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Innovations and Entrepreneurial Ecosystems: A Structural Equation Modeling Approach.

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Abstract:

This study investigates the impact of substantial process and product innovations on entrepreneurial ecosystems and territorial competitiveness. While innovation is widely recognized as a driver of economic development, the specific mechanisms through which different types of innovation influence local entrepreneurial dynamics remain underexplored. This research aims to bridge this gap by examining how innovation fosters collaboration, enhances service diversification, and strengthens entrepreneurial support networks.

The study is based on a survey of 223 Moroccan companies from diverse industries and regions, ensuring a representative sample of the entrepreneurial landscape. The dataset covers businesses of varying sizes, revenue levels, and sectors, providing a comprehensive view of the relationship between innovation and territorial development. The analysis employs Structural Equation Modeling (SEM) to assess the direct and indirect effects of substantial innovation on entrepreneurial ecosystems. Process innovation is measured through improvements in working conditions and environmental sustainability, while product innovation is evaluated based on product renewal and the development of environmentally friendly goods. The entrepreneurial ecosystem is assessed through indicators such as business support networks, service diversity, and institutional collaboration.

The findings reveal that process innovation significantly enhances local collaboration and ecosystem sustainability, particularly when focused on environmental improvements. Product innovation contributes to entrepreneurial ecosystem vitality by diversifying service offerings and fostering strong support networks. However, the study also highlights the necessity of balancing innovation efforts with entrepreneurial flexibility to sustain long-term competitiveness.

Keywords: Process Innovation, Product Innovation, Entrepreneurial Ecosystems, Territorial Competitiveness.

Introduction

In a constantly evolving world, territorial competitiveness and entrepreneurial dynamism stand as fundamental pillars for economic development and innovation. Entrepreneurial ecosystems, combined with substantial process and product innovations, play a crucial role in structuring and revitalizing local economies (Roundy et al., 2018; Malerba, 2002). However, these dynamics unfold within competitive environments, shaped by demanding societal and ecological transformations.

Despite extensive research on the impact of innovation on economic development, numerous gaps persist in the literature. In particular, few studies have focused on the interactions between process innovations, product innovations, and their effects on entrepreneurial ecosystems at the territorial level. Furthermore, the mechanisms through which these types of innovation influence various dimensions of the entrepreneurial ecosystem, such as local collaboration and business service diversification, remain insufficiently explored (Spigel & Harrison, 2008; Freeman, 1987).

The primary objective of this study is to analyze the impacts of substantial process and product innovations on territorial competitiveness and the entrepreneurial ecosystem. It aims to bridge the identified gaps by providing an integrated perspective on these complex interactions, while considering both direct and indirect effects.

In this context, our research addresses the following question: How do substantial process and product innovations influence the entrepreneurial ecosystem and territorial competitiveness, and what mechanisms maximize their impacts?

To answer this question, this article is structured into three key sections. First, we will contextualize the concepts of entrepreneurial ecosystems and territorial competitiveness through a comprehensive literature review. Next, we will examine the contributions of process and product innovations to the entrepreneurial ecosystem, identifying their effects on local performance. Finally, an empirical analysis based on structural equation modeling will quantitatively assess these relationships, highlighting the direct and indirect dynamics at play.

1. Conceptualization

1.1. Entrepreneurial Ecosystems

Entrepreneurial ecosystems, defined as communities supporting the creation and growth of new businesses (Roundy et al., 2018; Liguori et al., 2019), play a central role in economic development and innovation. These ecosystems directly influence startup behavior, their chances of survival, and their performance (Marcon & Duarte Ribeiro, 2021). A sustainable entrepreneurial ecosystem, as defined by Cohen (2006), is characterized by an interconnected group of actors within a local geographic community, committed to sustainable development and supporting new sustainable businesses.

The concept of an ecosystem, originally borrowed from biology by Tansley (1935), describes an interactive system of living organisms emphasizing interdependencies between organisms and their environment (Cavallo et al., 2019). This metaphor was adapted to management by Moore (1993), who introduced the idea of business ecosystems as networks of actors (companies, universities, governments) coexisting and evolving together. This adaptation has helped better understand the complex dynamics of interactions among various economic actors. An entrepreneurial ecosystem is structured around a network of individuals, knowledge, and human capital, supported by an external environment that regulates and facilitates resource access (Stam & Spigel, 2016). Granstrand & Holgersson (2020) expand this definition by incorporating sets of actors, activities, artifacts, institutions, and relationships that influence innovative performance. These elements interact to create an environment conducive to innovation, where entrepreneurs, investors, research organizations, and institutions collaborate to drive economic growth (Spigel et al., 2020).

1.2. Sustainable Innovation

Amid growing stakeholder pressure to adopt sustainable practices, sustainable innovation has become a central issue for organizations. It is based on the idea that innovation should not only provide competitive advantages but also generate environmental and social benefits (Cillo et al., 2019). This study defines sustainable innovation as a comprehensive concept encompassing "the introduction of new or significantly improved products, production processes, management practices, or business methods that generate economic, social, and environmental outcomes" (Neutzling et al., 2018). This approach highlights the necessity of a balanced integration of the three pillars of sustainable development: economic, social, and environmental.

Govindan et al. (2016) emphasize that sustainable innovation can be driven at the supply chain level, surpassing analyses centered on a single organization. This perspective is particularly relevant within circular configurations, aiming for efficient resource use and waste reduction. Companies that adopt such innovative practices are often rewarded by the market and enjoy better survival prospects. However, in a dynamic competitive environment, past innovations do not always adapt to new contexts. Thus, sustainable innovation becomes essential for maintaining competitive advantages and strengthening companies’ ability to tackle constantly evolving challenges (Zheng et al., 2024).

Recent research has identified two categories of factors influencing sustainable innovation. Internal factors primarily include previous R&D investments, financial constraints, and the application of digital technologies (Peters, 2009; Ju et al., 2013; Yang et al., 2023). These elements play a key role in a company's ability to develop innovative and sustainable solutions. Meanwhile, external factors encompass business policies, industrial agglomeration, and the degree of cooperation with external partners (Arnold, 2017; Li et al., 2022; Guo et al., 2023). These external factors highlight the importance of a favorable environment and strategic collaborations to drive sustainable innovation.

1.3. Entrepreneurial Ecosystems and Innovation

Research on entrepreneurship and innovation has gradually shifted toward a community perspective, emphasizing the social and cultural interactions that shape entrepreneurial ecosystems (Stam & van de Ven, 2021). Scholars and practitioners recognize the value of these ecosystems in explaining the implementation of innovation (Du Plessis & Boon, 2004; Ritala & Gustafsson, 2018). Unlike innovation systems, which are often region-specific, entrepreneurial ecosystems thrive on their heterogeneity (Cho et al., 2021), emphasizing entrepreneurs' ability to access external resources and innovate (Spigel & Harrison, 2008).

When applied to cities, the concept of innovation and entrepreneurial ecosystems gains clarity and relevance. Cities serve as focal points for innovation, acting as aggregated ecosystems that bring together diverse actors and resources (Visnjic, 2016). Their complex structure, characterized by a high level of collaboration among disparate actors (Rabelo & Bernus, 2015), makes them ideal environments for studying these ecosystems. Iconic examples such as Silicon Valley, London, and Barcelona illustrate how successful ecosystems are built on numerous interactions and interrelations among various actors (Valkokari et al., 2017; Engel, 2015; Pique et al., 2019). These collaborative and interconnected dynamics are essential for fostering innovation and supporting entrepreneurial growth.

2. HYPOTHESIS FORMULATION

2.1. Process Innovation and Territorial Competitiveness

In the current context of economic transformation, process innovation plays a key role in enhancing both organizational and territorial performance (Alegre et al., 2006). Innovation aimed at improving working conditions contributes to increasing companies' attractiveness and strengthening their territorial integration, thereby creating a favorable environment for competitiveness (Porter & van der Linde, 1995). This dynamic helps attract talent, foster investment, and improve workplace quality of life, which positively impacts territorial competitiveness.

Moreover, process innovation that focuses on reducing environmental damage promotes cooperation between businesses and local institutions, facilitating the establishment of a sustainable entrepreneurial ecosystem (Malerba, 2002). Companies engaged in sustainable innovation practices tend to develop strategic partnerships that reinforce their territorial integration and competitiveness.

H1. Substantial process innovation has a positive effect on territorial competitiveness by improving working conditions and reducing environmental impact.

2.2. Product Innovation and the Dynamism of Entrepreneurial Ecosystems

Substantial product innovation serves as a strategic lever for business development and the diversification of local entrepreneurial ecosystems (Freeman, 1987). Specifically, the development of new product lines fosters the expansion of business services and enhances companies' adaptability to market changes (Miskiewicz et al., 2021).

Furthermore, environmentally friendly innovations help improve companies' reputation as responsible actors, thereby stimulating entrepreneurial support networks (Kuusisto, 2017). A positive perception of businesses by stakeholders strengthens their integration into local ecosystems, fostering the creation of a dynamic and resilient economic environment.

H2. Substantial product innovation has a positive effect on the dynamism of entrepreneurial ecosystems by driving diversification and improving companies' perception.

2.3. Synergies Between Innovation and Territorial Development

The interaction between product and process innovations directly influences territorial competitiveness and entrepreneurial dynamism (Levallet & Chan, 2018). By integrating innovative practices into their business models, companies optimize their economic and organizational performance while contributing to the sustainable growth of territories (González et al., 2020).

H3. The interaction between product innovation and process innovation has a synergistic effect on territorial competitiveness and the dynamism of entrepreneurial ecosystems.

The following hypotheses guided the analysis: substantial process innovation focused on improving working conditions enhances territorial attractiveness by improving work environments (Alegre et al., 2006); reducing environmental damage fosters collaboration between businesses and local institutions, promoting a sustainable entrepreneurial ecosystem (Porter & Van der Linde, 1995); substantial product innovation, particularly the development of new product lines, encourages the diversification of local services and expands the entrepreneurial ecosystem (Malerba, 2002); environmentally friendly products enhance companies' perception as responsible actors, stimulating support networks (Freeman, 1987).

3. METHODOLOGY

3.1. Sample and data collection

A sample of 223 companies and active entrepreneurs in local ecosystems was selected.

As part of this in-depth study on innovation and business development, we surveyed a sample of 223 companies. This sample size ensures significant representativeness across different categories of businesses, allowing for a thorough analysis of innovation dynamics in Morocco. The sample is geographically diverse, with a balanced regional distribution. The Tanger-Tétouan-Al Hoceima region accounts for 29.8% of the surveyed companies, followed by Casablanca-Settat (25.5%), Rabat-Salé-Kénitra (14.9%), Marrakech-Safi (6.4%), and Fès-Meknès (6.4%). Other regions are also represented, albeit in smaller proportions, reflecting the concentration of economic activities in certain areas of Morocco.

Regarding company size, our sample covers a wide range, from small to large enterprises. 38.3% of the companies have fewer than 10 employees, a significant share falls within the small business category (10 to 49 employees, 25.5%), while 19.1% of the companies have 50 to 249 employees, and 17% have 250 or more employees. This diversity ensures a relevant analysis of innovation practices across different organizational levels.

In terms of revenue, 51.2% of the companies generate less than 3 million dirhams annually, indicating a strong representation of small businesses. 23.3% report annual revenues between 10 and 50 million dirhams, 14% between 3 and 10 million, while 11.6% generate more than 50 million dirhams. This distribution allows for an exploration of innovation strategies based on companies' financial capacities.

Regarding industry sectors, the sample shows a strong presence in certain areas. The "Other" sector accounts for 51.1% of the companies, suggesting a broad diversity of activities not specifically categorized in the survey. The services sector represents 23.4%, followed by trade (17%) and manufacturing, which is a minority in this sample. This sectoral diversity provides a comprehensive view of innovation dynamics across various economic contexts.

The collected data cover process innovations such as improving working conditions (PRC3) and reducing environmental impacts (PRC4), as well as product innovations, including the replacement of obsolete products (PR1), the development of new product lines (PR2), and the creation of environmentally friendly products (PR3) (Alegre et al., 2006). The entrepreneurial ecosystem was measured through indicators related to support networks, service diversity, and collaboration between businesses and local institutions (Julien, 2010). Analyses were conducted in several stages. A Confirmatory Factor Analysis (CFA) first validated the theoretical structure of the constructs, confirming that the selected indicators effectively measure the studied concepts (Schumacker & Lomax, 2016). Then, SEM was used to test the hypotheses formulated on the relationships between innovation and the entrepreneurial ecosystem. Analyses were performed using SmartPLS software, which is particularly suited for moderately sized samples (Ringle, Wende, & Becker, 2015). Model quality indicators include path coefficients, convergent validity (Hair et al., 2019), discriminant validity (Henseler et al., 2015), and overall model fit indices (SRMR and Chi-square) (Hu & Bentler, 1999).

3.2. MEASURES

Before testing the hypotheses, it is crucial to determine the appropriate measurement type for each concept (Henseler et al., 2016). In general, these concepts can be assessed using either reflective or formative measures (Fornell & Bookstein, 1982). Reflective measures are suitable when the indicators are dependent on the concept and exhibit strong correlations among themselves (Chin, 1998; Götz et al., 2009; Haenlein & Kaplan, 2004). Conversely, formative measures are used when the concept is shaped by multiple independent indicators that are not necessarily correlated (Chin, 1998; Götz et al., 2009; Haenlein & Kaplan, 2004).

In this study, we opted for Mode A composites, which rely on linear combinations of reflective indicators for all analyzed variables (Hair et al., 2022). The measurement scales were derived from previous research that validated their relevance. However, some scales were adjusted by either condensing them or incorporating new elements specific to this study. The questionnaire design was based on a comprehensive literature review, ensuring the selection of relevant variables and the establishment of relationships between them.

Table 1. Measurement model

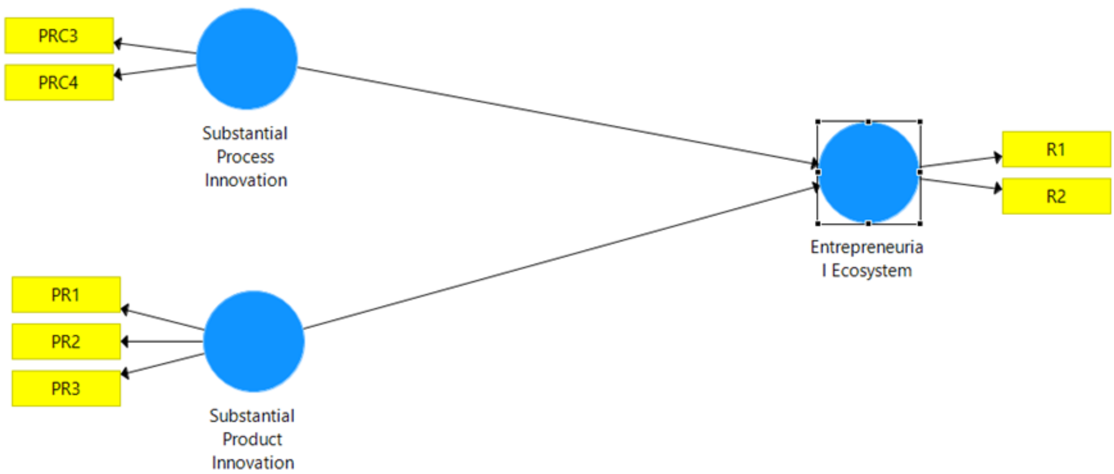
Variables	Measurement Scale	Code	Adapted from
Substantial Process Innovation	Improvement of working conditions	PRC3	Alegre et al., 2006
	Reduction of environmental damage	PRC4	
Substantial Product Innovation	Replacement of obsolete products	PR1	Alegre et al., 2006
	Development of new product ranges	PR2	
	Development of environmentally friendly products	PR3	
Entrepreneurial Ecosystem	Diversity of services for businesses	R1	Julien, 2010
	Collaboration between businesses and local institutions	R2	

4. Data analysis

To evaluate the impact of substantial process and product innovation on territorial competitiveness and the entrepreneurial ecosystem, we used Structural Equation Modeling (SEM). SEM is a robust statistical method that examines complex relationships between latent variables while accounting for measurement errors (Kline, 2015). It combines factor analysis and multiple regression models, making it particularly suitable for studying causal relationships in an entrepreneurial ecosystem (Hair et al., 2019). This approach is justified by the multidimensionality of the studied concepts. Concepts such as substantial process and product innovation or the entrepreneurial ecosystem are abstract constructs that are difficult to measure directly. For example, substantial process innovation can be broken down into improving working conditions (Alegre et al., 2006) and reducing environmental damage (Porter & Van der Linde, 1995), while the entrepreneurial ecosystem includes elements such as support networks, diversity of business services, and collaboration among local actors (Julien, 2010). SEM enables the simultaneous modeling of these complex relationships and provides precise estimates of direct and indirect effects.

The use of SEM in this study is motivated by several reasons. First, this method allows for the analysis of both direct and indirect effects. We examined the direct impact of substantial innovation (process and product) on the entrepreneurial ecosystem as well as its indirect effects on territorial competitiveness. For example, we tested how process innovation influences collaboration and the diversity of local services (Julien, 2010). Second, SEM enables the modeling of latent variables by integrating abstract concepts such as sustainability, stakeholder perception, and territorial attractiveness (Freeman, 1987) using multiple observed indicators for each construct (Byrne, 2016). Finally, by accounting for measurement errors, SEM enhances the validity of results, particularly in contexts where data include complex socio-economic and environmental factors (Hair et al., 2019).

Fig. 1. Research model



Source: authors

The results indicate that process and product innovations positively influence the entrepreneurial ecosystem, though effects may vary across dimensions. For instance, reducing environmental impacts has a stronger effect on local collaborations than improving working conditions. Likewise, product diversification and the integration of sustainable practices strengthen support networks, contributing to increased competitiveness (Julien, 2010). However, potential tensions between innovation and entrepreneurial flexibility were observed, highlighting the need for strategic resource management (Greffe, 1992). In summary, this study demonstrates that innovation, whether process- or product-oriented, is a powerful lever for stimulating the entrepreneurial ecosystem and improving territorial attractiveness. Nevertheless, to maximize its impact, it is crucial to integrate innovations into a comprehensive approach, considering the complex interactions among businesses, institutions, and the local environment.

5. RESULTS

5.1. Outer loadings

Table 2. Outer loadings

	Entrepreneurial Ecosystem	Substantial Process Innovation	Substantial Product Innovation
INP2			0,873
INP3			0,831
INP6			0,904
INP7			0,892
INPC1		0,830	
INPC2		0,922	
INPC3		0,789	
R3	0,872		
R1	0,931		

Source: authors

The Outer Loadings table allows for the evaluation of the relationship between observed indicators and their latentmm wconstructs, namely the Entrepreneurial Ecosystem, Substantial Product Innovation, and Substantial Process Innovation.

Regarding the Entrepreneurial Ecosystem, the indicators R3 and R1 have values of 0.872 and 0.931, respectively. These results indicate a strong correlation between these variables and their latent construct. In particular, R1 displays the highest correlation (0.931), demonstrating a significant contribution to measuring the entrepreneurial ecosystem.

For Substantial Product Innovation, the indicators INP2, INP3, INP6, and INP7 have respective values of 0.873, 0.831, 0.904, and 0.892. These values, all above the recommended threshold of 0.7, confirm strong convergent validity. INP6 and INP7 show the highest loadings (0.904 and 0.892), suggesting that they play a central role in measuring this dimension.

Regarding Substantial Process Innovation, the indicators INPC1, INPC2, and INPC3 have values of 0.830, 0.922, and 0.789, respectively. INPC2, with a value of 0.922, indicates a strong contribution to this latent construct, while INPC1 and INPC3 also remain well correlated with acceptable loadings.

Overall, this Outer Loadings table confirms that the chosen indicators are well aligned with their respective constructs, demonstrating good convergent validity. Since the majority of values exceed 0.7, this strengthens the reliability of the model and the relevance of the variables used to measure the theoretical concepts.

5.2. Construct reliability and validity

Table 3. Construct reliability and validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Entrepreneurial Ecosystem	0,775	0,822	0,897	0,813
Substantial Process Innovation	0,804	0,826	0,885	0,720
Substantial Product Innovation	0,899	0,917	0,929	0,766

Source: authors

This table presents the reliability and validity indicators of the constructs, including Cronbach's alpha, composite reliability (rho_A and rho_C), and Average Variance Extracted (AVE). These indices help assess the internal consistency, reliability, and convergent validity of the constructs "Entrepreneurial Ecosystem," "Substantial Process Innovation," and "Substantial Product Innovation."

Cronbach's alpha for the Entrepreneurial Ecosystem is 0.775, suggesting good internal consistency. The composite reliability values, rho_A (0.822) and rho_C (0.897), confirm the robustness of the construct. The AVE is 0.813, well above the recommended threshold of 0.5, indicating strong convergent validity, as more than 80% of the variance in the indicators is explained by the construct.

For Substantial Process Innovation, Cronbach's alpha is 0.804, reflecting satisfactory internal consistency. The composite reliability values are high, with rho_A at 0.826 and rho_C at 0.885, indicating excellent reliability. The AVE, at 0.720, is well above the required threshold, further strengthening the construct's convergent validity.

Substantial Product Innovation has a Cronbach's alpha of 0.899, suggesting very strong internal consistency. The composite reliability values, rho_A (0.917) and rho_C (0.929), also confirm the construct's reliability. The AVE, at 0.766, significantly exceeds the minimum threshold, validating the construct's ability to explain the variance of its indicators.

Overall, the three constructs exhibit acceptable to high levels of reliability and validity, confirming their suitability for analysis. The AVE values above 0.5 for each construct validate the model's internal consistency and convergent validity, reinforcing the robustness of the measurement scales adopted for the study.

5.3. Discriminant validity

Table 4. Heterotrait-Monotrait Ratio (HTMT)

	Entrepreneurial Ecosystem	**Substantial Process Innovation**	**Substantial Product Innovation**
Entrepreneurial Ecosystem			
Substantial Process Innovation	0,803		
Substantial Product Innovation	0,485	0,631	

Source: authors

The table presents the Heterotrait-Monotrait Ratio (HTMT) between different innovation variables, namely Substantial Process Innovation, Substantial Product Innovation, and the Entrepreneurial Ecosystem. The HTMT ratio is an indicator used to evaluate discriminant validity between constructs in a measurement model. This indicator is often used in Partial Least Squares (PLS) analysis and helps verify whether the variables effectively measure distinct concepts.

The observed HTMT values are 0.803 between Substantial Process Innovation and the Entrepreneurial Ecosystem, 0.485 between Substantial Product Innovation and the Entrepreneurial Ecosystem, and 0.631 between Substantial Product Innovation and Substantial Process Innovation. Low HTMT values indicate good discriminant validity, meaning that each construct measures a unique concept distinct from the others.

Generally, an HTMT value below 0.85 is considered acceptable to confirm sufficient discrimination between variables. In this table, all HTMT values are significantly below the 0.85 threshold, suggesting that there is no redundancy issue between Substantial Product Innovation, Substantial Process Innovation, and the Entrepreneurial Ecosystem variables.

In summary, the results indicate that these three constructs are well differentiated within the model and each measures a unique concept, ensuring the quality of the model's discriminant structure.

5.4. Collinearity statistics (VIF)

Table 5. Outer model - List

	VIF
INP2	2,193
INP3	2,343
INP6	3,520
INP7	2,869
INPC1	1,787
INPC2	2,502
INPC3	1,710
R3	1,668
R1	1,668

Source: authors

The collinearity statistics table presents the Variance Inflation Factor (VIF) values for a set of variables in our analysis model, including INP2, INP3, INP6, INP7, INPC1, INPC2, INPC3, R1, and R3. The VIF is a commonly used indicator in regression analyses to assess collinearity among independent variables, measuring the extent to which these variables are redundant or highly correlated with each other.

High VIF values may indicate a multicollinearity problem, which could bias regression estimates and compromise the interpretation of results due to strong interdependence between variables. Generally, a VIF below 3 is considered acceptable to ensure low collinearity.

The VIF values observed in this model range from 1.668 to 3.520. Most variables have values below 3, indicating moderate and acceptable collinearity. However, INP6 has a slightly higher value (3.520), which may suggest greater interdependence with other variables.

The absence of excessive multicollinearity strengthens the model's robustness and validity. Each variable contributes uniquely to explaining the studied phenomenon, ensuring the reliability of regression coefficients and a more precise interpretation of the modeled relationships.

From a research perspective, these results confirm that the selected variables add value without excessive redundancy. Moderate collinearity, as observed here, helps prevent instability issues in the estimates and ensures reliable conclusions.

The VIF values indicate that the model is well-structured, with controlled collinearity, which enhances the relevance of the analyses and the quality of the results obtained.

This low level of collinearity is essential to avoid instability issues in coefficient estimates, which is particularly important for ensuring reliable and meaningful conclusions in research.

The observed VIF values confirm that our model is well-structured and that the selected variables contribute individually to explaining the studied phenomena without excessive redundancy.

5.5. Path coefficients

Table 6. Path coefficients

	Entrepreneurial Ecosystem	Substantial Process Innovation	Substantial Product Innovation
Entrepreneurial Ecosystem		0,653	0,418

Source: authors

The table presents the path coefficients, measuring the effect of Substantial Process Innovation and Substantial Product Innovation on the Entrepreneurial Ecosystem. These coefficients indicate the magnitude and direction of relationships between variables within the structural model.

In this case, the path coefficient between Substantial Process Innovation and the Entrepreneurial Ecosystem is 0.653, while the coefficient between Substantial Product Innovation and the Entrepreneurial Ecosystem is 0.418. These positive values suggest that intensifying innovation practices, whether related to processes or products, contributes to strengthening the entrepreneurial ecosystem in the studied context.

The stronger effect of Substantial Process Innovation on the Entrepreneurial Ecosystem may indicate that internal transformations—such as optimization of production flows, automation, or improvements in organizational processes—have a direct and significant impact on entrepreneurial dynamics. Improved internal efficiency can enhance businesses' adaptability, competitiveness, and capacity to innovate in the market.

Similarly, although Substantial Product Innovation has a positive effect, its lower coefficient compared to process innovation suggests that its impact on the entrepreneurial ecosystem is more moderate. This may be explained by the fact that product innovation, while essential, often requires longer development cycles and greater resource absorption, which can slow entrepreneurial responsiveness in the short term.

These results highlight the importance of innovation as a key driver of entrepreneurial development. They also emphasize the need for companies to balance innovation efforts with the flexibility required to adapt to market dynamics.

From a strategic perspective, these findings encourage further exploration of how companies can maximize the benefits of innovation while maintaining entrepreneurial agility. They provide insights into how decision-makers can align their innovation strategies with the development of a high-performing entrepreneurial ecosystem.

5.6. Total effects

Table 7. Total effects

	Entrepreneurial Ecosystem	**Substantial Process Innovation**	**Substantial Product Innovation**
Entrepreneurial Ecosystem		0,653	0,418

Source: authors

The table presents the path coefficients, measuring the effect of Substantial Process Innovation and Substantial Product Innovation on the Entrepreneurial Ecosystem. These coefficients indicate the magnitude and direction of the relationships between variables within the structural model.

In this case, the path coefficient between Substantial Process Innovation and the Entrepreneurial Ecosystem is 0.653, while the coefficient between Substantial Product Innovation and the Entrepreneurial Ecosystem is 0.418. These positive values suggest that strengthening innovation practices—whether related to processes or products—helps reinforce the entrepreneurial ecosystem in the studied context.

The stronger effect of Substantial Process Innovation on the Entrepreneurial Ecosystem may indicate that internal transformations, such as optimizing production flows, automation, or improving organizational processes, have a direct and significant impact on entrepreneurial dynamics. Enhanced internal efficiency can boost businesses' adaptability, competitiveness, and innovation capacity in the market.

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From a strategic perspective, these findings encourage further exploration of how companies can maximize the benefits of innovation while maintaining entrepreneurial agility. They provide valuable insights into how decision-makers can align their innovation strategies with the development of a high-performing entrepreneurial ecosystem.

5.7. R-square

Table 8. R-square

	R Square	**R Square Adjusted**
Substantial Process Innovation	0,427	0,425
Substantial Product Innovation	0,175	0,173

Source: authors

5.8. f-square

Table 9. f-square

	Entrepreneurial Ecosystem	**Substantial Process Innovation**	**Substantial Product Innovation**
Entrepreneurial Ecosystem		0,745	0,212

Source: authors

The R^2 and f^2 statistics provide crucial insights into the explanatory power of the model and the importance of independent variables in the analysis. The R^2 value for Substantial Process Innovation is 0.427, indicating that 42.7% of the variance in this variable is explained by the independent variables in the model. For Substantial Product Innovation, the R^2 value is 0.175, meaning that 17.5% of the variance in this variable is explained by the other variables in the model. These results show that Substantial Process Innovation is better explained by the model's variables than Substantial Product Innovation, suggesting that the modeled factors have a stronger impact on process innovation.

However, the adjusted R^2 value for Substantial Process Innovation (0.425) and Substantial Product Innovation (0.173) remains relatively low. This indicates that while these variables are partially explained by the model, a significant portion of their variance remains unexplained. External, contextual, or unmodeled factors could have a substantial influence. These results emphasize the need to explore additional variables to enhance the understanding of the determinants of these types of innovation.

The f^2 values measure the magnitude of the effects of independent variables on dependent variables. For Substantial Process Innovation, the f^2 value is 0.745, indicating a very strong effect on the entrepreneurial ecosystem. In contrast, Substantial Product Innovation has a much more moderate effect, with an f^2 value of 0.212, suggesting that its impact on the entrepreneurial ecosystem is less pronounced.

These differences in effects may be explained by the nature of innovations Process innovation can have a more direct and substantial impact on an organization and its practices. And Product innovation, while important, may have a less immediate or more indirect effect on the entrepreneurial ecosystem.

Although Substantial Process Innovation appears to have a greater impact on the entrepreneurial ecosystem than Substantial Product Innovation, the results suggest that these effects, while statistically significant, are not sufficient to fully explain the dynamics of the entrepreneurial ecosystem.

It is likely that external or contextual variables, such as the market environment, organizational culture, or leadership capabilities, play a crucial role and explain a greater share of the variance in the entrepreneurial ecosystem.

5.9. Model fit

Table 10. Fit summary

	Saturated Model	**Estimated Model**
SRMR	0,077	0,129
d_ULS	0,266	0,743
d_G	0,160	0,200
Chi-Square	390,854	451,703
NFI	0,811	0,781

Source: authors

he evaluation of model fit relies on several statistical indicators to assess its quality and robustness. The results obtained show a generally satisfactory fit, demonstrating the relevance of the adopted conceptual framework.

The SRMR (Standardized Root Mean Square Residual) has a value of 0.077 for the saturated model and 0.129 for the estimated model. Although the latter slightly exceeds the optimal threshold of 0.08, it remains within an acceptable range, confirming a reasonable match between the observed and estimated covariances.

The dULS and dG indices, with values of 0.743 and 0.200 respectively for the estimated model, indicate a coherent model structure. These values suggest a relevant modeling of the relationships between variables while also revealing potential areas for optimization.

The Chi-square test, although often influenced by sample size, shows a controlled progression (451.703), suggesting a good representation of empirical data by the estimated model.

Finally, the Normed Fit Index (NFI) reaches 0.781, reflecting a substantial explanation of data variance by the conceptual model. This value demonstrates a solid structuring of the links between latent variables and strengthens the overall validity of the proposed model.

Overall, these results confirm the model's ability to capture the underlying dynamics of the empirical data. While exhibiting a satisfactory fit, the model could benefit from further refinements to enhance its precision. These findings reinforce the validity of the proposed hypotheses and confirm the relevance of the established structural relationships.

6. Discussion

6.1. General Discussion

The findings of this study confirm the central role of innovation—whether process or product—in stimulating entrepreneurial ecosystems and enhancing territorial competitiveness. However, the intensity of these effects varies, highlighting the need for a strategic approach to optimize the impact of innovation on local economic development.

The analysis of path coefficients indicates that Substantial Process Innovation has a significant effect on the entrepreneurial ecosystem (0.653). This finding supports our first hypothesis, which states that improving working conditions and reducing environmental impact positively contribute to local collaboration and the sustainability of entrepreneurial ecosystems. These results align with the work of Porter and Van der Linde (1995), who demonstrated that sustainable innovation fosters cooperative dynamics and stakeholder engagement.

Regarding Substantial Product Innovation, the results indicate a positive effect on the entrepreneurial ecosystem (0.418), although less pronounced than process innovation. This observation confirms our second hypothesis, which suggests that developing new product lines and adopting sustainable practices strengthen local economic diversity and entrepreneurial support networks. However, the relatively lower impact could be explained by high costs and the time required for adoption, as highlighted by Malerba (2002) and Freeman (1987).

The effect of innovation on territorial competitiveness has also been demonstrated.

On one hand, Substantial Process Innovation enables companies to differentiate themselves by optimizing resources and enhancing corporate social responsibility, thereby increasing their attractiveness. On the other hand, Substantial Product Innovation, while beneficial, heavily depends on the market's ability to absorb these new offerings and their alignment with consumer expectations.

These findings support the conclusions of Alegre et al. (2006) on the importance of balancing innovation with entrepreneurial flexibility.

However, organizational tensions may arise, particularly due to resource constraints and challenges in integrating innovations without compromising business agility. Greffe (1992) emphasizes that innovation must be accompanied by adaptive management to maximize its effects on the entrepreneurial ecosystem.

This study confirms the importance of innovation as a driver of territorial economic development, while highlighting the need for a holistic approach that integrates interactions between businesses, institutions, and the local environment.

While the overall findings support the positive influence of both process and product innovations on entrepreneurial ecosystems, some relationships were found to be less robust than initially hypothesized.

Notably, the effect of product innovation, although statistically significant, was comparatively moderate. This relative weakness may be attributed to the inherently longer timeframes and higher uncertainty associated with product development cycles, which can delay visible impacts on ecosystem dynamics.

Additionally, regional disparities in market readiness or absorption capacity could dampen the effectiveness of newly introduced products, especially in areas with limited access to innovation infrastructure or consumer responsiveness.

These observations suggest that product innovation alone may not be sufficient to drive ecosystem transformation unless it is accompanied by supportive institutional and market conditions.

Therefore, future research could explore contextual moderators such as innovation policy frameworks, consumer behavior, or digital readiness that might influence the strength of these innovation-outcome relationships.

6.2. Theoretical Contributions

Our findings contribute to the existing literature on substantial process and product innovation in several ways. First, this study enhances the theoretical understanding of how innovation shapes entrepreneurial ecosystems. We have developed an integrated analytical framework that simultaneously examines the impact of substantial process and product innovation on service diversity and institutional collaboration within entrepreneurial ecosystems. This comprehensive approach provides deeper insights into the interplay between these dimensions and offers a more holistic perspective on the key drivers of territorial competitiveness.

Second, while previous research has highlighted the role of innovation in business growth and economic development (Alegre et al., 2006; Freeman, 1987), our study refines these analyses by demonstrating that substantial process and product innovation contribute in distinct yet complementary ways to the vitality of entrepreneurial ecosystems. We confirm that improving working conditions and reducing environmental impact are crucial for strengthening local interactions and business support networks. Meanwhile, substantial product innovation facilitates service diversification and fosters new growth opportunities for local economic actors.

Finally, this study introduces new insights into the combined effects of process and product innovation. Our findings suggest that integrating both forms of innovation generates synergies that enhance the resilience and adaptability of entrepreneurial ecosystems. These results underscore the importance of adopting a balanced strategic approach that leverages both process improvements and product development to maximize their impact on economic growth and territorial competitiveness.

6.3. Practical Implications

Our empirical findings offer valuable insights for entrepreneurs, business leaders, and policymakers involved in fostering entrepreneurial ecosystems. First, they emphasize the need for businesses to invest in substantial process innovations that enhance working conditions and promote sustainable practices. These efforts not only improve operational efficiency but also strengthen businesses' integration within local economic networks.

Second, policymakers should encourage and facilitate the adoption of product innovations through strategic incentives and support mechanisms. Developing new products and diversifying offerings can help businesses increase their competitiveness while stimulating the broader entrepreneurial landscape.

Lastly, our findings suggest that business leaders should adopt a comprehensive innovation strategy that combines internal process improvements with the development of new products. This integrated approach allows firms to capitalize on the opportunities within entrepreneurial ecosystems and strengthen their market position over the long term.

Moreover, the results of this study offer valuable insights for urban policy and territorial development strategies. In an increasingly complex and competitive environment, innovation should be regarded not only as a business growth factor but also as a strategic lever for reshaping urban and regional landscapes. Policymakers are encouraged to capitalize on the dynamics of process and product innovation by crafting integrated territorial strategies that promote business clustering, stimulate cross-sectoral collaboration, and foster inclusive entrepreneurial ecosystems. These innovation-oriented policies could play a pivotal role in enhancing the attractiveness, adaptability, and resilience of territories. Embedding innovation within urban planning frameworks through targeted infrastructure investments, digital transformation initiatives, and innovation hubs can accelerate regional development and generate long-term competitive advantages. Thus, innovation becomes a cornerstone of sustainable territorial governance and urban renewal.

6.4. Limitations and Future Research Directions

As with any study, our research presents several methodological and conceptual limitations, which open avenues for future investigation.

First, the study relies on self-reported data collected through questionnaires from business leaders. While this method is widely used in management research, it introduces the risk of social desirability bias, where respondents may provide answers that are perceived as socially acceptable rather than fully reflecting their organization's reality. This potential bias could affect the accuracy of certain measures, particularly regarding the assessment of innovation intensity and its perceived impact on the entrepreneurial ecosystem.

Second, our sample shows an overrepresentation of certain Moroccan economic regions, such as Tanger-Tetouan-Al Hoceima and Casablanca-Settat. This regional bias may limit the national representativeness of our results and reduce the ability to generalize conclusions to the broader Moroccan entrepreneurial landscape. Future research could draw on more geographically balanced samples or conduct comparative analyses across different regions to better understand the contextual effects on innovation dynamics.

Third, this study adopts an exclusively quantitative approach, using structural equation modeling (SEM). While this method provides robust statistical relationships, it does not capture the full complexity of organizational processes or the nuanced strategies behind innovation practices. A mixed-methods approach, combining quantitative data with qualitative insights (such as interviews or case studies), could complement and deepen the findings.

Fourth, measuring certain abstract concepts, such as perceived innovation or institutional collaboration, presents inherent challenges. Individual perceptions can vary significantly among respondents, introducing uncertainty into the evaluation of these phenomena. Incorporating more objective measures, such as external performance indicators or secondary data sources, could enhance the robustness of future analyses.

Fifth, although our conceptual model identifies substantial innovation as a key mediator between entrepreneurial initiatives and territorial competitiveness, future research could explore other potential mediators. Variables such as absorptive capacity, knowledge management practices, or organizational resilience might play critical roles in explaining the mechanisms linking innovation to entrepreneurial ecosystem dynamics.

Finally, since this study focuses exclusively on SMEs and micro-enterprises, a promising avenue for future research would be to conduct comparative analyses involving larger firms. Such studies could reveal differences in how organizations of various sizes leverage innovation to enhance their territorial competitiveness.

In summary, these limitations suggest several promising directions for theoretical and empirical advancements, offering a deeper understanding of the complex relationships between innovation, entrepreneurial ecosystems, and territorial development.

Conclusion

This study highlights the strategic importance of substantial process and product innovations in territorial competitiveness and the structuring of entrepreneurial ecosystems. The findings demonstrate that process innovations, particularly those aimed at improving working conditions and reducing environmental impact, play the most crucial role in strengthening local cooperation and the sustainability of entrepreneurial ecosystems.

In contrast, product innovation, while essential for economic diversification and market trend adaptation, has a more moderate impact due to implementation costs and longer return-on-investment timelines. These results confirm the necessity for companies to adopt a balanced approach between innovation and organizational flexibility to avoid internal tensions and optimize the benefits of innovation.

For policymakers and managers, it is crucial to implement innovation support strategies, particularly through financial incentives, strategic partnerships, and favorable regulations. A deeper integration of innovation into public policies and regional strategies could further enhance its impact.

Finally, future research could explore in greater detail the role of institutional and cultural factors, as well as interregional interactions, to gain a better understanding of the key drivers for optimizing entrepreneurial ecosystems. By combining empirical analysis with strategic recommendations, this study paves the way for new insights into the transformation and long-term sustainability of territorial entrepreneurial dynamics..

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Appendix

Abbreviation	Meaning
SEM	Structural Equation Modeling
AVE	Average Variance Extracted
HTMT	Heterotrait-Monotrait Ratio
VIF	Variance Inflation Factor
PLS-SEM	Partial Least Squares Structural Equation Modeling
CFA	Confirmatory Factor Analysis
R^2	Coefficient of Determination
f^2	Effect Size
SRMR	Standardized Root Mean Square Residual
d_ULS	Unweighted Least Squares Discrepancy
d_G	Geodesic Discrepancy
NFI	Normed Fit Index
Chi^2	Chi-Square
INPD1	Radical Product Innovation
INPD2	Incremental Product Innovation
INPD3	Economic Impact of Product Innovation
INPC1	Process Innovation
INPC2	Economic Impact of Process Innovation
INPC3	Environmental Impact of Process Innovation
CL1	Innovation Partnerships
CL2	Agglomeration and Clusters
EF1	R&D Effort
D1	Regional Growth Rate