

# Antecedents of circular economy orientation in maritime and fisheries SMEs: institutional, capability and cultural drivers in Bali, Indonesia

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## Article

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# Abstract

Circular economy (CE) principles are increasingly relevant to small and medium enterprises (SMEs) in resource-dependent sectors, yet little is known about what shapes circular economy orientation (CEO) among maritime and fisheries SMEs in archipelagic emerging economies. This study examines entrepreneurial orientation, institutional pressure, green dynamic capability and Tri Hita Karana (THK) orientation, a Balinese indigenous value system, as antecedents of CEO and tests whether environmental dynamism moderates these relationships. Drawing on the resource-based view, institutional theory, dynamic capability theory and an indigenous cultural perspective, six hypotheses were tested with survey data from 260 owner-managers of maritime and fisheries SMEs in coastal Bali, Indonesia, using partial least squares structural equation modelling (PLS-SEM). All four antecedents were positively associated with CEO: entrepreneurial orientation ( $\beta = 0.242$ ,  $p < 0.001$ ), institutional pressure ( $\beta = 0.156$ ,  $p = 0.002$ ), green dynamic capability ( $\beta = 0.237$ ,  $p < 0.001$ ) and THK orientation ( $\beta = 0.277$ ,  $p < 0.001$ ), with THK orientation showing the largest standardised coefficient. Environmental dynamism strengthened the effects of entrepreneurial orientation ( $\beta = 0.107$ ,  $p = 0.037$ ) and green dynamic capability ( $\beta = 0.114$ ,  $p = 0.016$ ) on CEO, whereas its direct effect was not significant ( $\beta = 0.053$ ,  $p = 0.303$ ). The model explained 44.7% of the variance in CEO. The study treats CEO as an endogenous strategic outcome rather than a predictor of performance, shows that an indigenous value system can operate alongside strategic and institutional drivers, and extends CE evidence to natural-resource-dependent SMEs in an archipelagic setting. The results suggest that capability building and culturally grounded communication may complement regulatory instruments in promoting circular practices in coastal economies.

## 1. Introduction

The circular economy (CE) provides an alternative to the conventional linear model of production and consumption by emphasising resource reduction, reuse, and recovery across value chains (Kirchherr et al. 2017). For small and medium enterprises (SMEs), a circular strategic orientation can be relevant not only to environmental performance but also to resource efficiency and resilience (de Jesus and Mendonça 2018; Dey et al. 2022). Within this literature, circular economy orientation (CEO) can be understood as the extent to which circular principles are incorporated into a firm's strategic thinking and business logic, rather than treated only as individual operational practices (Arsawan et al. 2023).

Two gaps are particularly relevant to the present study. First, much of the empirical CE literature has examined manufacturing, retail, and urban service settings, whereas the antecedents of CEO among natural-resource-dependent SMEs, including maritime and fisheries enterprises, remain less well documented (Cooney et al. 2023). These enterprises generate organic and material waste streams, including fish offal, shells, by-catch, and used fishing gear, but the factors that shape their orientation towards circularity have received comparatively limited attention (Kyvelou et al. 2023). Research on other resource-dependent livelihoods in Bali, including bamboo handicrafts, has already linked conservation and resource management to livelihood sustainability (Irwansyah et al. 2023), but comparable empirical

evidence for maritime and fisheries-based enterprises is limited. Second, existing antecedent models have mainly emphasised strategic, capability, and institutional variables, such as entrepreneurial orientation, institutional pressure, and dynamic capability (Arranz et al. 2022; Kiranantawat and Ahmad 2023; Castro-Lopez et al. 2025). The role of indigenous cultural values as a distinct antecedent of circular strategic orientation has received less attention, despite evidence that local cultural systems can shape organisational approaches to sustainability (Sapta et al. 2021).

The importance of this issue is also apparent in Bali's post-pandemic economic context. The disruption to tourism exposed the vulnerability associated with a high concentration of economic activity in one sector and was accompanied by an increase in poverty (Dewi et al. 2024). Strengthening alternative, community-based and natural-resource-dependent activities, including fisheries, is therefore relevant to broader economic resilience. Understanding the factors associated with circular strategic orientation among maritime and fisheries SMEs can contribute to this discussion by linking resource efficiency with the sustainability of local livelihoods.

Bali provides a useful setting for examining these relationships because economic activity is embedded in the philosophy of Tri Hita Karana, which emphasises harmony among humans and the divine (parhyangan), among people (pawongan), and between people and nature (palemahan). Previous studies have linked THK-based organisational culture and business strategy with knowledge management and sustainable business performance in Balinese enterprises (Sapta et al. 2021; Yasa et al. 2024). At the same time, maritime and fisheries SMEs operate in an environment characterised by seasonal catch variability, changing market conditions, regulatory requirements, and the need to adapt resources and routines to environmental pressures (Arsawan et al. 2024, 2026). These characteristics make Bali a relevant context for examining both internal and external antecedents of CEO.

Against this background, the study develops and tests a model of CEO among maritime and fisheries SMEs in Bali. It examines the direct effects of entrepreneurial orientation, institutional pressure, green dynamic capability, and THK orientation on CEO and tests whether environmental dynamism changes the strength of the entrepreneurial orientation–CEO and green dynamic capability–CEO relationships. The study therefore brings together strategic, institutional, capability, and cultural explanations of CEO within one empirical model. It also extends the setting of CE research to maritime and fisheries SMEs and provides evidence that can inform discussions among SME owners, fisheries-sector organisations, and other stakeholders concerned with the transition towards more circular coastal economies.

## **2. Literature Review and Hypothesis Development**

### **2.1 Underpinning Theoretical Perspectives**

The conceptual model draws on four complementary perspectives. The resource-based view (RBV) and natural-resource-based view (NRBV) emphasise the role of valuable internal resources and capabilities in creating and sustaining firm-level advantages, including capabilities related to pollution prevention and

environmental stewardship (Barney 1991; Hart 1995). This perspective supports the inclusion of entrepreneurial orientation and green dynamic capability as internal drivers of CEO. Institutional theory provides a basis for examining how coercive, normative, and mimetic pressures influence organisational responses to environmental expectations (DiMaggio and Powell 1983; Zhu and Sarkis 2007; Arranz et al. 2022). Dynamic capability theory focuses on the ability to sense opportunities, seize them, and reconfigure resources as conditions change, which is directly relevant to green dynamic capability (Teece 2007; Kiranantawat and Ahmad 2023). Finally, the study treats THK as an indigenous cultural perspective that may shape strategic choices through locally embedded values and norms (Sapta et al. 2021; Yasa et al. 2024). Environmental dynamism is included as a boundary condition because the effect of strategic capabilities may vary with changes and uncertainty in the external environment (Chan et al. 2016; Arsawan et al. 2026).

## **2.2 Circular Economy Orientation**

Circular economy orientation (CEO) refers to the extent to which circular principles are incorporated into a firm's strategic posture, particularly through efforts to reduce resource use, extend the useful life of resources through reuse, and recover value from waste (Kirchherr et al. 2017; de Jesus and Mendonça 2018). This construct differs from circular economy practices, which describe specific operational activities; CEO captures the strategic orientation that can precede and guide those activities (Arsawan et al. 2023). The distinction is relevant to maritime and fisheries SMEs because their operations generate both organic by-products, such as fish offal, shells, and by-catch, and durable material waste, including fishing nets and styrofoam. These streams may provide opportunities for reuse, recycling, and value recovery (Cooney et al. 2023). Research on fish-scale waste further illustrates the potential to convert sector-specific waste into value-added applications (Manjudevi et al. 2024). Evidence from island settings also points to infrastructure and institutional constraints that can shape the implementation of circular economy principles (Shaznie et al. 2025).

## **2.3 Entrepreneurial Orientation and Circular Economy Orientation**

Entrepreneurial orientation (EO) describes a firm's tendency to innovate, act proactively, and accept calculated risks when pursuing opportunities (Miller 1983; Lumpkin and Dess 1996). These characteristics are relevant to circular strategies because innovation can support experimentation with new approaches to waste recovery, proactiveness can encourage firms to respond to emerging sustainability expectations, and calculated risk-taking can facilitate investment in initiatives whose returns are initially uncertain (Castro-Lopez et al. 2025). Evidence from SME research also links entrepreneurial orientation and related organisational resources with stronger engagement in circular economy activities (Dey et al. 2022). In maritime and fisheries SMEs, owner-managers with a stronger entrepreneurial orientation may therefore be more willing to identify and act on opportunities to reduce resource use and recover value from waste. On this basis, the following hypothesis is proposed:

**H1: Entrepreneurial orientation has a positive and significant effect on circular economy orientation among maritime/fisheries SMEs.**

## **2.4 Institutional Pressure and Circular Economy Orientation**

Institutional theory explains organisational responses to coercive, normative, and mimetic expectations within an institutional environment (DiMaggio and Powell 1983). In environmental management, coercive pressures may arise from regulation, normative pressures from professional or community expectations, and mimetic pressures from the practices of peer organisations. Previous studies have associated these forms of institutional pressure with the adoption of green and circular practices (Zhu and Sarkis 2007; Arranz et al. 2022). Nassani et al. (2023) further report a positive relationship between institutional pressures and circular economy target performance, with complementary zero-waste practices strengthening firms' responses. For maritime and fisheries SMEs, institutional pressure may therefore provide an external stimulus for incorporating circular principles into strategic decision-making. The study consequently proposes:

**H2: Institutional pressure has a positive and significant effect on circular economy orientation among maritime/fisheries SMEs.**

## **2.5 Green Dynamic Capability and Circular Economy Orientation**

Green dynamic capability (GDC) concerns a firm's ability to identify environmentally relevant opportunities, mobilise resources in response to them, and reconfigure routines and processes to support environmentally sound value creation (Teece 2007; Kiranantawat and Ahmad 2023). Such capability can help firms identify potential uses for waste streams, direct resources towards green process innovation, and modify routines to support reuse and recycling (Bag et al. 2022). This capability may be particularly relevant to resource-constrained SMEs because circular transition does not necessarily depend on large capital investments; it can also involve incremental changes in how existing resources and processes are organised. Prior SME studies associate green dynamic capability and related eco-innovation capabilities with circular economy capability and sustainability outcomes (Bag et al. 2022; Kiranantawat and Ahmad 2023). More broadly, dynamic capabilities have also been linked to entrepreneurial performance under resource constraints (Alhalalmeh et al. 2025). Accordingly, the study proposes:

**H3: Green dynamic capability has a positive and significant effect on circular economy orientation among maritime/fisheries SMEs.**

## **2.6 Tri Hita Karana Orientation and Circular Economy Orientation**

Tri Hita Karana (THK) is a Balinese-Hindu philosophical framework centred on harmony in three relationships: with the divine (parhyangan), with other people (pawongan), and with nature (palemahan). Previous research has linked THK-based organisational culture and strategy with knowledge management and sustainable business performance in Balinese enterprises (Sapta et al. 2021; Yasa et al. 2024). The palemahan dimension is particularly relevant to resource stewardship, while pawongan emphasises relationships and responsibilities within the community. These principles provide a plausible cultural basis for considering circularity as part of a firm's strategic orientation. In this study, THK orientation is therefore treated as a context-specific cultural antecedent that operates alongside, rather than in place of, strategic and institutional factors. The hypothesis is stated as follows:

**H4: Tri Hita Karana orientation has a positive and significant effect on circular economy orientation among maritime/fisheries SMEs.**

## 2.7 The Moderating Role of Environmental Dynamism

Environmental dynamism describes the degree of change and unpredictability in a firm's external environment, including fluctuations in demand, regulatory conditions, and, for maritime and fisheries enterprises, seasonal and climatic variation in catch volumes (Chan et al. 2016). From a contingency perspective, the relationship between a firm's strategic characteristics and its outcomes may depend on the conditions under which the firm operates. Chan et al. (2016) found that environmental dynamism altered the relationship between green product innovation and performance. Recent evidence from Indonesian SMEs likewise indicates that environmental dynamism can change the strength of relationships between internal organisational factors and circular economy-related outcomes (Arsawan et al. 2024, 2026). Qalati (2025) provides related evidence that environmental turbulence can condition relationships involving managerial ties, knowledge management, and sustainability outcomes. For maritime and fisheries SMEs, greater volatility in catch volumes, input costs, and market demand may increase the value of resource efficiency and waste recovery. The study therefore tests whether environmental dynamism strengthens the effects of entrepreneurial orientation and green dynamic capability on CEO.

**H5: Environmental dynamism moderates the relationship between entrepreneurial orientation and circular economy orientation, such that the relationship is stronger under conditions of high environmental dynamism.**

**H6: Environmental dynamism moderates the relationship between green dynamic capability and circular economy orientation, such that the relationship is stronger under conditions of high environmental dynamism.**

## 2.8 Conceptual Framework

Figure 1 presents the conceptual framework derived from the preceding arguments. Entrepreneurial orientation, institutional pressure, green dynamic capability, and THK orientation are specified as direct

antecedents of CEO. Environmental dynamism is modelled as a moderator of the entrepreneurial orientation–CEO and green dynamic capability–CEO relationships.

### **3. Research Method**

#### **3.1 Research Design**

This study used a quantitative explanatory design and a cross-sectional survey to test the hypothesised relationships among the latent constructs. The design is consistent with the study's objective of examining associations derived from established theoretical perspectives and with the use of PLS-SEM in recent SME-focused circular economy research (Arsawan et al. 2023, 2026).

#### **3.2 Population, Sample, and Sampling Technique**

The population comprised owner-managers of maritime and fisheries-based micro, small and medium enterprises operating in coastal regencies of Bali Province, Indonesia. For brevity, these enterprises are referred to as SMEs throughout the article. The population included capture fisheries, aquaculture, fish and seafood processing, and marine-based service enterprises. Because a complete sampling frame was not available from a single administrative source, purposive sampling was used. Eligible respondents were required to be the owner or principal decision-maker, to have operated the enterprise for at least one year, and to operate a micro, small, or medium enterprise under the applicable Indonesian MSME classification.

A minimum target of 260 usable responses was set a priori using the 10-times rule, that is, ten times the 26 measurement indicators in the model: five items for entrepreneurial orientation, four each for institutional pressure, green dynamic capability, THK orientation and environmental dynamism, and five for CEO (Hair et al. 2019). A total of 275 questionnaires were distributed to allow for incomplete responses and screening exclusions, and coverage was sought across capture fisheries, aquaculture, processing and marine services and across coastal regencies.

Because the 10-times rule does not guarantee adequate statistical power, the sensitivity of the achieved sample was also assessed. A post hoc power analysis for the increase in  $R^2$  attributable to a single predictor in a model with seven predictors ( $\alpha = 0.05$ ) shows that  $n = 260$  yields a power of 0.85 for the smallest direct effect ( $f^2 = 0.035$ ) and above 0.95 for the other direct effects, but only 0.58 and 0.68 for the two interaction terms ( $f^2 = 0.018$  and  $0.023$ ) (Cohen 1988; Faul et al. 2009). The inverse square root method gives a similar picture, indicating a minimum sample of about 254 for the smallest direct path ( $\beta = 0.156$ ) and about 476–540 for the interaction paths (Kock and Hadaya 2018). The moderation results are therefore interpreted with caution.

#### **3.3 Operationalisation and Measurement of Variables**

All constructs were measured with multi-item reflective indicators adapted from established literature and contextualised to the maritime and fisheries setting. Entrepreneurial orientation captured

innovativeness, proactiveness, and risk-taking (Miller 1983; Lumpkin and Dess 1996; Castro-Lopez et al. 2025). Institutional pressure captured coercive, normative, and mimetic pressures (Zhu and Sarkis 2007; Nassani et al. 2023). Green dynamic capability was represented through sensing, seizing, and reconfiguring dimensions (Teece 2007; Kiranantawat and Ahmad 2023). THK orientation was operationalised through parhyangan, pawongan, and palemahan dimensions, drawing on Balinese organisational studies and contextualised for business owners (Sapta et al. 2021; Yasa et al. 2024). Environmental dynamism captured market, regulatory, and operational or seasonal unpredictability (Chan et al. 2016; Arsawan et al. 2026). CEO was measured through reduce, reuse, and recycle indicators adapted to fisheries-related waste streams (Kirchherr et al. 2017; de Jesus and Mendonça 2018; Arsawan et al. 2023; Cooney et al. 2023). All items used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

### **3.4 Data Collection Procedure**

Data were collected between April 2026 and August 2026 using a structured self-administered questionnaire delivered face-to-face by trained enumerators, with an online version available for respondents with adequate digital access. Of the 260 usable responses, 137 (52.7%) were collected face-to-face and 123 (47.3%) online. Before the main survey, the instrument was reviewed by academics with expertise in strategic management and sustainability and, for the THK items, by scholars familiar with Balinese philosophy, to assess content validity and the clarity of item wording in the local context. The full list of items is provided in Supplementary Table S1

### **3.5 Data Analysis Technique**

Data were analysed using PLS-SEM in SmartPLS 4.1.1.8. PLS-SEM was selected because the study examined a prediction-oriented model with several latent constructs and moderation effects, and because its bootstrapping-based inference does not require multivariate normality (Hair et al. 2019; Arsawan et al. 2023, 2026). Analysis proceeded in two stages. First, the measurement model was assessed for indicator reliability, internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity (average variance extracted, AVE) and discriminant validity (Fornell–Larcker criterion and heterotrait–monotrait ratio, HTMT). Second, the structural model was assessed for collinearity (variance inflation factor, VIF), path coefficients,  $R^2$ ,  $f^2$  and statistical significance, using bootstrapping with 5,000 resamples, two-tailed tests at  $\alpha = 0.05$  and 95% bootstrap confidence intervals. Out-of-sample predictive power was evaluated with PLSpredict (Shmueli et al. 2019). The moderating effects of environmental dynamism were estimated using the two-stage approach for interaction terms and probed with simple slope analysis. The standardised root mean square residual (SRMR) and the normed fit index (NFI) were reported as supplementary diagnostics.

### **3.6 Validity, Reliability, and Common Method Bias**

Because the data were obtained from a single self-reported questionnaire, potential common method bias was considered. Procedural measures included respondent anonymity and separation of predictor and criterion items. Statistically, the full collinearity approach was applied, in which VIF values of 3.3 or

lower for all latent variables indicate that common method bias is unlikely to be a serious concern (Kock 2015).

## **3.7 Ethical Considerations**

The study followed standard research-ethics procedures, including voluntary participation, anonymity, and confidentiality of respondent and firm-level information. Respondents were informed about the purpose of the study and their right to withdraw without consequence, and informed consent was obtained from all respondents before participation. Ethical approval details are provided in the Ethics declarations section.

## **4. Results**

### **4.1 Sample Realisation**

Data collection produced 260 usable responses from 275 distributed questionnaires (usable response rate 94.5%) from owner-managers of maritime and fisheries-based SMEs in coastal regencies and the city of Bali. This number met the minimum sample target specified in the research design. The planned allocation of the sample across regencies and the city is shown in Table 1. The data were analysed in SmartPLS using the measurement-model and structural-model procedures described above (Hair et al. 2019).

Table 1  
Profile of respondents and enterprises (N = 260).

| Characteristic                   | Category                    | n   | %    |
|----------------------------------|-----------------------------|-----|------|
| <b>Sub-sector</b>                |                             |     |      |
|                                  | Capture fisheries           | 78  | 30.0 |
|                                  | Aquaculture                 | 62  | 23.8 |
|                                  | Fish and seafood processing | 68  | 26.2 |
|                                  | Marine-based services       | 52  | 20.0 |
| <b>Regency</b>                   |                             |     |      |
|                                  | Buleleng                    | 80  | 30.8 |
|                                  | Jemberana                   | 45  | 17.3 |
|                                  | Karangasem                  | 35  | 13.5 |
|                                  | Denpasar                    | 30  | 11.5 |
|                                  | Gianyar                     | 25  | 9.6  |
|                                  | Klungkung                   | 20  | 7.7  |
|                                  | Badung                      | 25  | 9.6  |
| <b>Enterprise size</b>           |                             |     |      |
|                                  | Micro                       | 155 | 59.6 |
|                                  | Small                       | 80  | 30.8 |
|                                  | Medium                      | 25  | 9.6  |
| <b>Years in operation</b>        |                             |     |      |
|                                  | 1–5                         | 92  | 35.4 |
|                                  | 6–10                        | 78  | 30.0 |
|                                  | > 10                        | 90  | 34.6 |
| <b>Gender of respondent</b>      |                             |     |      |
|                                  | Male                        | 165 | 63.5 |
|                                  | Female                      | 95  | 36.5 |
| <b>Age of respondent (years)</b> |                             |     |      |
|                                  | < 30                        | 35  | 13.5 |

| Characteristic    | Category            | n   | %    |
|-------------------|---------------------|-----|------|
| <b>Sub-sector</b> |                     |     |      |
|                   | 30–39               | 82  | 31.5 |
|                   | 40–49               | 91  | 35.0 |
|                   | ≥ 50                | 52  | 20.0 |
| <b>Education</b>  |                     |     |      |
|                   | Primary or lower    | 28  | 10.8 |
|                   | Secondary           | 124 | 47.7 |
|                   | Diploma or bachelor | 108 | 41.5 |

## 4.2 Measurement (Outer) Model Assessment

As shown in Table 2, all outer loadings exceeded 0.70 and were statistically significant at  $p < 0.001$ , supporting indicator reliability. Composite reliability values ranged from 0.874 to 0.900, while AVE values ranged from 0.622 to 0.693. These values exceed the commonly used thresholds of 0.70 for composite reliability and 0.50 for AVE. Cronbach's alpha values ranged from 0.811 to 0.861, providing additional evidence of internal consistency reliability (Hair et al. 2019).

Table 2

Outer loadings, t-values and reliability and validity indices of the measurement model. CA = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted; all loadings significant at  $p < 0.001$ .

| <b>Construct / Indicator</b>     | <b>Loading</b> | <b>t-value</b> | <b>CA</b> | <b>CR</b> | <b>AVE</b> | <b>Decision</b>  |
|----------------------------------|----------------|----------------|-----------|-----------|------------|------------------|
| Entrepreneurial Orientation (X1) |                |                | 0.861     | 0.900     | 0.642      | Valid & Reliable |
| X1.1                             | 0.804          | 30.08          |           |           |            |                  |
| X1.2                             | 0.793          | 30.14          |           |           |            |                  |
| X1.3                             | 0.810          | 36.28          |           |           |            |                  |
| X1.4                             | 0.816          | 33.67          |           |           |            |                  |
| X1.5                             | 0.783          | 27.84          |           |           |            |                  |
| Institutional Pressure (X2)      |                |                | 0.853     | 0.900     | 0.693      | Valid & Reliable |
| X2.1                             | 0.798          | 24.06          |           |           |            |                  |
| X2.2                             | 0.785          | 27.12          |           |           |            |                  |
| X2.3                             | 0.889          | 64.83          |           |           |            |                  |
| X2.4                             | 0.852          | 37.40          |           |           |            |                  |
| Green Dynamic Capability (X3)    |                |                | 0.842     | 0.894     | 0.678      | Valid & Reliable |
| X3.1                             | 0.844          | 38.34          |           |           |            |                  |
| X3.2                             | 0.839          | 38.19          |           |           |            |                  |
| X3.3                             | 0.815          | 27.45          |           |           |            |                  |
| X3.4                             | 0.794          | 29.33          |           |           |            |                  |
| THK Orientation (X4)             |                |                | 0.811     | 0.874     | 0.635      | Valid & Reliable |
| X4.1                             | 0.766          | 21.59          |           |           |            |                  |
| X4.2                             | 0.803          | 29.17          |           |           |            |                  |
| X4.3                             | 0.860          | 52.48          |           |           |            |                  |
| X4.4                             | 0.755          | 16.16          |           |           |            |                  |
| Environmental Dynamism (Z)       |                |                | 0.820     | 0.880     | 0.648      | Valid & Reliable |
| Z.1                              | 0.781          | 17.13          |           |           |            |                  |
| Z.2                              | 0.778          | 18.35          |           |           |            |                  |
| Z.3                              | 0.834          | 24.31          |           |           |            |                  |
| Z.4                              | 0.826          | 24.71          |           |           |            |                  |

| Construct / Indicator            | Loading | t-value | CA    | CR    | AVE   | Decision         |
|----------------------------------|---------|---------|-------|-------|-------|------------------|
| Circular Economy Orientation (Y) |         |         | 0.848 | 0.892 | 0.622 | Valid & Reliable |
| Y.1                              | 0.805   | 33.83   |       |       |       |                  |
| Y.2                              | 0.804   | 35.31   |       |       |       |                  |
| Y.3                              | 0.777   | 29.35   |       |       |       |                  |
| Y.4                              | 0.784   | 28.85   |       |       |       |                  |
| Y.5                              | 0.774   | 24.66   |       |       |       |                  |

Discriminant validity was examined using the Fornell–Larcker criterion (Table 3) and the HTMT ratio (Table 4). The square root of AVE for each construct exceeded its correlations with the other constructs, satisfying the Fornell–Larcker criterion. HTMT values ranged from 0.099 to 0.546, below the 0.85 criterion, indicating adequate discriminant validity among the constructs and interaction terms reported in the model. Table 4 also reports the means and standard deviations of the construct scores.

Table 3  
Fornell–Larcker criterion (diagonal = square root of AVE). Values for environmental dynamism and the two interaction terms are reported in Supplementary Table S2.

| Construct                           | 1     | 2     | 3     | 4     | 5     |
|-------------------------------------|-------|-------|-------|-------|-------|
| 1. Circular Economy Orientation (Y) | 0.789 |       |       |       |       |
| 2. Entrepreneurial Orientation (X1) | 0.447 | 0.802 |       |       |       |
| 3. Institutional Pressure (X2)      | 0.398 | 0.285 | 0.832 |       |       |
| 4. Green Dynamic Capability (X3)    | 0.456 | 0.363 | 0.350 | 0.823 |       |
| 5. THK Orientation (X4)             | 0.466 | 0.257 | 0.270 | 0.315 | 0.797 |

Table 4  
Descriptive statistics and heterotrait–monotrait (HTMT) ratios of the constructs (N = 260). Construct scores are means of item scores on a five-point scale. Values below the diagonal are HTMT ratios. SD = standard deviation; THK = Tri Hita Karana.

| Construct                       | Mean | SD   | 1     | 2     | 3     | 4     | 5     | 6 |
|---------------------------------|------|------|-------|-------|-------|-------|-------|---|
| 1. Circular economy orientation | 3.77 | 0.67 | -     |       |       |       |       |   |
| 2. Entrepreneurial orientation  | 3.62 | 0.70 | 0.521 | -     |       |       |       |   |
| 3. Institutional pressure       | 3.82 | 0.75 | 0.457 | 0.326 | -     |       |       |   |
| 4. Green dynamic capability     | 3.84 | 0.74 | 0.536 | 0.426 | 0.399 | -     |       |   |
| 5. THK orientation              | 3.74 | 0.66 | 0.546 | 0.306 | 0.318 | 0.377 | -     |   |
| 6. Environmental dynamism       | 3.69 | 0.68 | 0.312 | 0.294 | 0.281 | 0.297 | 0.199 | - |

Collinearity was assessed using VIF. Outer VIF values for the reflective indicators ranged from 1.575 to 2.265, while inner VIF values among the predictor constructs ranged from 1.104 to 1.350. These values are below the commonly used thresholds of 3.0 and 5.0, indicating no substantive collinearity problem in the measurement or structural model, including the moderation terms. In the full collinearity test, VIF values for all latent variables ranged from 1.132 to 1.710, below the 3.3 threshold, suggesting that common method bias is unlikely to be a serious concern (Kock 2015).

## 4.3 Structural (Inner) Model Assessment

The structural model was assessed using  $R^2$ ,  $f^2$ , and bootstrapped path significance tests based on 5,000 resamples and  $N = 260$  (Table 5; Fig. 2). CEO had an  $R^2$  of 0.447 and an adjusted  $R^2$  of 0.431. Thus, the predictors and interaction terms in the model accounted for 44.7% of the variance in CEO. This result indicates a moderate level of explanatory power for the endogenous construct in the present PLS-SEM model (Hair et al. 2019).

Table 5

Structural model path coefficients and hypothesis tests ( $N = 260$ ; bootstrapping with 5,000 resamples; two-tailed tests;  $R^2 = 0.447$ ; adjusted  $R^2 = 0.431$ ). CI = 95% bootstrap confidence interval; EO = entrepreneurial orientation; IP = institutional pressure; GDC = green dynamic capability; THK = Tri Hita Karana orientation; ED = environmental dynamism; CEO = circular economy orientation.

| Hypothesis / Path                                  | $\beta$ | t-value | p-value | $f^2$ | CI 95%          | Decision        |
|----------------------------------------------------|---------|---------|---------|-------|-----------------|-----------------|
| H1: EO (X1) $\rightarrow$ CEO (Y)                  | 0.242   | 4.532   | < 0.001 | 0.085 | [0.132, 0.350]  | Supported       |
| H2: IP (X2) $\rightarrow$ CEO (Y)                  | 0.156   | 3.122   | 0.002   | 0.035 | [0.043, 0.249]  | Supported       |
| H3: GDC (X3) $\rightarrow$ CEO (Y)                 | 0.237   | 4.111   | < 0.001 | 0.075 | [0.115, 0.338]  | Supported       |
| H4: THK (X4) $\rightarrow$ CEO (Y)                 | 0.277   | 5.522   | < 0.001 | 0.118 | [0.185, 0.370]  | Supported       |
| H5: ED (Z) $\times$ EO (X1) $\rightarrow$ CEO (Y)  | 0.107   | 2.096   | 0.037   | 0.018 | [0.003, 0.208]  | Supported       |
| H6: ED (Z) $\times$ GDC (X3) $\rightarrow$ CEO (Y) | 0.114   | 2.417   | 0.016   | 0.023 | [0.018, 0.202]  | Supported       |
| ED (Z) $\rightarrow$ CEO (Y)                       | 0.053   | 1.031   | 0.303   | 0.004 | [-0.042, 0.162] | Not significant |

The four hypothesised direct effects were positive and statistically significant (Table 5). Entrepreneurial orientation had a coefficient of  $\beta = 0.242$  ( $t = 4.532$ ,  $p < 0.001$ ), institutional pressure had  $\beta = 0.156$  ( $t = 3.122$ ,  $p = 0.002$ ), green dynamic capability had  $\beta = 0.237$  ( $t = 4.111$ ,  $p < 0.001$ ), and THK orientation had  $\beta = 0.277$  ( $t = 5.522$ ,  $p < 0.001$ ). H1, H2, H3, and H4 were therefore supported. The corresponding effect sizes were  $f^2 = 0.085$  for entrepreneurial orientation, 0.035 for institutional pressure, 0.075 for green dynamic capability, and 0.118 for THK orientation.

Both hypothesised moderation effects were statistically significant. The interaction between environmental dynamism and entrepreneurial orientation was positive ( $\beta = 0.107$ ,  $t = 2.096$ ,  $p = 0.037$ ), supporting H5. The interaction between environmental dynamism and green dynamic capability was also positive ( $\beta = 0.114$ ,  $t = 2.417$ ,  $p = 0.016$ ), supporting H6. These coefficients indicate that the positive relationships of entrepreneurial orientation and green dynamic capability with CEO were stronger at higher levels of environmental dynamism. Figure 3 plots these relationships at low ( $-1$  SD) and high ( $+1$  SD) levels of environmental dynamism. The direct effect of environmental dynamism on CEO was not significant ( $\beta = 0.053$ ,  $t = 1.031$ ,  $p = 0.303$ ).

PLSpredict results are reported in Table 6. All five of the CEO indicators had  $Q^2_{\text{predict}}$  values above zero, and all five had lower prediction errors (RMSE) under PLS-SEM than under the linear model benchmark, indicating high out-of-sample predictive power (Shmueli et al., 2019). (Shmueli et al. 2019).

Table 6  
PLSpredict results for the circular economy orientation indicators ( $k = 10$  folds,  $r = 10$  repetitions). LM = linear model benchmark; RMSE = root mean squared error.

| Indicator | $Q^2_{\text{predict}}$ | RMSE (PLS-SEM) | RMSE (LM) | PLS-SEM - LM |
|-----------|------------------------|----------------|-----------|--------------|
| Y.1       | 0.245                  | 0.751          | 0.770     | - 0.019      |
| Y.2       | 0.246                  | 0.717          | 0.753     | - 0.036      |
| Y.3       | 0.244                  | 0.701          | 0.757     | - 0.056      |
| Y.4       | 0.225                  | 0.769          | 0.779     | - 0.010      |
| Y.5       | 0.240                  | 0.764          | 0.794     | - 0.030      |

## 4.4 Model Fit

Model fit was examined using SRMR and NFI as supplementary diagnostics. The estimated model produced an SRMR of 0.055. The NFI was 0.838. These statistics are reported descriptively rather than treated as definitive evidence of confirmatory model fit, consistent with the prediction-oriented use of PLS-SEM (Hair et al. 2019).

In summary, the results support all six hypotheses (Table 5).

## 5. Discussion

### 5.1 Direct Effects on Circular Economy Orientation

The results show positive and significant relationships between CEO and each of the four proposed direct antecedents: entrepreneurial orientation, institutional pressure, green dynamic capability, and THK orientation (all  $p \leq 0.002$ ). Together, the findings support the view that CEO among Bali's maritime and

fisheries SMEs reflects a combination of internal strategic orientation, organisational capability, external institutional conditions, and locally embedded cultural values.

THK orientation had the largest direct coefficient ( $\beta = 0.277$ ) and effect size ( $f^2 = 0.118$ ) among the four antecedents. Previous studies have associated THK-based organisational culture with knowledge management and sustainable business performance in Balinese enterprises (Sapta et al. 2021; Yasa et al. 2024). The present result extends that evidence by showing that THK orientation is also positively associated with CEO in the sampled maritime and fisheries SMEs. The finding is consistent with the interpretation that the palemahan and pawongan dimensions can provide a cultural basis for resource stewardship and community-oriented business decisions. Because the study is cross-sectional and uses self-reported measures, however, the result should be interpreted as an empirical association rather than evidence that THK directly causes circular behaviour.

Entrepreneurial orientation was also positively related to CEO ( $\beta = 0.242$ ,  $f^2 = 0.085$ ). This result is consistent with research linking innovativeness, proactiveness, and risk-taking with circular innovation and SME engagement in circular economy activities (Dey et al. 2022; Castro-Lopez et al. 2025). The finding supports the RBV-based interpretation that a firm's strategic posture can shape how it identifies and responds to opportunities for circularity. For maritime and fisheries SMEs, entrepreneurial orientation may facilitate experimentation with alternative uses of resources and waste streams.

Green dynamic capability had a positive relationship with CEO ( $\beta = 0.237$ ,  $f^2 = 0.075$ ). The result is consistent with dynamic capability theory and with previous evidence that firms' ability to sense, seize, and reconfigure resources can support circular economy capability and sustainability outcomes (Teece 2007; Bag et al. 2022; Kiranantawat and Ahmad 2023). In resource-constrained maritime SMEs, the finding is compatible with a form of circular transition based on incremental changes to existing operations, such as recovering value from fish waste or extending the useful life of equipment.

Institutional pressure also showed a positive and significant association with CEO, although its effect size was the smallest among the four direct antecedents ( $\beta = 0.156$ ,  $f^2 = 0.035$ ). This result is consistent with institutional theory and previous studies linking regulatory, normative, and mimetic pressures with green and circular practices (DiMaggio and Powell 1983; Zhu and Sarkis 2007; Arranz et al. 2022). The comparatively smaller coefficient in the present sample should not be interpreted as evidence that institutional mechanisms are unimportant. Rather, it indicates that, relative to the other predictors included in this model, institutional pressure had a smaller estimated association with CEO among the sampled Bali maritime and fisheries SMEs.

## 5.2 The Moderating Role of Environmental Dynamism

Environmental dynamism strengthened both the entrepreneurial orientation–CEO relationship ( $\beta = 0.107$ ) and the green dynamic capability–CEO relationship ( $\beta = 0.114$ ), supporting H5 and H6. The result is consistent with contingency-based reasoning and with evidence that environmental conditions can alter the strength of relationships between organisational capabilities and sustainability-related outcomes

(Chan et al. 2016; Arsawan et al. 2024, 2026). For the sampled SMEs, greater uncertainty in market, input, or operating conditions may increase the relevance of entrepreneurial initiative and green capability when firms decide how to respond to resource constraints. This interpretation remains tentative because the study uses cross-sectional data.

The direct effect of environmental dynamism on CEO was not significant ( $\beta = 0.053$ ,  $p = 0.303$ ). The result indicates that environmental dynamism, by itself, was not associated with CEO in the estimated model. Its statistically significant interaction terms suggest instead that the environmental context changes the strength of selected internal drivers. This distinction is important because it separates the role of environmental dynamism as a moderator from that of an independent antecedent.

## 5.3 Theoretical Implications

The study contributes to the literature in three main respects. First, it combines resource-based, institutional, dynamic capability, and indigenous cultural perspectives in a single model of CEO. Second, it provides empirical evidence from maritime and fisheries SMEs in Bali, extending the geographical and sectoral scope of circular economy research that has often focused on manufacturing and urban settings (Bag et al. 2022; Cooney et al. 2023). Third, the positive association between THK orientation and CEO provides empirical support for considering indigenous cultural values when examining sustainability-oriented business strategy in culturally distinctive settings (Sapta et al. 2021; Yasa et al. 2024). The findings therefore support a context-sensitive interpretation of the antecedents of CEO rather than a one-size-fits-all explanation.

## 5.4 Managerial and Policy Implications

For SME owner-managers, the results indicate that entrepreneurial orientation and green dynamic capability are relevant organisational resources for developing a circular strategic orientation, particularly when environmental conditions are more dynamic. Practical actions may include encouraging experimentation with resource recovery, strengthening the ability to identify green opportunities, and developing routines for adapting existing processes. These implications are consistent with evidence that circular practices can be associated with organisational resilience and that deliberate strategic planning can support sustainability outcomes in resource-constrained SMEs (Mehta et al. 2025; Vasudevan et al. 2025).

For fisheries-sector organisations and SME support agencies, the findings indicate that institutional pressure is positively associated with CEO but has a smaller estimated effect than the other direct predictors in this model. Regulatory and compliance measures can therefore be complemented by capability-building and locally appropriate communication. In the Balinese context, programmes that engage community institutions and connect circular resource management with *parhyangan*, *pawongan*, and *palemahan* may provide a culturally familiar way to communicate sustainability objectives. This implication is consistent with evidence that conservation can shape the relationship between destination competitiveness and community welfare in Bali (Irwansyah et al. 2025) and with broader calls to recognise traditional knowledge in environmental sustainability (Adom and Awuah-Nyamekye 2026).

These implications should be interpreted as context-specific recommendations rather than as evidence that cultural approaches are universally more effective than regulatory instruments.

## **6. Conclusion, Limitations, and Future Research**

### **6.1 Conclusion**

This study examined the antecedents of circular economy orientation (CEO) among maritime and fisheries-based SMEs in Bali, Indonesia. Using survey data from 260 owner-managers and PLS-SEM, the analysis supported all six hypotheses. Entrepreneurial orientation, institutional pressure, green dynamic capability, and THK orientation were positively associated with CEO, with THK orientation showing the largest direct coefficient among the four antecedents. Environmental dynamism strengthened the relationships between entrepreneurial orientation and CEO and between green dynamic capability and CEO, while its direct association with CEO was not significant ( $p = 0.303$ ). The model explained 44.7% of the variance in CEO. Taken together, the findings indicate that circular strategic orientation in the sampled SMEs is associated with a combination of internal strategic disposition, organisational capability, institutional conditions, and indigenous cultural values.

### **6.2 Limitations**

Several limitations should be considered when interpreting the findings. First, the cross-sectional design limits causal interpretation; the estimated relationships should be understood as associations consistent with the hypotheses rather than definitive evidence of causal direction. Second, purposive sampling within Bali limits statistical generalisation beyond the study population, particularly for relationships involving THK orientation. Third, the use of single-respondent, self-reported data leaves some possibility of common method bias despite the procedural and statistical checks applied. Fourth, the THK orientation measure was contextualised for this study without a separate pilot test; although it showed adequate reliability and validity in the main sample, it requires further validation in other Balinese business populations. Fifth, the post hoc power for the two interaction effects was below the conventional 0.80 level, so the moderation findings should be replicated with larger samples. Sixth, the model did not include control variables such as enterprise size, age or sub-sector, which may account for part of the variation in CEO. Finally, SRMR and NFI were treated as supplementary diagnostics and should not be interpreted as confirmatory fit evidence in the same manner as covariance-based SEM.

### **6.3 Directions for Future Research**

Future research could use longitudinal or mixed-method designs to examine how CEO develops over time and how owner-managers interpret THK values in everyday business decisions. Comparative studies across Indonesian regions with different indigenous cultural systems could test whether the role of local cultural values observed in Bali is context-specific or more broadly transferable. Future models could also examine mediating mechanisms, such as green innovation, absorptive capacity, or environmental commitment, and extend the analysis downstream to assess whether CEO is associated

with environmental, social, and economic performance. Additional boundary conditions, including government support, digital readiness, and access to finance, may also help clarify when the antecedents identified in this study are most consequential..

## **Declarations**

## **Competing interests**

The authors declare no competing interests.

## **Informed consent**

Informed consent was obtained from all participants before data collection. Participants were informed about the purpose of the study, the voluntary nature of participation, the anonymity and confidentiality of their responses, and their right to withdraw at any stage without consequence.

## **Author Contribution**

MRI: conceptualisation, methodology, formal analysis, writing – original draft; BSN: methodology, validation, writing – review and editing; SS: investigation, data curation, writing – review and editing; RS: investigation, resources, writing – review and editing; DAD: formal analysis, visualisation, writing – review and editing. All authors read and approved the final manuscript.

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### **Ethical declaration**

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Formal ethical review was not required for this study, as it involved a non-interventional, anonymous survey of adult business owners and managers, collected no sensitive or personally identifiable information, and posed minimal risk to participants, consistent with prevailing institutional and national regulations in Indonesia for non-health social science research. The research was conducted under the oversight of the

Institute for Research and Community Service (LPPM), Universitas Pendidikan Ganesha (Contract No. 252/UN48.16/PT.01.01/2026). Participation was entirely voluntary, and informed consent was obtained from all participants prior to completing the questionnaire. Participants were informed of the study's purpose, assured of the confidentiality and anonymity of their responses, and advised of their right to withdraw at any time without consequence. All data were used solely for research purposes and stored securely.

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Figures

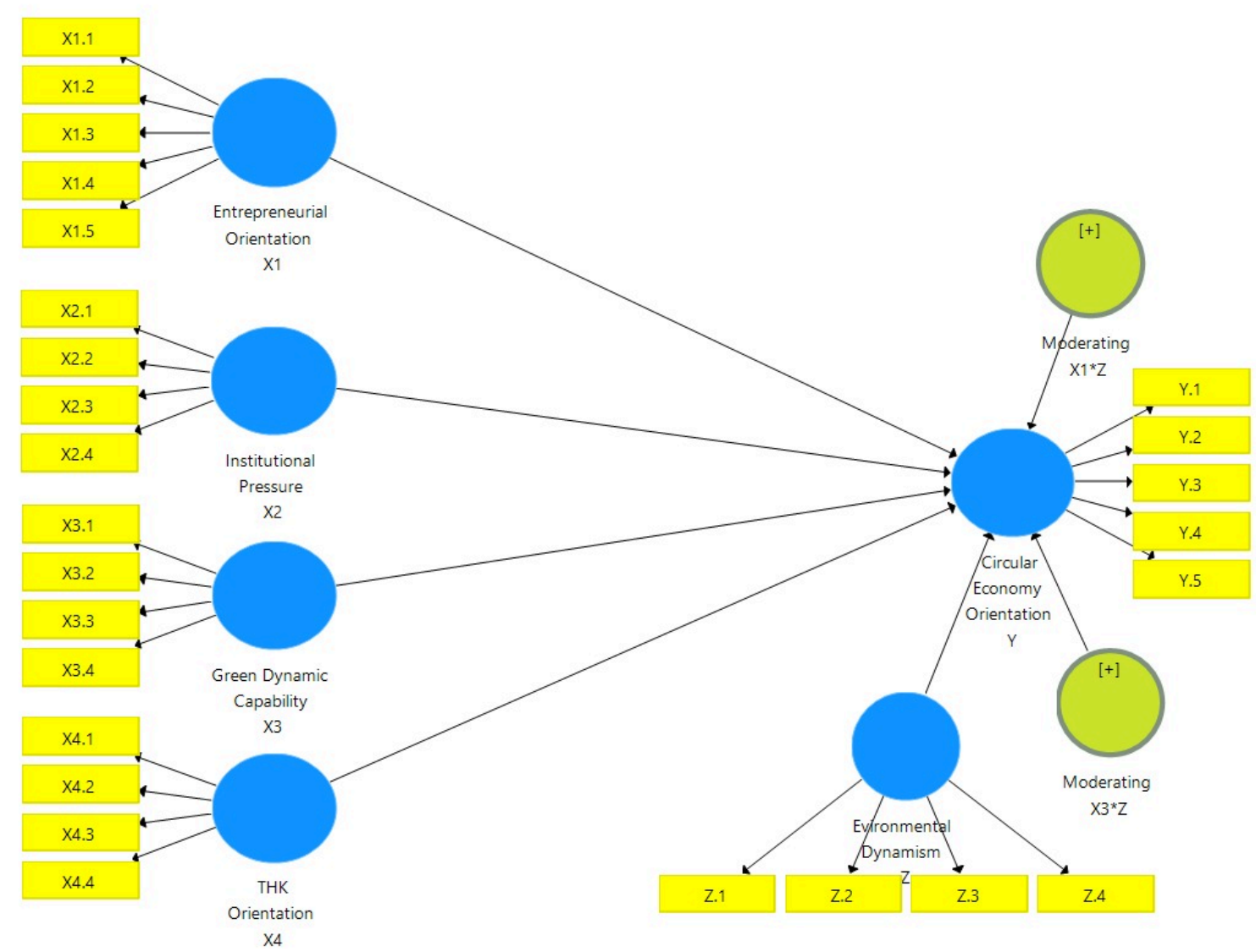


**Figure 1**

Conceptual framework. Entrepreneurial orientation, institutional pressure, green dynamic capability and Tri Hita Karana orientation are hypothesised to affect circular economy orientation directly (H1–H4), and environmental dynamism is hypothesised to moderate the effects of entrepreneurial orientation and green dynamic capability (H5–H6).

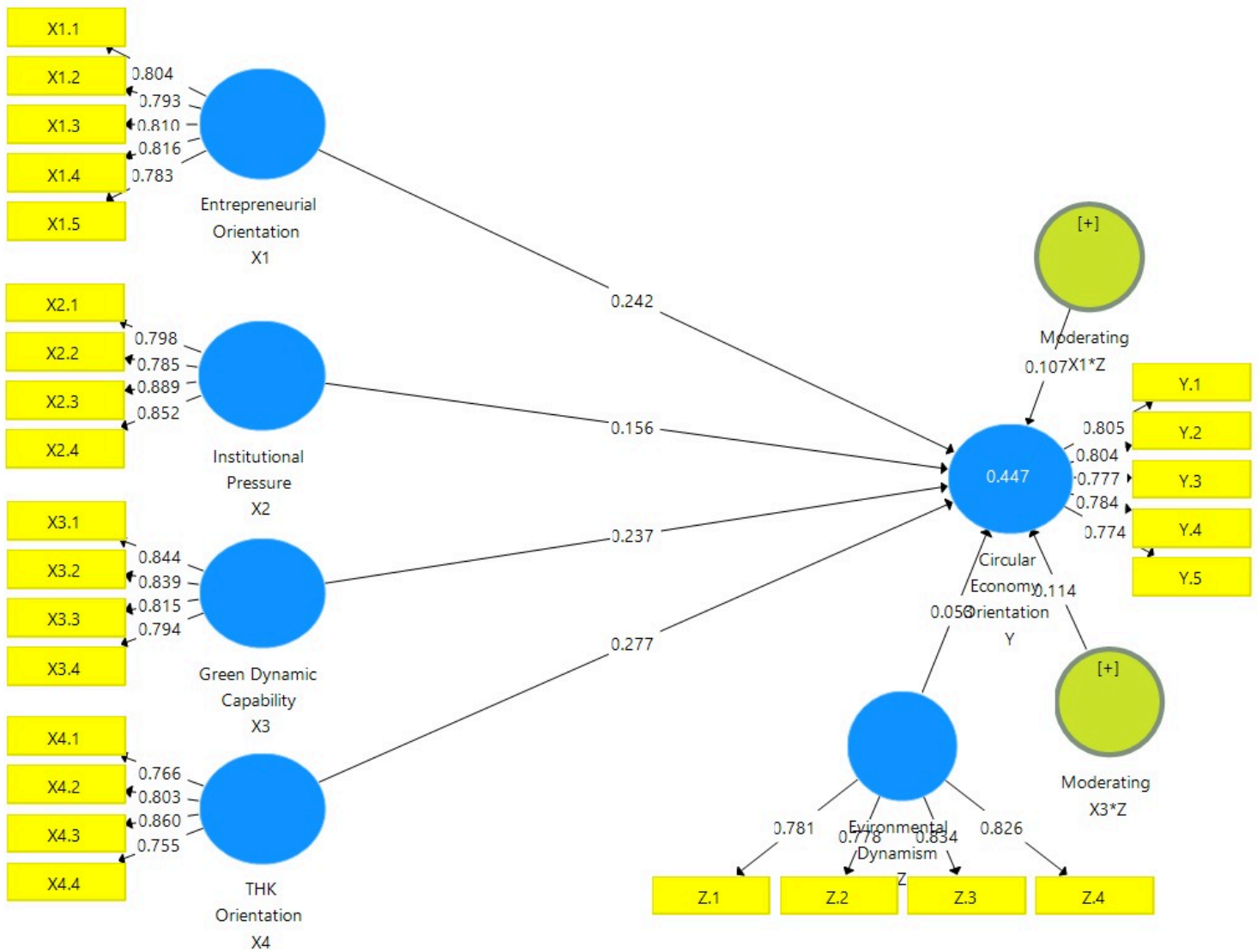


**Figure 2**

Estimated structural model. Standardised path coefficients, p-values and  $R^2$  for circular economy orientation (N = 260; bootstrapping with 5,000 resamples; two-tailed tests). Solid lines indicate significant paths ( $p < 0.05$ ); the dashed line indicates a non-significant path (ns).

Fig. 3. Simple slope analysis of the moderating effect of environmental dynamism

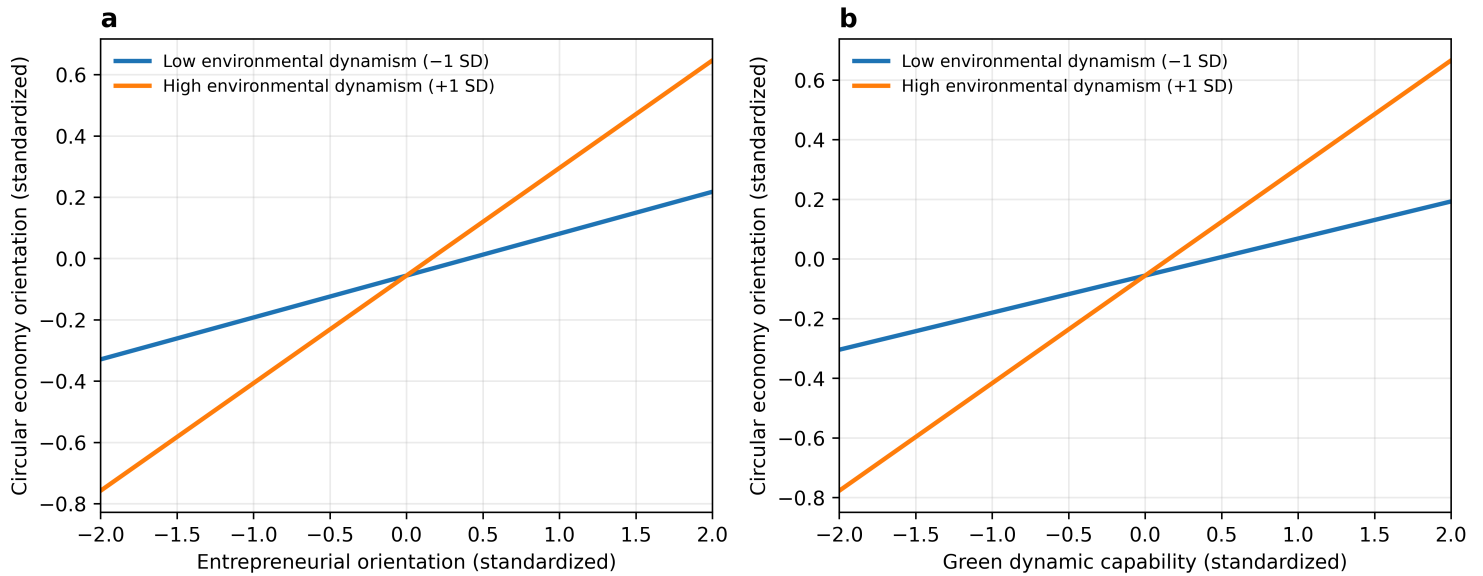


**Figure 3**

Simple slope analysis of the moderating effect of environmental dynamism. a Relationship between entrepreneurial orientation and circular economy orientation; b relationship between green dynamic capability and circular economy orientation, each at low ( $-1$  SD) and high ( $+1$  SD) levels of environmental dynamism.

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryData1.Anonymizedrespondentleveldataset.xlsx](#)