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# Driving Circular Business Practices in MSMEs: The Role of Green Human Resources, Green Environmental Strategy, Innovation, and Business Ecosystem Collaboration

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**ABSTRACT**

***Objective:*** *This study aims to examine the influence of green human resources and green environmental strategies on circular business practices in food and beverage MSMEs in East Java, with innovation as a mediating variable and business ecosystem collaboration as a moderating variable.* ***Method:*** *This study used a quantitative explanatory approach. Data were collected through questionnaires from 278 food and beverage MSMEs in Surabaya City, Gresik Regency, Malang Regency, and Malang City. Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS).* ***Results:*** *The results show that green human resources and green environmental strategies have a positive and significant effect on innovation and circular business practices. Innovation also has a positive effect on circular business practices and mediates the relationship between green human resources, green environmental strategies, and circular business practices. Furthermore, business ecosystem collaboration has been shown to strengthen the influence of green human resources and green environmental strategies on circular business practices.* ***Novelty:*** *The novelty of this research lies in the integration of green human resources, green environmental strategies, innovation, and business ecosystem collaboration in one model to explain circular business practices in food and beverage MSMEs in East Java.*

## INTRODUCTION

The transformation towards a circular economy has become a strategic issue in the development of micro, small, and medium enterprises (MSMEs), particularly in the food and beverage sector, which generates large amounts of organic waste, packaging, and production residues. The linear economic model based on the take-make-dispose pattern is increasingly irrelevant due to resource waste and environmental pressures. Instead, circular business practices emphasize the principles of reduce, reuse, recycle, and recover to minimize waste, increase raw material efficiency, and create added value from used resources (Gajanayake et al., 2024; Megawati et al., 2024). In the context of East Java, the urgency of implementing circular business practices is even greater because this province is a center of MSME growth while also facing complex environmental challenges, particularly in the areas of Surabaya, Gresik, and Malang.

Despite the enormous potential of a circular economy, its implementation in MSMEs still faces various obstacles. Many MSMEs are still focused on short-term profits and do not fully understand the economic benefits of environmentally friendly practices. Limited knowledge, skills, technology, access to financing, and collaborative networks mean that most MSMEs still employ conventional production patterns (De Angelis, 2024; von Kolpinski et al., 2023). This situation suggests that the success of circular business practices is determined not only by environmental awareness but also by the organization's internal capacity, particularly green human resources and green environmental strategies. Green human resources are needed to build pro-environmental competencies, awareness, and behavior, while green environmental strategies play a role

in directing business policies to be more efficient, low-waste, and sustainable (Muzamwese et al., 2024; Nikam & Melati, 2023).

Theoretically, this research is based on the Resource-Based View (RBV) and the Natural Resource-Based View (NRBV). The RBV explains that competitive advantage can be built through the management of valuable, rare, difficult-to-imitate, and non-substitutable internal resources (Barney, 1991). The NRBV expands this perspective by positioning environmental capabilities as a source of sustainable competitive advantage (Andersén, 2021; McDougall et al., 2019). Within this framework, green human resources and green environmental strategies are viewed as strategic assets that can drive MSMEs to transform from a linear business model to a circular one. However, the influence of these two resources is not always immediate, as innovation is needed as a mechanism to transform green competencies and environmental strategies into more efficient and sustainable operational practices (Cuthbertson & Furseth, 2022; Wang et al., 2024).

Innovation plays a crucial role in bridging internal resources with circular business practices. Through innovation, MSMEs can develop environmentally friendly products, improve production processes, reduce waste, reuse waste materials, and create new business models that are more adaptive to green market demands (Jain et al., 2024; Xie et al., 2019). Furthermore, MSMEs' limited resources necessitate external support through collaboration within the business ecosystem. Collaboration with government, communities, financial institutions, academics, suppliers, and other business actors can expand access to knowledge, technology, financing, and markets. Thus, business ecosystem collaboration has the potential to strengthen the influence of green human resources and green environmental strategies on circular business practices (Chirumalla et al., 2024; Trevisan et al., 2021; Perotti et al., 2024).

Although previous studies have examined green human resources, green environmental strategies, innovation, and circular economy practices, the research gap remains evident. Prior findings are still inconsistent regarding whether green human resources and environmental strategies directly promote circular business practices or work through innovation. Moreover, many studies have focused on large firms or developed-country contexts, while empirical evidence from MSMEs in developing countries remains limited. Therefore, this study addresses this gap by integrating green human resources, green environmental strategies, innovation, and business ecosystem collaboration into a single model in the context of food and beverage MSMEs in East Java, Indonesia.

This study contributes to the literature in three ways. First, it integrates green human resources, green environmental strategy, innovation, and business ecosystem collaboration into a single model to explain circular business practices. Second, it examines innovation as a mediating mechanism that links internal green capabilities with circular practices. Third, it includes business ecosystem collaboration as a moderating variable, which is particularly relevant for MSMEs in emerging economies that often depend on external support to overcome resource limitations.

Based on these conditions, this study aims to examine the influence of green human resources and green environmental strategies on circular business practices in food and beverage MSMEs in East Java, with innovation as a mediating variable and business ecosystem collaboration as a moderating variable. The novelty of this research lies in the integration of internal factors, innovation mechanisms, and external collaborative

support within a single research model. Thus, this study is expected to provide theoretical contributions to the development of the RBV and NRBV in the MSME context, while also providing practical recommendations for business actors and stakeholders in accelerating the transformation of MSMEs toward more circular and sustainable business practices.

**Conceptual Framework and Hypothesis Development**

This study uses the Resource-Based View (RBV) and Natural Resource-Based View (NRBV) to explain circular business practices in food and beverage MSMEs in East Java. RBV positions green human resources as internal capabilities, while NRBV views green environmental strategy as a source of environmental competitiveness. However, these capabilities do not automatically lead to circular business practices. Innovation acts as a mediating mechanism that transforms green competencies and environmental strategies into practical circular actions, while business ecosystem collaboration serves as a moderating mechanism by providing external resources, knowledge, and support that MSMEs often lack (Barney, 1991; Andersén, 2021; McDougall et al., 2019; Arsawan et al., 2024; Cheng et al., 2023; Rashid et al., 2025; Dambiski Gomes de Carvalho et al., 2021; Xie et al., 2019; Graça & Camarinha-Matos, 2017; Trevisan et al., 2021; Perotti et al., 2024; Chirumalla et al., 2024; Quttainah et al., 2025).

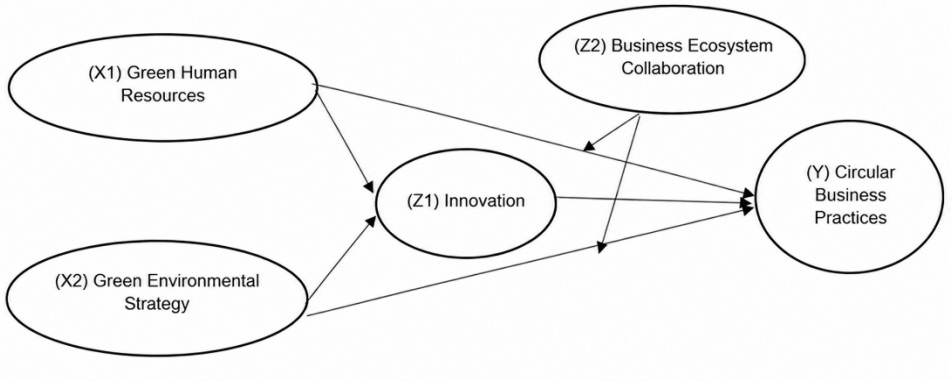


**Figure 1.** Conceptual framework of the research

Based on this framework, this study proposes nine hypotheses. Green human resources are assumed to influence circular business practices and innovation because environmental competence and awareness can encourage MSMEs to manage waste, use resources efficiently, and create more environmentally friendly business solutions (Górska & Prusak, 2023; Arsawan et al., 2024; Cheng et al., 2023; Meng et al., 2023; Malik et al., 2020). Green environmental strategies are also assumed to influence circular business practices and innovation because clear environmental policies can direct the use of environmentally friendly materials, energy efficiency, waste reduction, and the development of more sustainable products and processes (Peng & Pan, 2023; Rashid et al., 2025; Shi & Huang, 2024; Wu et al., 2021; Zhou, 2024). Therefore, the proposed hypotheses are: H1: Green human resources influence circular business practices. H2: Green human resources influence innovation. H3: Green environmental strategies influence circular business practices. H4: Green environmental strategies influence

innovation.

Furthermore, innovation is assumed to influence circular business practices and mediate the influence of green human resources and green environmental strategies on circular business practices. Innovation enables MSMEs to transform environmental knowledge, skills, and strategies into more efficient and sustainable products, processes, and business models (Adiandari, 2022; Appio et al., 2021; Dambiski Gomes de Carvalho et al., 2021; Rao et al., 2019; Xie et al., 2019; Saunila, 2020). In addition, business ecosystem collaboration is assumed to moderate the influence of green human resources and green environmental strategies on circular business practices because collaborative networks can strengthen MSMEs' access to knowledge, technology, financing, markets, and external resources needed in the transition to a circular economy (Graça & Camarinha-Matos, 2017; Trevisan et al., 2021; Perotti et al., 2024; Chirumalla et al., 2024; Quttainah et al., 2025). Therefore, the proposed hypotheses are: H5: Innovation influences circular business practices. Innovation emerged as the strongest predictor of circular business practices because it directly translates environmental awareness and strategic intentions into tangible business actions. In the context of Indonesian MSMEs, circular economy adoption often depends on practical solutions such as waste utilization, product redesign, eco-friendly packaging, and resource efficiency rather than on environmental orientation alone. Due to limited financial and technological resources, MSMEs tend to prioritize innovations that generate immediate operational and economic benefits. Therefore, innovation becomes the key mechanism through which sustainability objectives are converted into actual circular business practices. H6: Innovation mediates the influence of green human resources on circular business practices. H7: Innovation mediates the influence of green environmental strategies on circular business practices. Although innovation significantly mediated the relationships, the mediation effects were relatively small. This finding suggests that many MSMEs are still at an early stage of green transformation, where environmental knowledge and strategies have not been fully converted into innovation outcomes. Limited access to technology, financial constraints, and the predominance of micro-scale enterprises may reduce the ability of MSMEs to develop and implement more advanced innovations. As a result, green human resources and green environmental strategies continue to exert direct influences on circular business practices beyond the innovation pathway. H8: Business ecosystem collaboration moderates the influence of green human resources on circular business practices. H9: Business ecosystem collaboration moderates the influence of green environmental strategies on circular business practices.

The operational definitions of the variables in this study include five main constructs. Green human resources are the knowledge, skills, experience, and commitment of MSMEs in supporting environmentally friendly and sustainable business activities (Mustafa et al., 2023; Ma et al., 2021). Green environmental strategy is a business policy and strategic direction that integrates sustainability principles into business processes through environmental policies, the use of environmentally friendly materials, green technology, and waste management and energy efficiency (Ahmad et al., 2022; Alsuraihi et al., 2022; Ayu Kusumawardani et al., 2024; Wayan Edi Arsawan et al., 2021). Innovation is the ability of MSMEs to develop environmentally friendly products and apply the principles of reduce, reuse, and recycle in business processes (Haryati et al., 2021; Mengistu & Panizzolo, 2021). Business ecosystem collaboration is the ability of MSMEs

to establish strategic partnerships, build quality relationships, expand partnership intensity, and share information with external stakeholders (Cobben et al., 2023; Graça & Camarinha-Matos, 2021; Yue et al., 2022). Circular business practices are the implementation of business models that emphasize the use of recycled materials, sustainable product design, and reuse and remanufacturing to maintain the value of resources in the economic cycle for as long as possible (Moraga et al., 2019; Natrajan et al., 2024; Negri et al., 2021; Tritto et al., 2024; Vogt et al., 2025).

**Table 1.** Operational definition of variables

| Variable | Definition | Indicators | Sources |
|---|---|---|---|
| Green Human Resources | Green human resources refer to the knowledge, skills, experience, and commitment of MSME actors in supporting environmentally friendly and sustainable business activities. | Knowledge, skills, experience, and environmental commitment | Mustafa et al. (2023); Ma et al. (2021) |
| Green Environmental Strategy | Green environmental strategy refers to business policies and strategic directions that integrate sustainability principles into operational activities. | Environmental policy, use of environmentally friendly materials, green technology in production, waste management, and energy efficiency | Ahmad et al. (2022); Alsuraihi et al. (2022); Ayu Kusumawardani et al. (2024); Wayan Edi Arsawan et al. (2021) |
| Innovation | Innovation refers to the ability of MSMEs to develop environmentally friendly products and apply circularity principles in business processes. | Development of environmentally friendly products and implementation of *reduce*, *reuse*, and *recycle* principles | Haryati et al. (2021); Mengistu & Panizzolo (2021) |
| Business Ecosystem Collaboration | Business ecosystem collaboration refers to the ability of MSMEs to build strategic partnerships and share resources, information, and knowledge with external stakeholders. | Strategic partnerships with external stakeholders, relationship quality, partnership intensity and scope, and information sharing | Cobben et al. (2023); Graça & Camarinha-Matos (2021); Yue et al. (2022) |
| Circular Business Practices | Circular business practices refer to a business model that emphasizes resource efficiency by maintaining the value of products, components, and materials within the economic cycle for as long as possible. | Use of recycled materials, sustainable product design, reuse, and remanufacturing | Moraga et al. (2019); Natrajan et al. (2024); Negri et al. (2021); Tritto et al. (2024); Vogt et al. (2025) |

## RESEARCH METHOD

This study uses a quantitative explanatory approach to examine the causal relationship between green human resources, green environmental strategies, innovation, business ecosystem collaboration, and circular business practices, both directly and through mediation and moderation mechanisms (Seočanac, 2024). The study was conducted on MSMEs in the food and beverage sector in East Java, specifically in Surabaya, Gresik, and Malang Raya, because these three regions represent different characteristics in the implementation of a circular economy, namely urban consumption centers, industrial-based areas, and tourism and education areas. The study population consisted of 916 MSMEs in the food and beverage sector, while the sample was determined using a non-probability sampling technique with a purposive sampling approach. Based on Hair et al.'s calculation with five times the number of indicators, the minimum sample is 160 respondents, but this study used 278 respondents to ensure a more proportional and representative sample distribution.

**Table 2.** Proportional sample distribution

| Location | Number of Food and Beverage MSMEs | Sample Size |
|---|---|---|
| Surabaya City | 275 | 84 |
| Gresik Regency | 117 | 36 |
| Malang Regency | 296 | 89 |
| Malang City | 228 | 69 |
| **Total** | **916** | **278** |

The inclusion criteria were: (1) MSMEs operating in the food and beverage sector, (2) actively operating for at least one year, (3) having a business owner or manager willing to participate in the survey, and (4) conducting regular production and marketing activities during the study period. No specific requirement regarding prior implementation of environmentally friendly practices was imposed, as the study aimed to capture varying levels of green practices among MSMEs.

Variables were measured using a 1–5 Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. Green human resources were measured through environmental knowledge, skills, experience, and commitment. Green environmental strategies were measured through environmental policies, the use of environmentally friendly materials, green technology in production, waste management, and energy efficiency. Innovation was measured through the development of environmentally friendly products and the application of the principles of reduce, reuse, and recycle. Business ecosystem collaboration was measured through strategic partnerships, relationship quality, partnership intensity and scope, and information sharing. Circular business practices were measured through the use of recycled materials, sustainable product design, reuse, and remanufacturing.

The questionnaire indicators were adapted from established scale sources to support content validity. Green human resources were measured through environmental knowledge, skills, experience, and commitment; green environmental strategy through environmental policy, eco-friendly materials, green technology, waste management, and energy efficiency; innovation through eco-friendly product development and reduce, reuse, and recycle practices; business ecosystem collaboration through partnerships, relationship quality, partnership intensity, and information sharing; and circular business practices through recycled materials, sustainable product design, reuse, and

remanufacturing.

Data were collected through a structured questionnaire distributed to selected MSMEs. Prior to the main data analysis, the research instrument was pilot tested on 30 respondents outside the main sample. The pilot test results showed that all indicators had loading factor values above 0.70, thus meeting convergent validity criteria. The reliability test results also showed that all constructs had Cronbach's Alpha and Composite Reliability values above 0.70, and Average Variance Extracted values above 0.50. Thus, the research instrument was declared valid and reliable for measuring the research constructs (Hair et al., 2020).

Data analysis was conducted using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with the assistance of SmartPLS. PLS-SEM was selected instead of covariance-based SEM because this study focuses on prediction and explanation of circular business practices, involves a relatively complex model with mediation and moderation effects, and is suitable for analyzing survey data that may not fully meet multivariate normality assumptions. Therefore, PLS-SEM is considered appropriate for examining the direct, mediating, and moderating relationships in the proposed research model. The analysis stages included evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). Evaluation of the outer model was conducted through convergent validity, discriminant validity, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted. Evaluation of the inner model was conducted through path coefficients, t-statistics, p-values, R-squares, Q-squares, and model fit. Mediation testing was conducted to determine the role of innovation in the relationship between green human resources, green environmental strategies, and circular business practices. Meanwhile, a moderation test was conducted to determine whether business ecosystem collaboration strengthens the influence of green human resources and green environmental strategies on circular business practices. The hypothesis is declared significant if the t-statistic is greater than 1.96 or the p-value is less than 0.05 (Hair et al., 2020; Hair et al., 2024; Hayes, 2022).

## RESULTS AND DISCUSSION

### Results

#### *Overview of Research Object*

This research was conducted on MSMEs in the food and beverage sector in East Java, specifically in Surabaya City, Gresik Regency, Malang Regency, and Malang City. These four regions represent distinct MSME ecosystem characteristics: Surabaya as an urban consumption area, Gresik as an industrial-based area, and Greater Malang as a tourism, education, and creative economy area. These differing characteristics indicate that the implementation of circular business practices in food and beverage MSMEs is developing within diverse regional contexts.

Observations indicate that some MSMEs have begun implementing practices that support a circular economy, such as order-based production, the use of more efficient packaging, organic waste management, the reuse of waste materials, and the development of products with longer shelf lives. In general, circular business practices in the research areas are developing through raw material efficiency, product innovation, environmental strategies, and collaboration with businesses, communities, the government, and the market.


**Figure 2.** Observation of food and beverage MSMEs in East Java

***Respondent Characteristics***

This study involved 278 food and beverage MSMEs in East Java. Based on gender, respondents were relatively balanced, with a slight preponderance of women at 51.4% and men at 48.6%. Based on age, the majority of respondents were in the productive age group, especially those aged 25–34 years at 36.3% and 35–44 years at 30.2%. In terms of education, most respondents had a high school/vocational high school education at 54.0%, followed by a bachelor's degree at 26.3%. Based on region, the majority of respondents came from Malang Regency at 32.0%, Surabaya City at 30.2%, Malang City at 24.8%, and Gresik Regency at 12.9%. Most businesses were still in the early stages of growth, with businesses having been in business for less than one year at 36.3% and 1–3 years at 36.0%. Furthermore, the majority of MSMEs (64.7%) have 2–5 employees, 46.4% do not have legal documentation, and 70.5% have never received external support. These findings indicate that respondents are predominantly micro and small-scale MSMEs that are still developing, thus requiring legal strengthening, external support, innovation, and business ecosystem collaboration to accelerate the implementation of circular business practices.

**Table 3.** Respondent characteristics

| Characteristic | Category | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 135 | 48.6% |
| | Female | 143 | 51.4% |
| Age | <25 years | 53 | 19.1% |
| | 25–34 years | 101 | 36.3% |
| | 35–44 years | 84 | 30.2% |
| | 45–54 years | 25 | 9.0% |
| | ≥55 years | 15 | 5.4% |
| Education | Elementary school | 14 | 5.0% |
| | Junior high school | 26 | 9.4% |
| | Senior high/vocational school | 150 | 54.0% |
| | Diploma | 7 | 2.5% |
| | Bachelor's degree | 73 | 26.3% |
| | Postgraduate | 8 | 2.9% |
| Location | Surabaya City | 84 | 30.2% |
| | Gresik Regency | 36 | 12.9% |
| | Malang Regency | 89 | 32.0% |
| | Malang City | 69 | 24.8% |
| Business age | <1 year | 101 | 36.3% |
| | 1–3 years | 100 | 36.0% |

| Characteristic | Category | Frequency | Percentage |
|---|---|---|---|
| | 4–7 years | 59 | 21.2% |
| | >7 years | 18 | 6.5% |
| Number of employees | 1 employee | 52 | 18.7% |
| | 2–5 employees | 180 | 64.7% |
| | 6–10 employees | 36 | 12.9% |
| | >10 employees | 10 | 3.6% |
| Business legality | IUMK | 40 | 14.4% |
| | Food certification | 50 | 18.0% |
| | Halal certificate | 59 | 21.2% |
| | None | 129 | 46.4% |
| External support | Never received support | 196 | 70.5% |
| | MSME community/social organization | 12 | 4.3% |
| | Educational institution | 11 | 4.0% |
| | Government | 28 | 10.1% |
| | Private/CSR | 31 | 11.2% |

***Descriptive Analysis of Research Variables***

Descriptive analysis was conducted to determine the trends in respondents' responses to five research variables: green human resources, green environmental strategies, innovation, business ecosystem collaboration, and circular business practices. The analysis results showed that innovation received the highest average score of 3.625, falling within the good category. Furthermore, circular business practices received an average score of 3.490, green environmental strategies 3.480, and business ecosystem collaboration 3.441, all of which fell within the good category. Meanwhile, green human resources received an average score of 3.301, falling within the fair category. These findings indicate that food and beverage MSMEs in East Java have a positive tendency to implement innovation, environmental strategies, collaboration, and circular business practices. However, the capacity of green human resources still needs to be strengthened, particularly in the areas of skills in using environmentally friendly equipment and managing environmentally-based business practices.

**Table 4.** Descriptive statistics of research variables

| Variable | Mean Score | Category |
|---|---|---|
| Green Human Resources | 3.301 | Fairly good |
| Green Environmental Strategy | 3.480 | Good |
| Innovation | 3.625 | Good |
| Business Ecosystem Collaboration | 3.441 | Good |
| Circular Business Practices | 3.490 | Good |

***SEM-PLS Analysis***

Data analysis was conducted using Structural Equation Modeling–Partial Least Squares (SEM-PLS). Model evaluation was conducted in two stages: measurement model evaluation (outer model) and structural model evaluation (inner model). Outer model evaluation was conducted to test convergent validity, discriminant validity, and

construct reliability. Based on the criteria of Hair et al. (2017), an indicator is considered valid if it has a loading factor value greater than 0.70 and an AVE value greater than 0.50. The analysis results showed that all indicators in the variables of green human resources, green environmental strategy, innovation, business ecosystem collaboration, and circular business practices had loading factor values above 0.70, AVE values above 0.50, and Cronbach's Alpha and Composite Reliability values above 0.70. Thus, all constructs were declared valid and reliable. In addition, the results of discriminant validity testing through the Fornell-Larcker Criterion, HTMT, and cross loading show that each indicator has the highest value in its respective construct, so there are no discriminant validity problems (Chin, 1998; Hair et al., 2017; Henseler et al., 2015; Ghozali, 2015).

**Table 5.** Measurement model results

| Construct | Loading Factor Range | Cronbach's Alpha | Composite Reliability | AVE | Decision |
|---|---|---|---|---|---|
| Green Human Resources | 0.896–0.935 | 0.975 | 0.978 | 0.849 | Valid and reliable |
| Green Environmental Strategy | 0.920–0.942 | 0.978 | 0.981 | 0.867 | Valid and reliable |
| Innovation | 0.919–0.950 | 0.948 | 0.962 | 0.865 | Valid and reliable |
| Business Ecosystem Collaboration | 0.888–0.919 | 0.955 | 0.964 | 0.818 | Valid and reliable |
| Circular Business Practices | 0.835–0.919 | 0.951 | 0.961 | 0.803 | Valid and reliable |

An inner model evaluation was conducted to determine the model's ability to explain endogenous variables. The test results showed that the R-square value of circular business practices before including the moderating interaction was 0.305, which means that green human resources, green environmental strategies, and innovation were able to explain 30.5% of the variation in circular business practices. After the moderating interaction of business ecosystem collaboration was included, the R-square value increased to 0.394. This indicates that the model with moderation has better explanatory power, with an increase of 8.9%. In addition, the $Q^2$predict value for circular business practices also increased from 0.141 to 0.240 after the moderating interaction was included, so the model has predictive relevance because the $Q^2$ value is greater than zero. The model fit results also showed that the model met the criteria for good fit, with SRMR values below 0.08–0.10 and NFI values above 0.90, both in the unmoderated and moderated models (Hair et al., 2017).

**Table 6.** Structural model evaluation

| Model | Endogenous Variable | R-square | $Q^2$predict | SRMR | NFI | Decision |
|---|---|---|---|---|---|---|
| Without moderation | Circular Business Practices | 0.305 | 0.141 | 0.036 | 0.914 | Good fit |

| Model | Endogenous Variable | R-square | Q²predict | SRMR | NFI | Decision |
|---|---|---|---|---|---|---|
| Without moderation | Innovation | 0.144 | 0.126 | 0.036 | 0.914 | Good fit |
| With moderation | Circular Business Practices | 0.394 | 0.240 | 0.042 | 0.902 | Good fit |
| With moderation | Innovation | 0.144 | 0.126 | 0.042 | 0.902 | Good fit |

***Research Findings***

The results of the hypothesis testing indicate that all relationships in the research model are significant and accepted. Green human resources have a positive influence on circular business practices and innovation, while green environmental strategies also have a positive influence on circular business practices and innovation. Furthermore, innovation has been shown to have a positive influence on circular business practices and mediate the relationship between green human resources and circular business practices, as well as the relationship between green environmental strategies and circular business practices. Furthermore, collaboration within the business ecosystem has been shown to strengthen the influence of green human resources and green environmental strategies on circular business practices. Thus, these findings confirm that circular business practices in food and beverage MSMEs are influenced not only by internal capabilities but also by innovation and collaborative support from the business ecosystem.

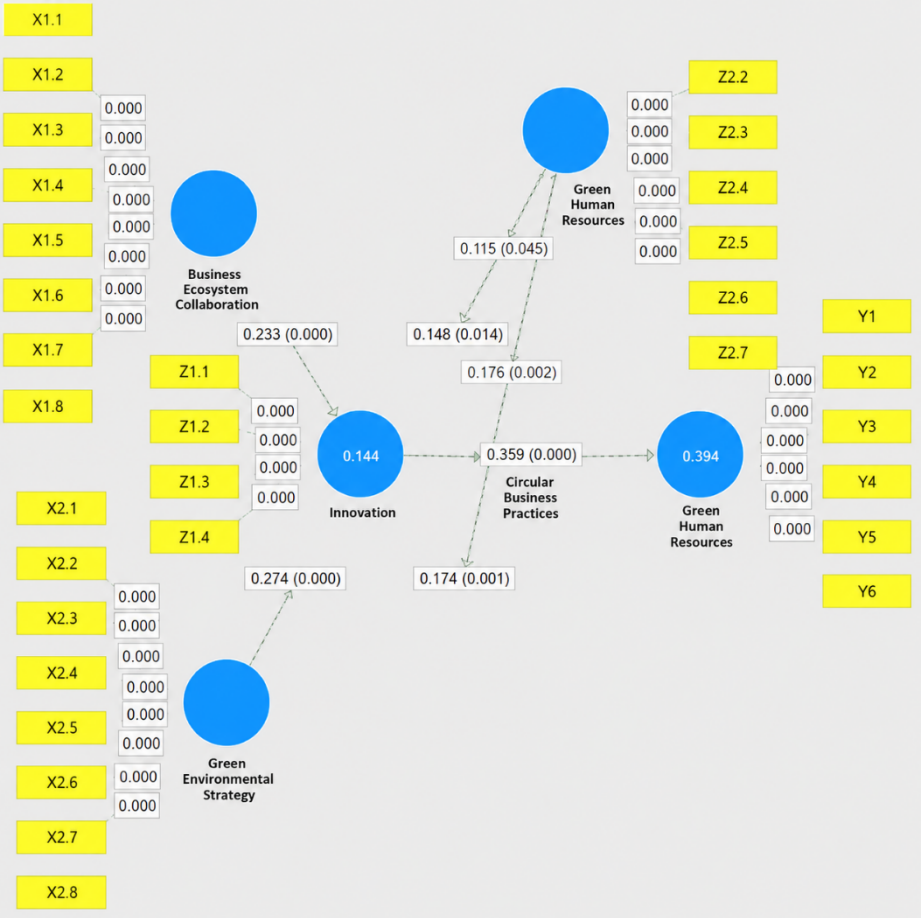


**Figure 3.** Empirical model of SEM-PLS results

**Table 7.** Hypothesis testing results

| Hypothesis | Relationship | Path Coefficient | T-statistics | P-value | Decision |
|---|---|---|---|---|---|
| H1 | Green Human Resources, Circular Business Practices | 0.148 | 2.470 | 0.014 | Accepted |
| H2 | Green Human Resources, Innovation | 0.233 | 4.020 | 0.000 | Accepted |
| H3 | Green Environmental Strategy, Circular Business Practices | 0.174 | 3.333 | 0.001 | Accepted |
| H4 | Green Environmental Strategy, Innovation | 0.274 | 4.806 | 0.000 | Accepted |
| H5 | Innovation, Circular Business Practices | 0.359 | 6.780 | 0.000 | Accepted |
| H6 | Green Human Resources, Innovation, Circular Business Practices | 0.084 | 3.553 | 0.000 | Accepted |
| H7 | Green Environmental Strategy, Innovation, Circular Business Practices | 0.098 | 3.998 | 0.000 | Accepted |
| H8 | Green Human Resources and Business Ecosystem Collaboration, Circular Business Practices | 0.115 | 2.004 | 0.045 | Accepted |
| H9 | Green Environmental Strategy and | 0.176 | 3.103 | 0.002 | Accepted |

| Hypothesis | Relationship | Path Coefficient | T-statistics | P-value | Decision |
|---|---|---|---|---|---|
| | Business Ecosystem Collaboration, Circular Business Practices | | | | |

## Discussion

The results of this study indicate that green human resources, green environmental strategies, innovation, and business ecosystem collaboration play a crucial role in promoting circular business practices among MSMEs in East Java. Green human resources have been shown to strengthen circular business practices because business actors with environmental awareness, green competencies, and pro-environmental behaviors are more likely to implement resource efficiency, waste reduction, and material reuse. This finding aligns with the Green Human Resource Management concept of Renwick, Redman, and Maguire (2013), the Resource-Based View of Barney (1991), and the Behavioral Theory of the Firm of Cyert and March (1963), which emphasize that human resources are a strategic asset in shaping sustainable organizational decisions and behavior.

Green human resources have also been shown to influence innovation. This suggests that MSME actors' environmental competencies and awareness can foster the emergence of new ideas, whether in products, production processes, waste management, or the use of environmentally friendly raw materials. This finding supports Schumpeter's (1934) view that humans are the primary agents of economic change through innovation. These results also align with Renwick et al. (2013), Jabbour and de Sousa Jabbour (2016), Pham et al. (2020), Yong et al. (2020), and Daily and Huang (2001), which confirm that green HR practices can foster creativity, green innovation, and strengthen a sustainable organizational culture.

Green environmental strategies also positively influence circular business practices and innovation. MSMEs that implement waste management, energy efficiency, the use of environmentally friendly raw materials, and biodegradable packaging tend to be better prepared to implement circular business models. This finding reinforces Hart's (1995) Natural Resource-Based View, which states that environmental strategies can be a source of sustainable competitive advantage. Furthermore, these results align with the Triple Bottom Line of Elkington (1997), Chen, Lai, and Wen (2006), Chang (2011), Pham et al. (2019), and Yusliza et al. (2020), and Suryani and Rahmawati (2021), who emphasized that environmental orientation can increase innovation, efficiency, and business competitiveness.

Innovation is the most powerful factor in driving circular business practices. Through innovation, MSMEs can redesign production processes, utilize waste into economically valuable products, develop environmentally friendly packaging, and increase resource efficiency. These findings support those of Agyemang et al. (2019), Kirchherr et al. (2020), Dangelico and Pujari (2019), Su et al. (2021), Fadhilah and Hidayat (2022), and Handayani (2021), who stated that product and process innovation is key to the successful implementation of a circular economy, particularly in the MSME sector.

The results of this study also indicate that innovation mediates the relationship between green human resources and circular business practices. This means that green awareness and competencies possessed by human resources will have a greater impact if translated into applicable innovations. These findings align with those of Singh et al. (2020), Kirchherr et al. (2018), and Agyemang et al. (2019), which confirms that green innovation acts as a bridge between internal capabilities and sustainable practices. However, the relatively small mediating effect indicates that some MSMEs still face limitations in technical knowledge, business legality, and external support.

Innovation also mediates the relationship between green environmental strategies and circular business practices. A sound environmental strategy will be more effective if accompanied by innovative capabilities in products, processes, and business models. This supports the Dynamic Capability Theory of Teece, Pisano, and Shuen (1997), which emphasizes the importance of an organization's ability to adapt resources to environmental changes. This finding is also consistent with Singh et al. (2020), Chuang and Huang (2018), and Yusoff et al. (2022), which show that innovation plays a crucial role in transforming green strategies into sustainable business practices.

Business ecosystem collaboration has been shown to strengthen the relationship between green human resources and circular business practices, as well as the relationship between green environmental strategies and circular business practices. Collaboration with suppliers, customers, government, communities, universities, and supporting institutions enables MSMEs to acquire knowledge, technology, resources, and broader market access. These findings support Adner's (2017) Innovation Ecosystem Theory, Geissdoerfer et al.'s (2020) Circular Economy Ecosystem, and research by Singh et al. (2021), Kumar and Dhir (2023), Mazzi et al. (2020), Chen et al. (2021), Kumar and Raj (2022), and Wijayanti and Sari (2023), which confirm that cross-actor collaboration strengthens the successful implementation of circular practices.

The moderating role of business ecosystem collaboration can be explained through the practical support provided by external actors. Universities may assist MSMEs through training, product development, and simple technology transfer. Government institutions can support circular transformation through regulations, mentoring programs, certification, and access to financial assistance. Suppliers contribute by providing eco-friendly materials and packaging, while communities and customers encourage waste separation, reuse practices, and market acceptance of green products. Therefore, collaboration helps MSMEs overcome resource limitations and makes green human resources and environmental strategies more effective in promoting circular business practices.

The findings of this study are also consistent with evidence from other developing and emerging economies. Studies in Vietnam, Pakistan, Malaysia, and Saudi Arabia have shown that green human resources, environmental strategies, and innovation contribute to sustainable business performance and circular economy adoption among SMEs facing resource constraints (Chowdhury et al., 2022; Bhatti et al., 2023; AlQershi et al., 2023; Akinwale, 2024). Similar to those contexts, Indonesian MSMEs rely on internal capabilities and external collaboration to overcome limitations in technology, financing, and environmental knowledge. This suggests that the drivers of circular business practices identified in this study are not unique to Indonesia but are broadly relevant to MSMEs in emerging economies.

Overall, this research confirms that the transformation of MSMEs toward circular businesses requires the integration of green human resources, green environmental strategies, innovation, and business ecosystem collaboration. Green human resources form the basis of behavior, green environmental strategies provide policy direction, innovation translates both into practical solutions, and collaboration expands MSMEs' capacity to access external resources. Thus, strengthening these four aspects is an important strategy in building more efficient, adaptive, competitive, and sustainable MSMEs, while also supporting the achievement of Sustainable Development Goals, especially goals 8 and 12.

## CONCLUSION

**Fundamental Finding:** This study demonstrates that the transition toward circular business practices in MSMEs is driven by the combined roles of green human resources, green environmental strategies, innovation, and business ecosystem collaboration. Among these factors, innovation emerged as the key mechanism that translates environmental capabilities into practical circular business actions, while ecosystem collaboration strengthens MSMEs' ability to implement sustainable practices despite resource constraints. **Implication:** The findings suggest that sustainable MSME transformation requires practical support from both internal and external actors. Local governments should develop green MSME training programs, provide incentives for eco-innovation, and facilitate waste management partnerships between MSMEs, suppliers, communities, and recycling actors. In addition, ecosystem-based collaboration platforms are needed to connect MSMEs with universities, financial institutions, government agencies, and markets so that circular business practices can be implemented more effectively and continuously. **Limitation:** This study focused on food and beverage MSMEs in East Java, which may limit the generalizability of the findings to other sectors and regions. In addition, the cross-sectional design does not capture changes in circular business practices over time. **Future Research:** Future studies should develop more theory-driven research by conducting longitudinal studies to examine how MSMEs transform from linear to circular business models over time. Comparative studies across sectors or regions are also needed to identify whether circular transformation differs between industries and institutional contexts. In addition, multi-country studies in emerging economies and mixed-method approaches could provide deeper insights into the behavioral dimensions of green innovation adoption and ecosystem-based collaboration.

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