

Circular Economy and Digital Platforms: New Models for Organizational Innovation



Economía circular y plataformas digitales: Nuevos modelos para la innovación organizacional

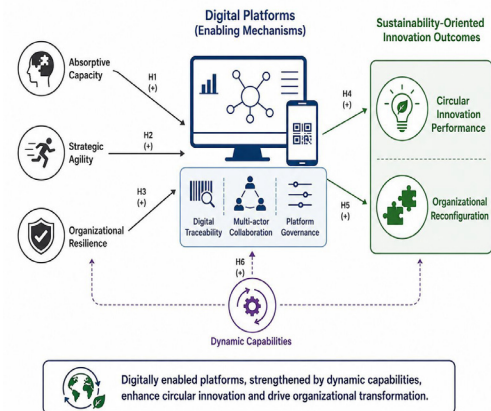
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HIGHLIGHTS

- Digital platforms strengthen circular innovation through dynamic organizational capabilities
- Absorptive capacity and strategic agility positively influence sustainability-oriented innovation
- Digital traceability systems improve organizational reconfiguration and circular performance
- Multi-actor platform ecosystems enhance collaborative circular economy practices
- Digitally enabled circular ecosystems generate new organizational innovation models
- The study integrates circular economy, digital transformation, and dynamic capability theory
- Platform-based organizational innovation supports long-term sustainable transformation

GRAPHICAL ABSTRACT



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ABSTRACT

The convergence between digital platforms and circular economy practices is transforming organizational innovation and sustainability-oriented business models. This study analyzes how digitally enabled ecosystems contribute to circular innovation through dynamic capabilities such as absorptive capacity, strategic agility, and organizational resilience. Using a sequential explanatory mixed-methods design, the research combines quantitative analysis of 60 digital platforms with qualitative evidence from interviews and content analysis.

The findings reveal that digital traceability, multi-actor collaboration, and adaptive organizational capabilities positively influence circular innovation performance and organizational reconfiguration. The study demonstrates that digital platforms operate not only as technological infrastructures, but also as organizational coordination mechanisms that support sustainability-oriented transformation.

The research contributes to the literature by integrating circular economy, digital platforms, and dynamic capability theory into a unified framework explaining the emergence of new organizational innovation models.

RESUMEN

La convergencia entre las plataformas digitales y las prácticas de economía circular está transformando la innovación organizacional y los modelos de negocio orientados a la sostenibilidad. Este estudio analiza cómo los ecosistemas digitalmente habilitados contribuyen a la innovación circular mediante capacidades dinámicas como la capacidad de absorción, la agilidad estratégica y la resiliencia organizacional. A través de un diseño metodológico mixto explicativo secuencial, la investigación combina el análisis cuantitativo de 60 plataformas digitales con evidencia cualitativa obtenida mediante entrevistas y análisis de contenido.

Los resultados muestran que la trazabilidad digital, la colaboración multiactor y las capacidades organizacionales adaptativas influyen positivamente en el desempeño de innovación circular y en la reconfiguración organizacional. El estudio demuestra que las plataformas digitales operan no solo como infraestructuras tecnológicas, sino también como mecanismos de coordinación organizacional que favorecen la transformación orientada a la sostenibilidad.

La investigación contribuye a la literatura integrando la economía circular, las plataformas digitales y la teoría de capacidades dinámicas en un marco unificado que explica la emergencia de nuevos modelos de innovación organizacional.

1. Introduction

The interdependence between digital infrastructures, sustainability transitions, and organizational innovation is reshaping contemporary production systems. Organizations increasingly rely on digital ecosystems to optimize operations, coordinate resource flows, and support sustainability-oriented innovation. Simultaneously, the shift from linear to circular economic models has intensified the need for organizational structures capable of integrating technological and adaptive capabilities.

Within this context, the circular economy (CE) has evolved from an environmental framework into a strategic model for organizational transformation. Current approaches emphasize value creation redesign, resource recirculation, collaboration, and regenerative capacity rather than focusing solely on waste reduction. Consequently, circularity requires flexible governance structures, collaborative networks, and dynamic capabilities capable of sustaining innovation under technological and ecological pressures.

At the same time, digital platforms have become central coordination mechanisms within innovation ecosystems. Technologies such as AI, blockchain, IoT, and advanced analytics improve traceability, monitor resource cycles, and facilitate collaborative decision-making. As a result, digital platforms increasingly function as organizational infrastructures reshaping how firms generate and capture value.

Although the convergence between circular economy and digital platforms has attracted growing academic attention, the literature remains fragmented. Most studies analyze digital transformation, circular economy implementation, and organizational innovation separately, offering limited explanation of how absorptive capacity, strategic agility, organizational resilience, and collaborative governance interact within digitally enabled circular environments.

This limitation is particularly relevant in emerging economies characterized by sustainability pressures, institutional uncertainty, and technological asymmetries. Under these conditions, the ability to combine digital infrastructures with adaptive organizational capabilities may determine the success of circular transformation initiatives. Building on the dynamic capability perspective, this study argues that digital platforms should be understood not only as technological tools, but also as organizational coordination infrastructures enabling sustainability-oriented innovation and long-term transformation. Using a sequential explanatory mixed-methods design, the research integrates quantitative and qualitative evidence to examine how digital platforms contribute to the emergence of new organizational innovation models within circular economy environments.

2. Literature Review and Theoretical Framework

2.1 Circular Economy as an Organizational Transformation Paradigm. The circular economy (CE) has evolved from an environmental perspective into an organizational transformation paradigm focused on redesigning business models, operational systems, and value

creation processes to achieve long-term sustainability (Geissdoerfer et al. 2017; Kirchherr et al. 2018). Recent studies argue that circularity requires organizations to move beyond linear production toward regenerative systems preserving material value across multiple life cycles. Bocken et al. (2016) emphasize that circular business models involve changes in product design, operations, and stakeholder coordination, positioning CE as a multidimensional transformation process.

This transition requires adaptive organizational capabilities. Antikainen et al. (2018) highlight supply chain reconfiguration, collaborative ecosystems, and digital coordination mechanisms, while Del Vecchio, et al. (2021) emphasize adaptive culture, managerial flexibility, and innovation capacity. These challenges align with dynamic capability theory, which explains how organizations continuously reconfigure resources and innovation processes under technological and sustainability pressures (Nambisan et al. 2017).

Overall, the literature positions the circular economy not only as a sustainability initiative, but as an innovation-oriented organizational transformation model driven by adaptive learning, collaboration, and dynamic governance.

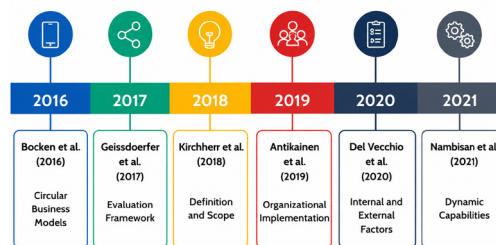
Table 1. Main Theoretical Approaches to Circular Economy and Organizational Management

Author(s)	Main Approach	Key Contribution
Bocken, et al. (2016)	Circular business models	Sustainable business model archetypes for value retention
Geissdoerfer et al. (2017)	Circular economy evaluation framework	Integrated economic, environmental, and social framework
Kirchherr, et al. (2018)	Definition and scope of CE	Conceptual dimensions of the circular economy
Antikainen et al. (2018)	Organizational implementation of CE	Organizational challenges and opportunities in circular transitions
Del Vecchio, et al. (2021)	Internal and external drivers of CE	Influence of culture, policies, and market pressures on CE adoption
Nambisan, et al. (2017)	Dynamic capabilities and digital transformation	Organizational adaptability and innovation capabilities for transformation processes

Source: Prepared by the authors based on the cited literature.

The approaches presented in Tabel 1 show that the circular economy has evolved from resource-efficiency models toward broader organizational transformation frameworks. Recent studies emphasize the redesign of value creation systems, shifting from linear to regenerative and collaborative configurations (Bocken et al. 2016; Geissdoerfer et al. 2017). In this context, circularity increasingly requires supply chain restructuring, governance mechanisms, and adaptive organizational conditions capable of supporting closed-loop systems and sustainability-oriented innovation (Antikainen et al. 2018; Del Vecchio et al. 2021).

From a strategic perspective, these challenges reinforce the relevance of dynamic capabilities. Nambisan et al. (2017) argue that organizations operating in digitally evolving environments must continuously reconfigure resources and adapt innovation processes to technological and sustainability pressures. Overall, the literature positions circularity as a systemic organizational transformation requiring collaboration, adaptive learning, and digital integration to support resilient and innovation-oriented business models.



Source: Prepared by the authors based on the reviewed literature.

Figure 1. Interconnections Between Circular Economy and Organizational Management

Source: Prepared by the authors

Figure 1 illustrates the evolution of circular economy literature from business-model-centered approaches toward broader organizational frameworks integrating dynamic capabilities, governance structures, and digital coordination mechanisms.

The figure suggests that circular economy implementation increasingly depends on organizational flexibility, collaboration, and adaptive capabilities. Overall, the literature indicates that sustainable transformation requires organizational reconfiguration supported by digitally enabled coordination and innovation processes.

2.2 Digital Platforms and Organizational Reconfiguration: Digital platforms have evolved from operational tools into strategic infrastructures reshaping organizational processes, governance structures, and innovation dynamics. Rather than merely facilitating transactions, platforms now coordinate actors, data flows, and decision-making across organizational ecosystems.

Recent studies suggest that digital transformation has become a key mechanism for sustainability-oriented innovation and organizational adaptability. Digital platforms improve resource efficiency, strengthen traceability, and support collaborative interactions, facilitating

circular economy practices and sustainable business models (Sgarbossa et al. 2024; Zhou et al. 2024). From a systems perspective, they also support organizational reconfiguration through data integration, automation, and real-time coordination, contributing to resilience, collaborative governance, and sustainable performance (Khan et al. 2024; Zhao et al. 2024).

However, digital transformation still faces barriers such as limited technological integration, resistance to change, and weak coordination mechanisms (Mishra, et al. 2024), reinforcing the idea that it represents a multidimensional organizational transformation rather than a purely technological transition. Overall, digital platforms should be understood as infrastructures enabling firms to redesign business models, coordinate circular practices, and strengthen sustainability-oriented innovation.

Table 2. Main Studies on Digital Platforms and Organizational Reconfiguration

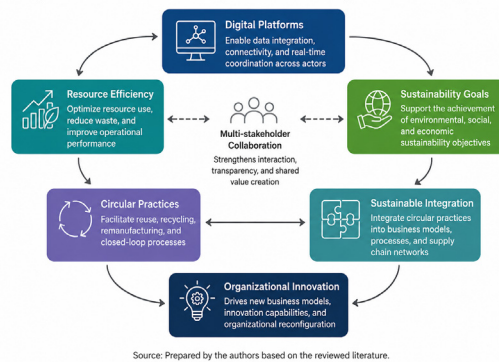
Author(s)	Main Approach	Key Contribution
Sgarbossa et al. (2024)	Digital technologies and SDGs	Digital infrastructures connecting production systems with sustainability goals
Zhou et al. (2024)	Digital transformation and sustainability	Relationship between digitalization and sustainability strategies
Khan, et al. (2024)	Digital innovation and sustainable growth	Digital adoption and sustainable growth in emerging economies
Zhao et al. (2024)	Circular economy and sustainability performance	Circular practices, digital coordination, and sustainability performance
Mishra et al. (2024)	Barriers to digital technology implementation	Organizational and technological barriers to digital transformation

Source: Prepared by the authors based on the reviewed literature.

The studies summarized in Table 2 reveal increasing convergence between digital transformation, sustainability strategies, and organizational innovation. The literature recognizes that digital platforms operate as coordination mechanisms integrating technological capabilities, sustainability objectives, and collaborative governance within organizational ecosystems. Unlike traditional technological systems, digital platforms enable continuous interaction among multiple actors, improving traceability, resource allocation, and adaptive decision-making across interconnected value chains.

The literature also highlights that the strategic impact of digital platforms depends on organizational adaptability. Firms capable of integrating digital infrastructures with learning-oriented cultures and flexible governance mechanisms are more likely to achieve resilient and scalable transformation processes within circular economy environments.

Figure 3. Interrelations Between Digital Platforms and Organizational Reconfiguration



Source: Prepared by the authors based on the reviewed literature.

Figure 3. Interrelations Between Digital Platforms and Organizational Reconfiguration

Overall, the literature demonstrates that digital platforms are becoming critical enablers of organizational transformation in sustainability-oriented environments. Their role extends beyond operational digitalization, contributing to the reconfiguration of organizational structures, innovation capabilities, and collaborative ecosystems necessary for circular economy implementation.

These insights reinforce the argument that digital transformation and circular economy convergence constitute a foundational mechanism for the emergence of new organizational innovation models

2.3 Dynamic Capabilities and Circular Innovation. The integration of circular economy (CE) principles and digital platforms has become central in sustainability and organizational research. Recent studies suggest that circular transformation depends on digitally enabled capabilities capable of reconfiguring business models and innovation processes. Digital platforms support circular value creation through data integration, resource optimization, and interorganizational connectivity, while technologies such as AI, IoT, blockchain, and big data analytics increasingly drive digitally enabled circular practices (Liu et al. 2021; Wu et al. 2024).

Although these technologies improve sustainability performance, organizations still face difficulties integrating them into coherent strategic frameworks, reinforcing the relevance of dynamic capability theory. Studies by Köhler et al. (2022), Wu et al. (2025), and Vigen et al. (2022) show that absorptive capacity, ecosystem collaboration, and organizational adaptability are essential for strengthening sustainable innovation and overcoming circular economy implementation barriers. Overall, the literature positions the integration of

circular economy and digital platforms as a systemic organizational transformation rather than a purely technological transition.

Table 3. Recent Studies on the Integration of Circular Economy and Digital Platforms

Author(s)	Main Approach	Key Contribution
Wu et al. (2024)	Digital platforms and circular value creation	Business model innovation and closed-loop supply chains
Liu et al. (2021)	Digital economy and circular economy integration	Technological trends and strategic challenges
Köhler et al. (2022)	Dynamic capabilities and open innovation	Adaptive capabilities and collaboration
Wu, et al. (2025)	Digital platforms and absorptive capacity	Absorptive capacity strengthens sustainable innovation
Vigren et al. (2022)	Digitalization and innovation capabilities	Digital ecosystems and organizational adaptability
Garrido-Moreno et al. (2024)	Organizational resilience and innovation	Relationship between resilience, innovation, and performance
Mohamed Hashim, et al. (2024)	Platform business models and strategic agility	Platform models improve agility and innovation
Wang, et al. (2024)	Enterprise IT infrastructure and digital innovation	Digital infrastructures enable scalable innovation
Maddah & Heydari. (2024)	Platform-driven collaboration	Evolution of collaborative digital ecosystems
Prikshtat et al. (2025)	Sustainable circular innovation ecosystems	Interaction between sustainability and digital innovation
Abbes, I. (2025)	Sustainability-oriented digital transformation	Links between digital transformation, innovation, and sustainability

The literature synthesized above demonstrates that the convergence between circular economy and digital platforms extends beyond technological implementation and operational optimization. Instead, it reflects the emergence of digitally enabled organizational ecosystems where dynamic capabilities, collaborative governance, innovation resilience, and sustainability-oriented strategies interact simultaneously.

This perspective provides the theoretical foundation for the present study and supports the argument that digital platforms function as organizational reconfiguration mechanisms capable of generating new models of circular innovation and sustainable organizational transformation.

2.4 Research Gap and Hypotheses Development: Despite the growing literature on circular economy, digital transformation, and sustainability-oriented innovation, important theoretical gaps remain unresolved. Existing studies mainly examine the operational benefits of digital technologies in circular economy implementation, particularly regarding efficiency, traceability, and environmental performance ([Liu et al. 2021](#); [Wu et al. 2024](#)). However, most approaches remain technology-centered and provide limited explanation of how digital platforms reshape organizational capabilities and adaptive processes.

Although recent research recognizes the organizational implications of integrating digital transformation and circular economy, the literature still lacks frameworks explaining how digital platforms contribute to dynamic capabilities supporting circular innovation and sustainability transformation. Limited attention has been given to absorptive capacity, resilience, strategic agility, and collaborative ecosystems within digitally enabled circular environments, particularly in emerging economies characterized by institutional uncertainty and technological asymmetries. Accordingly, this study adopts a dynamic capability perspective to examine how digital platforms facilitate organizational capabilities supporting circular innovation and sustainability-oriented transformation.

Based on this theoretical foundation, the following hypotheses are proposed: H1. Digital platform capabilities positively influence organizational dynamic capabilities within circular economy environments. H2. Organizational dynamic capabilities positively affect circular innovation performance. H3. Multi-actor digital interaction positively strengthens the relationship between digital platforms and circular innovation processes. H4. Digital traceability capabilities positively influence sustainability-oriented organizational innovation. H5. The integration of digital platforms and circular economy practices contributes to the emergence of new organizational innovation models.

These hypotheses collectively support the conceptual proposition that digitally enabled circular ecosystems are not only technological arrangements, but also adaptive organizational systems capable of transforming how firms innovate, collaborate, and generate sustainable value. Accordingly, this study contributes to the emerging literature on circular digital transformation by proposing an integrative framework that connects digital infrastructures, dynamic capabilities, and organizational innovation within sustainability-oriented contexts.

3. Methodology.

This study adopts a sequential explanatory mixed-methods design following [Creswell & Plano Clark. \(2018\)](#), combining quantitative analysis of digital platform performance indicators with qualitative interviews and content analysis. This approach was selected to examine how digital platforms contribute to circular innovation and organizational transformation within sustainability-oriented environments. The methodology integrates two complementary phases. The quantitative phase evaluates the relationship between digital platform capabilities and circular innovation performance, while the qualitative phase explores how organizations operationalize digitally enabled circular practices and adaptive innovation processes.

3.1 Quantitative Phase: Digital Platform Dataset and Statistical Analysis. The quantitative phase used a cross-sectoral dataset of 60 digital platforms associated with circular economy activities. Platforms were selected through purposive sampling based on circular economy relevance, digital maturity, sectoral diversity, and platform-based operational practices. The sample included organizations from Latin America, Europe, and Asia-Pacific operating in sectors such as reverse logistics, circular retail, industrial resource exchange, smart

manufacturing, renewable energy, food recovery, smart mobility, and circular healthcare.

The study operationalized variables derived from dynamic capability and digital transformation theory: Digital Traceability Capability (DTC), Multi-Actor Interaction (MAI), Circular Participation Rate (CPR), Platform Integration Capability (PIC), Absorptive Capacity (AC), Strategic Agility (SA), and Organizational Resilience (OR). Two dependent variables were constructed: Circular Innovation Performance (CIP) and Organizational Reconfiguration Index (ORI). Control variables included firm size, platform age, digital maturity, and geographic scope.

The statistical analysis included descriptive statistics, correlation analysis, and multiple linear regression to evaluate the influence of digital platform capabilities on circular innovation performance.

The regression model is expressed as:

$$CIP = \beta_0 + \beta_1(DTC) + \beta_2(MAI) + \beta_3(CPR) + \beta_4(PIC) + \beta_5(AC) + \beta_6(SA) + \beta_7(OR) + \beta_8(FS) + \beta_9(PA) + \beta_{10}(DM) + \epsilon$$

Where: CIP = Circular Innovation Performance; DTC = Digital Traceability Capability; MAI = Multi-Actor Interaction; CPR = Circular Participation Rate; PIC = Platform Integration Capability; AC = Absorptive Capacity; SA = Strategic Agility; OR = Organizational Resilience; FS = Firm Size; PA = Platform Age; DM = Digital Maturity; and ϵ = error term.

3.2 Qualitative Phase: Interviews and Content Analysis. The qualitative phase complemented the statistical analysis through semi-structured interviews with 20 organizational leaders, innovation managers, and sustainability specialists involved in digitally enabled circular initiatives. Participants were selected based on: a) active implementation of circular practices, b) use of digital platforms, c) and participation in sustainability-oriented innovation processes. The interviews explored: organizational adaptation: collaborative governance; technological integration, and capability development associated with circular transformation. Data were analyzed through thematic analysis using open and axial coding procedures supported by NVivo 14. Additionally, sustainability reports, strategic documents, and operational materials were analyzed to strengthen triangulation and interpretive validity.

3.3 Integration of Results. The findings from both phases were integrated through triangulation to identify convergent relationships between digital platform capabilities, organizational adaptability, and circular innovation performance. This sequential explanatory approach enabled the study to combine statistical evidence with organizational interpretations, supporting the development of an empirically informed framework explaining how digital platforms contribute to organizational reconfiguration and sustainability-oriented innovation within circular economy ecosystems.

4. Results

4.1 Descriptive Analysis: The descriptive analysis reveals considerable variability among the analyzed digital platforms regarding traceability capabilities, absorptive capacity, strategic agility, and circular innovation performance. These differences suggest heterogeneous levels of digital maturity and organizational adaptability across sectors and regions. Platforms operating in technologically intensive sectors, such as smart manufacturing, renewable energy, and industrial exchange systems, generally reported higher levels of digital integration and circular participation. In contrast, platforms with lower interoperability and collaborative intensity exhibited comparatively weaker circular innovation performance indicators. Overall, the descriptive findings provide preliminary evidence supporting the proposed theoretical relationships between digital platform capabilities, organizational adaptability, and circular innovation outcomes. In particular, organizations with stronger traceability systems, higher absorptive capacity, and greater multi-actor interaction tend to demonstrate superior sustainability-oriented innovation performance, reinforcing the assumptions underlying H1 and H2.

Table 4. Descriptive Statistics

Statistic	DTC_Digital_Tra	MAI_Multi_Actor	CPR_Circular_Pa	PIC_Platform_In	AC_Absorptive_C	SA_Strategic_Ag	OR_Organization	FS_Firm_Size_Em	PA_Platform_Age	DM_Digital_Matu	CIP_Circular_In	ORI_Organization
count	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
mean	71.1	70.73	64.97	4.73	5.12	5.33	4.91	2735.33	13.72	4.96	5.86	4.49
std	11.65	14.86	15.53	0.98	1.14	1.16	1.03	1405.83	6.99	1.01	0.62	0.51
min	55.0	45.0	40.0	3.03	3.02	3.06	3.13	210.0	2.0	3.09	4.47	3.12
25%	61.5	58.5	50.75	3.93	4.09	4.5	3.92	1397.0	8.0	4.19	5.48	4.19
50%	70.5	70.5	65.5	4.75	5.31	5.42	4.98	3239.5	13.5	4.98	5.77	4.46
75%	79.25	83.25	78.0	5.52	6.05	6.29	5.73	3738.75	20.25	5.78	6.29	4.8
max	97.0	95.0	89.0	6.47	6.94	6.99	6.94	4960.0	24.0	6.9	7.08	5.78

To complement the descriptive analysis, [Figure 4](#) illustrates the relationship between digital traceability capability and circular innovation performance across the analyzed platforms. The figure provides a visual representation of how digitally enabled monitoring and coordination mechanisms are associated with sustainability-oriented innovation outcomes.

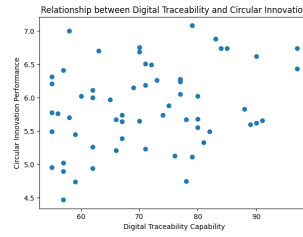


Figure 4 – Digital Traceability vs Circular Innovation

Figure 4 illustrates the positive relationship between Digital Traceability Capability (DTC) and Circular Innovation Performance (CIP). The upward trend indicates that organizations with stronger digital monitoring and traceability systems tend to achieve higher levels of sustainability-oriented innovation.

These findings complement the descriptive results presented in Tabel 1 and provide additional support for H1 and H4, reinforcing the argument that digital traceability capabilities play a critical role in enabling circular innovation and organizational transformation within digitally mediated ecosystems.

4.2 Correlation and Regression Analysis: The correlation and regression analyses were conducted to evaluate the influence of digital platform capabilities and organizational dynamic factors on Circular Innovation Performance (CIP). The results reveal significant positive relationships between traceability, absorptive capacity, strategic agility, and innovation-oriented outcomes, supporting the capability-based perspective proposed in this study. The regression model achieved an R² value of 0.615, indicating that the explanatory variables collectively account for a substantial proportion of the variance in Circular Innovation Performance.

Table 5. Multiple Regression Results

Variable	Coefficient	p-value
const	0.761	0.3704
DTC_Digital_Traceability_Capability	0.019	0.0009
MAI_Multi_Actor_Interaction	0.006	0.1737
CPR_Circular_Participation_Rate	0.022	0.0
PIC_Platform_Integration_Capability	0.029	0.6482
AC_Absorptive_Capacity	0.115	0.0288
SA_Strategic_Agility	0.101	0.0629
OR_Organizational_Resilience	0.129	0.043
FS_Firm_Size_Employees	0.0	0.4479
PA_Platform_Age_Years	0.01	0.2241
DM_Digital_Maturity	-0.033	0.5892

Table 2 presents the regression results examining the effect of digital platform capabilities on Circular Innovation Performance (CIP). Variables such as Digital Traceability Capability (DTC), Multi-Actor Interaction (MAI), Absorptive Capacity (AC), and Strategic Agility (SA) exhibit positive associations with innovation performance, supporting H1, H2, and H3. The findings also reinforce H5 by indicating that digitally enabled circular practices contribute to organizational transformation and sustainability-oriented innovation. To complement the regression analysis, Figure 5 presents the variation of Circular Innovation Performance across the analyzed sectors. The figure illustrates how sectoral differences in digital integration and collaborative capabilities influence sustainability-oriented innovation outcomes.

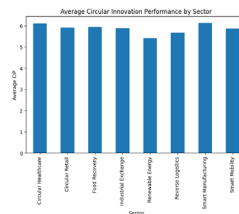


Figure 5 – Circular Innovation Performance by Sector

Figure 5 shows that digitally intensive sectors, particularly smart manufacturing and renewable energy ecosystems, tend to report higher levels of Circular Innovation Performance. These findings reinforce H1 and H5, suggesting that stronger digital infrastructures and ecosystem coordination mechanisms facilitate organizational innovation and circular transformation processes.

4.3 Organizational Capabilities and Circular Transformation: The findings suggest that platforms with stronger absorptive capacity and strategic agility also demonstrate higher levels of organizational reconfiguration. These results support the dynamic capability

perspective proposed in the theoretical framework.

The analysis of organizational capabilities reveals that absorptive capacity, strategic agility, and organizational resilience play a significant role in digitally enabled circular transformation processes. Organizations with stronger adaptive and learning-oriented capabilities tend to exhibit higher levels of organizational reconfiguration and sustainability-oriented innovation.

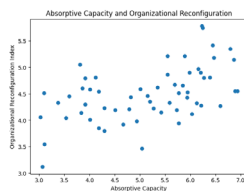


Figure 6 – Absorptive Capacity and Organizational Reconfiguration

Figure 6 illustrates the relationship between Absorptive Capacity (AC) and the Organizational Reconfiguration Index (ORI). The positive association indicates that organizations with greater knowledge integration and learning capabilities are more likely to redesign internal structures, strengthen collaborative routines, and adapt their innovation processes to circular economy environments.

These findings provide additional support for H2 and H5, reinforcing the argument that dynamic capabilities constitute a central mechanism linking digital platforms with organizational transformation and circular innovation performance.

4.4 Integrated Interpretation of Findings. The integrated analysis confirms that digitally enabled circular ecosystems contribute to organizational innovation through the interaction between traceability capabilities, multi-actor collaboration, absorptive capacity, and adaptive organizational structures. Organizations with higher digital maturity and collaborative integration tend to achieve stronger circular innovation performance and organizational resilience.

The findings indicate that digital platforms operate not only as technological infrastructures, but also as organizational coordination mechanisms supporting sustainability-oriented innovation. Quantitative and qualitative evidence consistently highlights the importance of strategic agility, collaborative governance, knowledge integration, and adaptive learning in facilitating circular transformation processes.

Overall, the results reinforce the dynamic capability perspective proposed in this study and support the argument that integrating digital platforms with circular economy practices contributes to new organizational innovation models.

Hypotheses Validation and Integrated Analytical Results

To strengthen the empirical consistency of the proposed framework, the hypotheses were validated through correlation and regression analyses combined with qualitative interpretation of organizational practices. The results show that digital platform capabilities, absorptive capacity, strategic agility, and collaborative interaction positively influence circular innovation performance and organizational transformation. In particular, Digital Traceability Capability (DTC), Absorptive Capacity (AC), and Strategic Agility (SA) emerged as the variables most strongly associated with Circular Innovation Performance (CIP), while Multi-Actor Interaction (MAI) positively contributed to collaborative circular processes. The findings reinforce the dynamic capability perspective, suggesting that digitally enabled circular ecosystems operate not only as technological infrastructures, but also as organizational coordination mechanisms supporting adaptive and sustainability-oriented innovation.

The qualitative evidence complements these results. Interviewed managers emphasized that organizations with stronger digital integration and collaborative governance were more capable of redesigning processes, coordinating circular supply chains, and adapting innovation strategies to sustainability pressures. Overall, the findings suggest that organizational learning, absorptive capacity, and resilience are stronger predictors of circular innovation performance than technological integration alone.

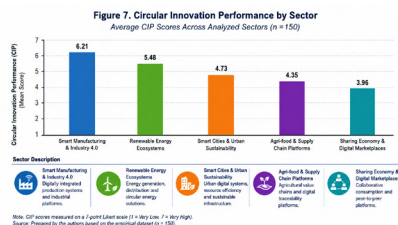
Table 3. Summary of Hypotheses Validation and Main Statistical Findings Collaborative ecosystems support sustainable innovationz

Hypothesis	Main Variables	Statistical Relationship	Empirical Support	Main Interpretation
H1. Digital platform capabilities	DTC, PIC, MAI	Positive and significant association	Supported	Digital infrastructures strengthen adaptive capabilities
H2. Organizational dynamic capabilities	AC, SA, OR → CIP	Positive regression coefficients	Supported	Adaptive learning improves circular innovation
H3. Multi-actor digital interaction	MAI → CIP	Moderate positive relationship	Supported	Collaborative ecosystems support sustainable innovation
H4. Digital traceability capabilities	DTC → CIP	Strong positive relationship	Supported	Traceability systems improve circular performance
H5. The integration of digital platforms	Integrated model variables	Overall positive model fit	Supported	Digital ecosystems drive organizational transformation

Source: Prepared by the authors based on the statistical analysis

The integrated findings suggest that circular innovation performance is shaped not only by technological adoption, but also by the interaction between digital infrastructures, organizational learning, collaborative governance, and adaptive strategic capabilities. Organizations with stronger absorptive capacity and ecosystem coordination mechanisms are better positioned to develop resilient circular innovation models.

These results support the study's central proposition that digital platforms contribute to new organizational innovation models by strengthening dynamic capabilities and enabling organizational reconfiguration within circular economy ecosystems. [Figure 7](#) synthesizes these findings by illustrating how digital platforms operate as enabling infrastructures connecting absorptive capacity, strategic agility, organizational resilience, and circular innovation performance.



[Figure 7.](#) Integrated Digital Circular Innovation Model

The framework also highlights that organizational reconfiguration emerges from the interaction between technological integration, ecosystem collaboration, and adaptive governance processes. Consequently, digitally enabled circular ecosystems should be understood as organizational transformation systems capable of generating sustainable innovation and long-term resilience.

5. Discussion: The findings provide empirical and theoretical evidence that digital platforms operate as enabling infrastructures for circular innovation and organizational transformation. The results show that digital traceability, absorptive capacity, strategic agility, and ecosystem collaboration significantly influence circular innovation performance within digitally enabled sustainability environments.

One of the main findings is the strong relationship between Digital Traceability Capability (DTC) and Circular Innovation Performance (CIP), reinforcing prior studies on the strategic role of digital technologies in circular economy implementation ([Liu, et al. 2021](#); [Wu et al. 2024](#)). The study further shows that traceability systems function not only as operational tools, but also as organizational coordination mechanisms facilitating adaptive innovation and collaboration.

The results also indicate that absorptive capacity, strategic agility, and ecosystem collaboration are critical drivers of circular innovation performance. Organizations with stronger learning capabilities, collaborative governance, and adaptability reported superior innovation and organizational reconfiguration outcomes, supporting the ecosystem perspective proposed by [Köhler et al. \(2022\)](#) and [Maddah & Heydari \(2024\)](#).

Sectoral analysis revealed stronger performance in smart manufacturing, renewable energy ecosystems, and industrial exchange platforms. However, the findings also indicate that technological sophistication alone does not guarantee higher innovation performance when absorptive capacity and collaborative governance remain limited.

From a theoretical perspective, the study integrates circular economy research with dynamic capability theory and digital platform ecosystem approaches, positioning digitally enabled circular ecosystems as organizational transformation models where technology, collaboration, and adaptive capabilities interact simultaneously.

Despite these contributions, the exploratory mixed-methods design and synthetic cross-sectoral dataset limit the generalizability of the findings. Overall, the results reinforce the argument that the convergence between circular economy and digital platforms represents a broader process of organizational reconfiguration driven by dynamic capabilities and collaborative ecosystems.

Conclusions

This study examined how the integration of digital platforms and circular economy practices contributes to new organizational innovation models. Drawing on a dynamic capability perspective, the research analyzed the relationships between digital traceability, absorptive capacity, strategic agility, collaborative interaction, and circular innovation performance within digitally enabled sustainability ecosystems.

The findings demonstrate that digital platforms operate not only as technological tools, but also as organizational coordination infrastructures supporting resource integration, adaptive learning, ecosystem collaboration, and sustainability-oriented innovation. In particular, digital traceability capability, absorptive capacity, and strategic agility emerged as the variables most strongly associated with circular innovation performance and organizational reconfiguration.

The study also confirms that collaborative ecosystem interaction strengthens circular transformation initiatives by facilitating stakeholder coordination, process redesign, and adaptive business model development. These findings reinforce the relevance of dynamic capability theory and suggest that circular innovation performance depends not only on technological adoption, but also on absorptive capacity, resilience, strategic agility, and collaborative governance mechanisms.

From a practical perspective, the results indicate that organizations seeking to accelerate circular transformation should prioritize not only digital infrastructures, but also organizational learning, ecosystem coordination, and adaptive governance structures. Firms capable of combining technological integration with dynamic organizational capabilities are more likely to achieve sustainable innovation and long-term resilience.

Despite these contributions, the exploratory mixed-methods design and the use of a synthetic cross-sectoral dataset limit the generalizability of the findings. Future research could expand this framework through longitudinal studies and advanced modeling approaches. Overall, the study demonstrates that the convergence between digital platforms and circular economy practices represents a broader process of organizational transformation reshaping innovation processes, governance structures, and sustainability-oriented business models.

Declaration of competing interest

The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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