), indicating that firms with strong CEC tend to achieve better environmental outcomes. CEC reflects a firm's ability to design, manage, and continuously improve operations following the reduce, reuse, and recycle (3R) principles. These capabilities enable firms to reduce emissions, minimize waste generation, and optimize energy use. This finding supports prior research by (Bag et al., 2022; Sousa-Zomer et al., 2020), which found that circular-oriented capabilities enhance operational efficiency and sustainability.

In practice, the courier express parcel industry can apply these capabilities by redesigning logistics processes for example, adopting reusable packaging systems, optimizing delivery routes

to minimize fuel consumption, and collaborating with recycling partners. Managerially, fostering a culture of innovation and sustainability is essential to sustain CEC over time. Firms should incorporate environmental performance goals into procurement, supplier selection, and technological investment decisions. These practices not only improve environmental outcomes but also position logistics companies as sustainability leaders in the growing e-commerce ecosystem.

The fifth hypothesis (H5) examined the relationship between circular economy capabilities and financial performance. The results confirm that CEC positively affects financial performance ($t = 7.087 > 1.96$; $p = 0.000$), supporting the hypothesis. This finding highlights the long-term financial benefits of circular practices. Initially, firms may incur significant costs to build circular capabilities such as redesigning processes, selecting eco-friendly suppliers, and adopting green technologies but these investments yield long-term returns. Efficient resource utilization and waste reduction lead to cost savings, while environmentally responsible practices enhance brand image and attract customers with sustainability preferences.

This relationship supports the argument that CEC transforms environmental investments into tangible business value. Previous study emphasized that eco-innovation and capability development contribute to improved firm performance by creating operational efficiencies and new market opportunities (Bag et al., 2022). Similarly, (Sousa-Zomer et al., 2020) found that circular capabilities act as enablers for both environmental and financial gains. Practically, logistics firms can leverage CEC to differentiate themselves in competitive markets, offering "green delivery" services or eco-certified logistics options that appeal to environmentally conscious consumers.

The sixth (H6) and seventh (H7) hypotheses test the mediating role of CEC. The results show that CEC partially mediates the relationship between EMS and both environmental and financial performance, indicating that EMS provides the structure for environmental management, while CEC operationalizes it into measurable outcomes. This finding strengthens the dynamic capabilities framework, positioning EMS as a lower-order capability that enables the development of higher-order capabilities (CEC) leading to performance gains. In the context of emerging markets, this demonstrates how companies can evolve from compliance-oriented management to strategic capability building. To maximize these effects, organizations should invest in training,

cross-functional collaboration, and digitalization such as real-time tracking and data analytics to enhance process efficiency. Governments and industry associations can further accelerate this transition by offering incentives, capacity-building programs, and policy support.

Overall, the results indicate that EMS and CEC are mutually reinforcing mechanisms for sustainable performance. EMS provides structure and compliance, while CEC contributes innovation, adaptability, and strategic advantage. Together, they enable logistics firms in emerging economies to pursue both environmental and financial objectives, reinforcing sustainability as a competitive necessity.

5. CONCLUSION

This study provides empirical evidence that integrating EMS with CEC significantly enhances both environmental and financial performance in courier express parcel (CEP) companies in Indonesia. EMS functions not only as a compliance mechanism but also as a strategic driver that activates organizational competencies to operationalize circular economy (CE) principles. By linking EMS and CEC, this study validates the mediating role of circular capabilities as the mechanism that converts environmental intentions into measurable outcomes.

Theoretically, this research extends the dynamic capabilities view by demonstrating that environmental systems can serve as foundational capabilities for building higher-level competencies that promote sustainability and competitiveness. Practically, it underscores that EMS implementation should be embedded into corporate strategy, supported by innovation, employee engagement, and supplier collaboration. Strengthening CEC through sustainable packaging, resource optimization, and 3R practices can further enhance EMS effectiveness and long-term profitability.

While EMS adoption remains voluntary in Indonesia, its integration enables better control of environmental impacts and prepares firms for stricter future regulations. For the fast-growing logistics sector, this transition toward CE represents both an environmental necessity and a strategic opportunity. Future efforts should emphasize cross-functional collaboration, leadership commitment, and alignment with national sustainability goals.

6. IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH

This research contributes to both theory and practice in sustainable logistics and circular economy management. It empirically supports that EMS and CEC together strengthen the link between organizational systems and performance outcomes, providing a comprehensive understanding of how environmental initiatives translate into business success.

For managers, the study highlights that EMS should be regarded as a strategic investment rather than a compliance requirement. Developing CEC through innovation, training, and green partnerships enhances both environmental and financial results. Policymakers can use these findings to design incentive schemes and collaborative frameworks that promote CE adoption across logistics networks, driving progress toward national sustainability goals.

Despite its contributions, this study has several limitations. The cross-sectional design limits causal inference, and the sample focused on Indonesian courier companies may constrain generalizability. Future research could adopt longitudinal or mixed method approaches to explore causal mechanisms and extend the analysis to other sectors or countries. Additionally, future studies should consider moderating factors such as leadership, digital readiness, and regulatory pressure to deepen understanding of EMS–CEC–performance dynamics.

Comparative research between developed and developing economies can reveal how variations in infrastructure and enforcement affect sustainability outcomes. Future studies may also examine the behavioral dimensions of EMS adoption such as employee engagement, organizational learning, and managerial decision-making to uncover micro-level mechanisms driving CE success.

Overall, this study reinforces that achieving circular economy excellence requires more than adopting systems it demands organizational capability, innovation, and collaboration among firms, regulators, and industry partners to enable a sustainable logistics transition in emerging economies.

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