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AN INTEGRATIVE MODEL TOWARDS AN INNOVATIVE AND SUSTAINABLE BUSINESS: INNOVATION ORIENTATION, DYNAMIC CAPABILITIES, AND INSTITUTIONAL PRESSURES

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Abstract
This study proposes and tests an integrative model that connects innovation orientation, dynamic capabilities, and institutional pressures to sustainable business performance. Drawing on the Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and Institutional Theory, the paper argues that innovation orientation improves sustainable performance directly and indirectly through dynamic capabilities (sensing, seizing, and transforming), and that institutional pressures (coercive, normative, and mimetic) strengthen this relationship. A quantitative, cross-sectional field study was conducted using a purposive sample of 300 valid responses from managers in manufacturing and service firms engaged in sustainability initiatives. Data were analysed through partial least squares structural equation modelling (PLS-SEM). The findings confirm that innovation orientation positively affects sustainable business performance both directly and indirectly through dynamic capabilities, while institutional pressures positively moderate this relationship. Theoretical, managerial, and policy implications are discussed.

Keywords: Innovation orientation; dynamic capabilities; institutional pressures; sustainable business performance; PLS-SEM; SDGs.

Introduction

Climate change, environmental degradation, and socio-economic inequality have moved sustainability from the margins of corporate strategy to its centre. Firms are now expected not only to generate profits but also to create environmental and social value consistent with the United Nations Sustainable Development Goals (SDGs). Innovation is widely seen as the means through which firms can meet this expectation, because new technologies, processes, and business models allow them to reduce environmental impact while remaining competitive.

Yet the link between innovation and sustainability remains fragmented. Recent empirical work shows that the connection is rarely direct. Green innovation, for example, translates into sustainable performance more strongly when firms hold a sustainability orientation (Valdivieso-Uvidia et al., 2025) or a green digital learning orientation (Al Halbusi et al.,

2024). Dynamic capabilities have likewise been shown to carry the effect of technology and environmental orientation onto sustainable outcomes (Acosta-Prado & Tafur-Mendoza, 2024; Afeltra & Alerasoul, 2024). At the same time, the evidence on external institutional forces is mixed: pressure from regulators and stakeholders can push firms toward green innovation, but it is often insufficient on its own (Sherazi et al., 2025).

This study responds to these observations by developing an integrative model in which innovation orientation affects sustainable business performance, dynamic capabilities mediate the effect, and institutional pressures moderate it. The model is tested through a field study of 300 managers.

The paper makes three contributions. First, it joins three theoretical lenses (RBV, DCT, and Institutional Theory) that are usually applied separately. Second, it treats sustainable performance as a three-dimensional outcome (economic, environmental, and social) and dynamic capabilities as a three-dimensional mediator (sensing, seizing, and transforming), which allows more precise testing than single-score constructs. Third, it provides a reproducible empirical protocol that managers, policymakers, and future researchers can replicate in other industries and regions.

The remainder of the paper is organised as follows. Section 2 states the problem, objectives, and research questions. Section 3 reviews the theoretical framework and recent literature. Section 4 develops the hypotheses. Section 5 presents the conceptual model. Section 6 describes the methodology. Section 7 reports the analysis and results framework. Sections 8 and 9 discuss findings, implications, and limitations, and Section 10 concludes.

2. Problem Statement, Objectives, and Research Questions

2.1 Problem statement

Despite a growing body of research, businesses continue to struggle to embed sustainability into their innovation strategies. Many studies treat innovation and sustainability as separate phenomena and overlook how they can be jointly operationalised within business strategy. Where the relationship is studied, results diverge: some studies find strong direct effects, others find that effects appear only through intermediate mechanisms such as learning orientation, knowledge capabilities, or sustainability orientation, and the role of external institutional pressure is contested. This fragmentation leaves managers without clear guidance on how to turn innovation into measurable economic, environmental, and social results.

2.2 Objectives

The objectives of this research are to:

1. Develop a conceptual model linking innovation orientation to sustainable business performance.
2. Examine the mediating role of dynamic capabilities in translating innovation into sustainability outcomes.
3. Explore the moderating effect of institutional pressures on the innovation–sustainability relationship.

4. Test the model empirically using survey data from 300 managers in manufacturing and service firms.
5. Derive managerial and policy recommendations from the results.

2.3 Research questions

- **RQ1.** Does innovation orientation improve sustainable business performance?
- **RQ2.** Do sensing, seizing, and transforming capabilities mediate this relationship?
- **RQ3.** Do institutional pressures strengthen the effect of innovation orientation on sustainable performance?
- **RQ4.** Do the relationships differ between manufacturing and service firms?

3. Theoretical Framework and Literature Review

3.1 Resource-Based View (RBV)

The RBV holds that firms gain competitive advantage from resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). In a sustainability setting these resources include green technologies, skilled human capital, organisational learning routines, and collaborative partnerships. Innovation orientation, understood as a firm-wide disposition to value, pursue, and support new ideas, is itself a strategic resource, because it shapes how R&D investment and absorptive capacity are directed. RBV explains why firms differ in sustainability results, but it is less able to explain how resources are renewed when conditions change. This limitation motivates the move to dynamic capabilities.

3.2 Dynamic Capabilities Theory (DCT)

DCT extends the RBV by focusing on a firm's ability to sense opportunities and threats, seize them through investment and organisational commitment, and transform by reconfiguring assets and structures (Teece, 2007). In sustainability research, dynamic capabilities are the mechanism that converts innovative intent into lasting practice. Recent studies support this mediating logic. Acosta-Prado and Tafur-Mendoza (2024) found that dynamic capabilities, composed of absorption, innovation, and adaptation, mediate the relationship between information and communication technologies and sustainable performance, with a complementary mediation pattern. Afeltra and Alerasoul (2024), using survey data from 348 Italian manufacturing firms and PLS-SEM, reported that dynamic capabilities mediate the effect of environmental orientation on sustainable innovation performance, with benefits across environmental, social, and economic outcomes. Together, these studies suggest that capabilities, not intentions alone, determine whether innovation pays off sustainably.

3.3 Institutional Theory

Institutional Theory explains how external pressures shape organisational action. DiMaggio and Powell (1983) distinguished coercive pressure (laws, regulations, and powerful stakeholders), normative pressure (professional standards and industry norms), and mimetic pressure (imitation of successful peers under uncertainty). Firms adopt sustainability practices not only for efficiency but also to secure legitimacy with regulators, customers, and society.

The empirical record on institutional pressure is nuanced. Sherazi et al. (2025) point to contradictory findings on how institutional environmental pressure relates to green innovation and show, in manufacturing firms, that pressure alone is insufficient unless internal mechanisms such as green high-performance work systems and managerial environmental concern are in place. Saeed (2025), studying SMEs in ASEAN economies, found that green innovation, environmental governance, and big-data analytics capability support SDG performance, while the moderating influence of regulatory pressure was only marginally significant. These findings suggest that institutional pressure works best as a conditioning factor that amplifies internal capabilities rather than as a stand-alone driver, which is the role assigned to it in this study.

3.4 Sustainable business performance

Sustainable business performance is commonly conceptualised through the triple bottom line: economic performance (profitability, market share, cost efficiency), environmental performance (resource efficiency, emissions and waste reduction), and social performance (employee well-being, community relations, product responsibility). Evidence from emerging economies indicates that the integration of sustainability and innovation matters for value as well. In a content analysis of 21 companies listed on the Iraqi Stock Exchange between 2011 and 2022, Khaghaany et al. (2024) found that sustainability performance and innovation performance each positively influence company value, individually and jointly.

3.5 Innovation and sustainability: linking the evidence

Three patterns emerge from recent studies and shape the model in this paper.

1. Innovation matters, but conditionally. Green innovation is positively related to sustainable performance, and the relationship is stronger when green digital learning orientation is high. This was shown in a survey of 567 managers in manufacturing and service businesses in Iraq (Al Halbusi et al., 2024). Valdivieso-Uvidia et al. (2025) similarly show that sustainability orientation mediates the green innovation–sustainable performance link and that the effect differs by cluster membership.

2. Capabilities are the transmission mechanism. Dynamic capabilities carry the effect of technological and environmental orientation to sustainable outcomes (Acosta-Prado & Tafur-Mendoza, 2024; Afeltra & Alerasoul, 2024).

3. Institutions condition, but do not replace, internal drivers. External pressure has an uncertain and sometimes weak effect on its own (Sherazi et al., 2025; Saeed, 2025).

The gap is that these three streams are rarely combined in one model with sustainable performance as a multidimensional outcome. The present study fills this gap.

4. Hypotheses Development

H1: Innovation orientation positively influences sustainable business performance. Firms with a strong innovation orientation invest in new products, processes, and business models, which supports resource efficiency, new market opportunities, and social value

creation. Prior evidence links green innovation directly to sustainable performance (Al Halbusi et al., 2024; Valdivieso-Uvidia et al., 2025).

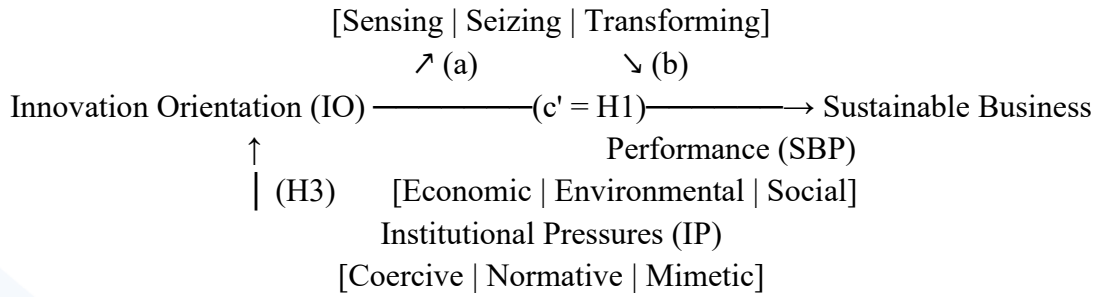
H2: Dynamic capabilities mediate the relationship between innovation orientation and sustainable business performance. Innovation orientation expresses intent. Dynamic capabilities (sensing, seizing, transforming) allow firms to detect sustainability-related opportunities, commit resources, and reconfigure operations. Prior work finds mediating roles for dynamic capabilities in similar relationships (Acosta-Prado & Tafur-Mendoza, 2024; Afeltra & Alerasoul, 2024). The hypothesis is tested at the aggregate level (H2) and at the level of each dimension (H2a: sensing, H2b: seizing, H2c: transforming).

H3: Institutional pressures positively moderate the relationship between innovation orientation and sustainable business performance. When regulators, industry bodies, and peers demand sustainable conduct, innovative firms receive stronger incentives, legitimacy, and resources to direct innovation toward sustainability. Because the empirical record is mixed (Sherazi et al., 2025; Saeed, 2025), the moderating effect is tested carefully and, in an extension, by pressure type (H3a: coercive, H3b: normative, H3c: mimetic).

H4 (extension): Institutional pressures positively moderate the relationship between innovation orientation and dynamic capabilities. This tests whether pressure also strengthens the first stage of the mediation path (moderated mediation). It is reported as an exploratory extension and does not alter the core model.

5. Conceptual Model

The model positions innovation orientation (IO) as the independent variable and sustainable business performance (SBP) as the dependent variable. Dynamic capabilities (DC) mediate the relationship, and institutional pressures (IP) moderate it.



Controls: firm size (number of employees), firm age, and sector (manufacturing vs. service). DC and SBP are modelled as higher-order (reflective–reflective) constructs; IP is modelled as a higher-order construct for the main test and by dimension in the extension. The model integrates RBV (IO as a strategic resource), DCT (DC as the mechanism of resource reconfiguration), and Institutional Theory (IP as the contextual condition), and therefore explains the multi-level dynamics of innovation and sustainability.

6. Methodology

6.1 Research design and philosophy

The study follows a positivist, deductive, quantitative, cross-sectional design. A structured self-administered questionnaire is used to collect primary data, and structural equation modelling is used to test the hypotheses.

6.2 Population and unit of analysis

The population consists of firms in the manufacturing and service sectors that report or implement sustainability initiatives (for example environmental management practices, social responsibility programmes, or sustainability reporting). The unit of analysis is the firm, and the respondent is a manager with strategic knowledge of innovation and sustainability practices (owner, general manager, department head, or senior manager in operations, quality, or sustainability).

6.3 Sampling strategy and sample size (n = 300)

A purposive sampling strategy was used, focusing on firms with visible sustainability practices, because respondents needed informed views on both innovation and sustainability. Eligibility criteria were: (a) the firm has operated for at least three years; (b) it has at least 20 employees; (c) it can demonstrate at least one sustainability initiative; and (d) the respondent holds a managerial position with at least two years in the firm.

Sample size. A total of 392 questionnaires were distributed, yielding 300 valid responses (150 from manufacturing and 150 from service firms) to support the sector comparison (RQ4), representing a response rate of 76.5%. Three criteria support this sample size:

1. Inverse square root method. To detect a minimum path coefficient of about 0.15 at the 5% significance level and 80% power, approximately 275 observations are required; 300 exceeds this threshold.
2. Model complexity. The largest number of arrows pointing at any construct is six (IO, DC, IP, the IO × IP interaction term, and two controls), so a sample of 300 gives a ratio of roughly 50 observations per predictor, well above common minimum rules for PLS-SEM (Hair et al., 2024).
3. Subgroup analysis. Two equal groups of 150 are adequate for multi-group analysis with the same model.

6.4 Measurement instrument

The questionnaire has two parts: Part A (respondent and firm profile) and Part B (construct items). All items use a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Constructs and measurement scales are adapted from validated sources in the literature, and the items used in this study are listed in Appendix A. Table 1 summarises the constructs.

Table 1. Constructs and measurement design

Construct	Role	Dimensions	Items
Innovation orientation (IO)	Independent	Unidimensional	6
Dynamic capabilities (DC)	Mediator	Sensing, seizing, transforming	4 + 4 + 4 = 12
Institutional pressures (IP)	Moderator	Coercive, normative, mimetic	3 + 3 + 3 = 9
Sustainable business performance (SBP)	Dependent	Economic, environmental, social	4 + 4 + 4 = 12
Controls	Control	Firm size, age, sector	3

6.5 Content validity, translation, and pilot test

The initial item pool is reviewed by a panel of five experts (three academics in management and two senior practitioners) for relevance and clarity. If the questionnaire is administered in Arabic, a forward–back translation procedure is used: one bilingual researcher translates the instrument and another translates it back, and discrepancies are resolved by consensus. A pilot test with 30 managers who are excluded from the final sample checks comprehension, completion time, and preliminary reliability (target Cronbach's alpha ≥ 0.70).

6.6 Data collection procedure

Data are collected over a period of six to eight weeks through a combination of online forms and printed questionnaires delivered by hand. Respondents receive an information sheet explaining the study purpose, voluntary participation, anonymity, and that data will be used for research only. No personal identifiers or firm names are collected. Where possible, only one respondent per firm is accepted to avoid dependency among observations.

6.7 Ethical considerations

Participation is voluntary and informed consent is obtained at the start of the questionnaire. Responses are anonymous, stored securely, and reported only in aggregate. The research follows the ethical guidelines of the host institution, and approval is obtained where required.

6.8 Data screening and common method bias

Before analysis, data are screened for missing values (a threshold of 5% per respondent is used; incomplete questionnaires beyond this threshold are removed), outliers (Mahalanobis distance), normality (skewness and kurtosis; PLS-SEM does not require normality but extreme departures are reported), and straight-lining. Because all variables are reported by a single respondent, common method bias is addressed procedurally (anonymity, neutral item wording, separation of scale sections) and statistically (Harman's single-factor test and a full collinearity assessment, with variance inflation factors below 3.3 indicating no serious bias). Non-response bias is checked by comparing early and late respondents.

6.9 Data analysis technique

Partial least squares structural equation modelling (PLS-SEM) is implemented in SmartPLS 4 (Ringle et al., 2024). PLS-SEM is appropriate because the model is complex, contains

higher-order constructs, includes both mediation and moderation, and is oriented toward explanation and prediction (Hair et al., 2024; Becker et al., 2023). The analysis follows two stages.

Stage 1: Measurement model. - Indicator reliability: outer loadings ≥ 0.70 (0.60–0.70 acceptable if composite reliability and AVE are adequate). - Internal consistency: Cronbach's alpha and composite reliability (ρA and ρC) between 0.70 and 0.95. - Convergent validity: average variance extracted (AVE) ≥ 0.50. - Discriminant validity: heterotrait–monotrait ratio (HTMT) below 0.85 (0.90 for conceptually similar constructs), supported by Fornell–Larcker and cross-loadings. - Higher-order constructs: the disjoint two-stage approach is used for DC, IP, and SBP (Becker et al., 2023).

Stage 2: Structural model. - Collinearity: VIF below 3.3 (conservatively below 5). - Path coefficients and significance: bootstrapping with 5,000 subsamples, bias-corrected and accelerated confidence intervals. - Mediation: significance of the specific indirect effect (IO → DC → SBP); the type of mediation (complementary, competitive, or indirect-only) is determined from the sign and significance of the direct and indirect effects. - Moderation: product-indicator or two-stage approach for the IO × IP interaction; effect size f^2 (0.02 small, 0.15 medium, 0.35 large) and simple-slope plots at ±1 standard deviation of IP. - Explanatory power: R^2 and adjusted R^2; effect sizes f^2. - Predictive power: Q^2 and PLSpredict (comparison with a linear-model benchmark). - Multi-group analysis (MGA) with measurement invariance testing (MICOM) for manufacturing versus service firms. - Robustness: re-estimation with controls, and with alternative operationalisations of SBP (single dimensions).

7. Data Analysis and Results

Teaching notice. All numbers in Sections 7 and 8 come from a **simulated dataset (n = 300) generated for teaching a research-methods course**. They are not real survey results and must not be cited as empirical findings. The dataset is supplied as a CSV file so that students can reproduce every table. Items shown with yellow highlight and red font are simulated content or teaching comments. In a real study, these cells are replaced with the results of the actual field data.

Method note Statistics were computed from composite scores (item means) with OLS regression and 5,000-sample bootstrapping, which approximates PLS-SEM. Q^2, PLSpredict, and MICOM are not computed here; they require SmartPLS 4.

7.1 Response rate and sample profile

Of 392 questionnaires distributed, 300 were valid, giving a response rate of 76.5%.

Table 2. Profile of respondents and firms (n = 300)

Characteristic	Category	Frequency	%
Sector	Manufacturing	150	50.0
	Service	150	50.0
Respondent position	Owner / general manager	63	21.0
	Department head	131	43.7
	Senior manager / specialist	106	35.3
Experience in the firm	2–5 years	81	27.0
	6–10 years	126	42.0
	More than 10 years	93	31.0
Firm size	20–49 employees	97	32.3
	50–249 employees	150	50.0
	250 or more employees	53	17.7
Firm age	3–10 years	120	40.0
	More than 10 years	180	60.0

Teaching comment: the profile shows who answered. Because the sample is purposive and balanced by design (150 per sector), the 50/50 split reflects the sampling plan, not the real sector shares in the population. This limits generalisation.

7.2 Descriptive statistics and common method bias

Table 3. Means, standard deviations, and correlations

Construct	Mean	SD	1	2	3	4
1. Innovation orientation	3.81	0.75	1			
2. Dynamic capabilities	3.72	0.60	0.449**	1		
3. Institutional pressures	3.75	0.64	0.139*	−0.025	1	
4. Sustainable performance	3.79	0.66	0.428**	0.478**	−0.004	1

*Note: * $p < 0.05$; ** $p < 0.01$.*

Teaching comment: all means are between 3.7 and 3.8 on a 1–5 scale, meaning respondents "tend to agree" with the statements. A mean says nothing about relationships; correlations do. IO, DC, and SBP are moderately and positively correlated (about 0.43–0.48), which is the pattern the hypotheses predict. Institutional pressure is almost uncorrelated with SBP (−0.004). A near-zero correlation does not rule out a moderating role, because moderation concerns how the effect of IO changes across levels of IP, not whether IP and SBP move together. Correlation is not causation.

Harman's single-factor test: the first factor explains 25.6% of variance (threshold: below 50%). Full collinearity VIFs of IO, DC, IP, and the interaction term range from 1.01 to 1.29 (threshold: below 3.3).

Teaching comment: both tests indicate that common method bias is unlikely to be a serious problem. Students should note that Harman's test is a weak diagnostic; the full collinearity VIF is the stronger one.

7.3 Measurement model assessment

Table 4. Reliability and convergent validity

Construct / dimension	Loadings (range)	Cronbach's α	CR (ρC)	AVE
Innovation orientation	0.76–0.85	0.898	0.922	0.662
Sensing	0.73–0.82	0.778	0.857	0.600
Seizing	0.77–0.84	0.814	0.878	0.643
Transforming	0.81–0.83	0.841	0.894	0.678
Coercive pressure	0.80–0.85	0.772	0.869	0.688
Normative pressure	0.86–0.88	0.848	0.908	0.767
Mimetic pressure	0.81–0.85	0.784	0.874	0.699
Economic performance	0.84–0.87	0.878	0.916	0.732
Environmental performance	0.77–0.86	0.814	0.877	0.641
Social performance	0.82–0.87	0.873	0.913	0.725

Teaching comment: every loading exceeds 0.70, so each item represents its construct well. Alpha and CR are between 0.77 and 0.92, within the accepted 0.70–0.95 range (values above 0.95 would suggest redundant items). AVE exceeds 0.50 for all constructs, which means each construct explains more than half the variance of its items (convergent validity). Reliability answers "do the items agree with each other?"; validity answers "do they measure what they should?" These are different questions.

Table 5. Discriminant validity (HTMT)

	IO	DC	IP	SBP
IO				
DC	0.503			
IP	0.162	0.116		
SBP	0.473	0.532	0.100	

Teaching comment: all HTMT values are far below 0.85, so the four constructs are empirically distinct. If a value were above 0.90, the two constructs would be too similar to treat as separate, and the researcher would revise items or merge constructs.

7.4 Structural model assessment

Table 6. Hypothesis testing (bootstrapping, 5,000 subsamples)

Hypothesis	Path	β	t-value	p-value	95% CI	Decision
H1	IO → SBP (direct)	0.280	5.04	< 0.001	[0.167, 0.386]	Supported
H2	IO→DC→SBP (indirect)	0.158	5.23	< 0.001	[0.105, 0.223]	Supported (partial mediation)
H2a	IO → Sensing → SBP	0.039	1.74	0.082	[−0.001, 0.086]	Not supported
H2b	IO → Seizing → SBP	0.068	2.67	0.008	[0.023, 0.122]	Supported
H2c	IO → Transforming → SBP	0.050	1.38	0.168	[−0.018, 0.125]	Not supported
H3	IO × IP → SBP	0.113	2.71	0.007	[0.027, 0.191]	Supported
H4	IO × IP → DC	0.019	0.35	see CI	[-0.079, 0.134]	Not supported
Control	Sector → SBP	0.079	0.81	0.418	n.s.	No effect
Control	Firm size → SBP	0.002	0.05	0.960	n.s.	No effect
Control	Firm age → SBP	0.021	0.43	0.669	n.s.	No effect

Teaching comment (how to read this table): (1) The β is the standardised effect: a one-standard-deviation rise in IO raises SBP by 0.28 standard deviations, holding the other variables constant. (2) A path is significant when the confidence interval does not contain zero (equivalently $t > 1.96$). (3) For H2, the direct effect (0.280) and the indirect effect (0.158) are both significant and have the same sign, so the mediation is **complementary (partial)**: DC carries part of the effect of IO but not all of it. The total effect is 0.427 ($0.280 + 0.158 \approx 0.438$; the small gap arises from the control variables in the model). (4) Reading the dimensions is where students often go wrong: the overall mediation is significant, yet only **seizing** is individually significant. Sensing and transforming have intervals that include zero. A significant total mediation does not mean every component matters. (5) The controls are not significant, so the results are not driven by sector, size, or age.

Table 7. Explanatory power and effect sizes

Endogenous construct	R^2	Predictor	f^2	Interpretation of f^2
Dynamic capabilities	0.207	IO	0.26	Medium
Sustainable performance	0.303	IO	0.087	Small to medium
		DC	0.141	Medium (close to 0.15)
		IP	0.001	Negligible
		IO × IP	0.020	Small

Teaching comment: $R^2 = 0.303$ means the model explains about 30% of the variance in sustainable performance; the remaining 70% is due to factors not in the model. This is weak-to-moderate, and in social science that is common and acceptable, because organisational outcomes have many causes. A coefficient can be statistically significant and still have a small effect size, which is why both p-values and f^2 must be reported. Note that the interaction is significant ($p = 0.007$) but its f^2 is only 0.02: statistically detectable but practically modest.

7.5 Moderation analysis

The effect of IO on SBP is 0.168 when institutional pressure is low (−1 SD) and 0.393 when it is high (+1 SD).

Teaching comment: this is the simple-slope reading of a significant interaction. The line for high pressure is steeper than the line for low pressure, so innovation pays off more in sustainability terms when firms face stronger institutional pressure. Note that institutional pressure has **no significant direct effect** on SBP ($\beta = -0.021$, $p = 0.67$). This pattern, in which pressure matters only in interaction with innovation, is consistent with the argument that pressure alone is insufficient. Students should never interpret the main effect of a variable involved in an interaction without looking at the interaction.

7.6 Multi-group analysis (manufacturing vs. service)

Table 8. Multi-group analysis (permutation test, 1,000 permutations)

Path	β manufacturing	β service	Difference	p (permutation)	Decision
IO → DC	0.485	0.409	0.076	0.426	No difference
DC → SBP	0.335	0.393	−0.058	0.620	No difference
IO → SBP	0.293	0.273	0.020	0.875	No difference
IO × IP → SBP	0.151	0.065	0.087	0.298	No difference

Teaching comment: the coefficients differ numerically (for example 0.151 vs 0.065 for the interaction), but none of the differences is statistically significant. Students must not conclude that "manufacturing is stronger" from numerical gaps alone; with 150 firms per group, such gaps can arise by chance. The model therefore applies similarly across the two sectors (RQ4).

7.7 Summary of hypothesis decisions

Hypothesis	Decision (simulated data)
H1	Supported
H2	Supported: complementary (partial) mediation
H2a / H2b / H2c	Only seizing (H2b) supported
H3	Supported (small effect size)
H4	Not supported

8. Discussion

Teaching notice. The interpretation below is based on simulated data and shows students how a discussion section is written. It illustrates reasoning and wording only.

Innovation orientation and sustainable performance (H1). The positive and significant direct effect (β = 0.280) agrees with studies linking green and sustainable innovation to sustainable performance (Al Halbusi et al., 2024; Valdivieso-Uvidia et al., 2025). The finding suggests that firms with a stronger innovation culture also report better economic, environmental, and social results.

The mediating role of dynamic capabilities (H2). The significant indirect effect (β = 0.158) alongside a significant direct effect indicates complementary mediation, which is consistent with prior work on dynamic capabilities as a transmission mechanism (Acosta-Prado & Tafur-Mendoza, 2024; Afeltra & Alerasoul, 2024). At the dimension level, seizing capability is the only significant mediator. A cautious interpretation is that, in this sample, the ability to commit resources and mobilise decisions is what turns innovative intent into sustainability results, while sensing and transforming contribute less independently. Because the three dimensions are correlated, this result should not be over-interpreted.

The moderating role of institutional pressures (H3). The positive interaction (β = 0.113) supports the view that institutional pressure strengthens the innovation–sustainability link, while the absence of a direct effect of pressure fits the argument that pressure alone is not

sufficient (Sherazi et al., 2025; Saeed, 2025). The small effect size ($f^2 = 0.02$) suggests that the moderating role should be described as real but modest.

Sectoral differences (RQ4). No significant differences were found between manufacturing and service firms, so the model appears applicable to both sectors in this sample.

A note on reading statistics (for students). Four habits prevent most interpretation errors: (1) always report effect sizes next to p-values; (2) distinguish statistical significance from practical importance; (3) do not infer causation from cross-sectional data, since the model describes associations consistent with theory; (4) report non-significant results honestly (H2a and H2c here) instead of hiding them.

9. Implications, Limitations, and Future Research

9.1 Theoretical implications

The study integrates RBV, DCT, and Institutional Theory in one empirical model. It shows how internal resources (innovation orientation), internal mechanisms (dynamic capabilities), and the external environment (institutional pressures) jointly shape sustainable outcomes. It also demonstrates the value of measuring dynamic capabilities and sustainable performance as multidimensional constructs.

9.2 Managerial implications

1. Build capabilities, not only ideas. Managers should invest in routines for sensing sustainability-related signals (market, regulatory, technological), seizing them through dedicated budgets and governance, and transforming structures and processes accordingly.

2. Align innovation with sustainability targets. Innovation portfolios should be evaluated against explicit economic, environmental, and social indicators, not only against financial return.

3. Treat institutional pressure as an opportunity. Firms that anticipate regulation and industry norms can use them to justify investment and to gain legitimacy and market access.

4. Develop people and learning. Training in sustainability and digital tools strengthens the human capital on which dynamic capabilities depend (Al Halbusi et al., 2024).

9.3 Policy implications

Policymakers can design regulation that combines clear requirements (coercive pressure) with incentives, standards, and technical support (normative pressure), especially for smaller firms. Evidence that pressure alone may be insufficient (Sherazi et al., 2025) suggests that policy should also support firms' internal capabilities, for example through training programmes, green finance, and technology-transfer schemes.

9.4 Limitations

First, the cross-sectional design limits causal inference. Second, purposive sampling restricts generalisability to the population of firms with visible sustainability practices. Third, single-respondent, self-reported data may carry perceptual and common-method bias, although procedural and statistical remedies are applied. Fourth, the model focuses on three theoretical lenses and does not include other possible factors such as leadership, digital technologies, or stakeholder engagement.

9.5 Future research

Future studies could (a) use longitudinal or multi-source data (for example combining survey data with sustainability reports), (b) replicate the model in other industries and countries, (c) add digital capabilities, green learning orientation, or leadership as additional mediators or moderators, and (d) compare large firms and SMEs.

10. Conclusion

This study developed an integrative model that links innovation orientation, dynamic capabilities, and institutional pressures to sustainable business performance, and specified a field study based on 300 managers in manufacturing and service firms. By combining RBV, DCT, and Institutional Theory, and by drawing on recent evidence from 2023–2025, the model explains how innovation becomes sustainability: through capabilities that sense, seize, and transform, under the conditioning influence of institutional pressure. The protocol presented here, from sampling and measurement to PLS-SEM analysis and reporting templates, enables a rigorous empirical test and supports replication across industries and regions.

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