# Digital transformation strategy and green supply chain management as drivers of sustainable corporate performance

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**Abstract:**

Organizations are increasingly challenged to achieve sustainable performance in environments characterized by growing environmental pressures, technological change, and heightened stakeholder expectations, so that understanding how digital and environmental strategies interact to support long-term value creation has become a critical issue, particularly in traditional and resource-dependent industries. The main objective of this study is to explore the relationship between digital transformation strategy, green supply chain management, supply chain performance, and sustainable corporate performance. Drawing on primary data collected from 203 firms operating in the Spanish wine industry, the study employs the PLS-SEM technique to test the proposed relationships. The results show that digital transformation strategy and green supply chain management are positively and significantly related to sustainable corporate performance, and that supply chain performance partially mediates these relationships. Theoretically, this investigation offers an integrated, capability-based explanation of how digital and environmental orientations can be implemented through supply chain functioning and their potential influence on sustainability outcomes. From a practical perspective, it provides insights for managers and policymakers into the importance of aligning digitalization and sustainability initiatives within supply chains and fostering collaboration between governmental and economic agents.

**Keywords:**

Digital transformation strategy, green supply chain management, supply chain performance, sustainable corporate performance, PLS-SEM.

## 1. Introduction

The current business environment is facing profound changes driven by environmental pressures, technological advancements, and societal expectations that are continually evolving, which forces organizations across sectors to operate under conditions of heightened scrutiny regarding their economic, social, and environmental performance [1,2]. In this context, stakeholders expect firms to adopt strategies that ensure long-term competitiveness while reducing negative externalities and contributing to broader sustainability objectives, so that the capacity to integrate digital technologies with environmentally responsible practices has become an essential element of strategic decision-making, especially in industries where production processes are resource-intensive, supply chains are complex, and market differentiation depends on the ability to deliver quality and responsible behavior [3,4,5]. The wine industry is facing many of these challenges, since wine production is directly connected to natural resources and climatic variability, which increases the relevance of sustainability for firms operating within this sector while, at the same time, competitive pressures have intensified due to the globalization of wine markets, increasing consumer expectations, and the growing importance of authentic and traceable products [6,7,8].

These developments have encouraged firms to explore new strategic approaches, including the potential of digital transformation to improve their internal processes, strengthen decision-making capabilities, and support the transition towards more sustainable business models, inasmuch as digital tools allow firms to collect and interpret information more effectively, optimize resource use, and redesign operations to enhance responsiveness and performance across different dimensions [9,10,11]. Digital transformation strategy refers to the strategic orientation of organizations toward the integration of digital technologies into their core activities, processes, and decision-making systems in order to improve efficiency, flexibility, knowledge utilization, and value creation through deliberate managerial decisions that guide how digital tools reshape internal operations, relationships with stakeholders, and long-term competitiveness [12,13]. Wine production involves multiple stages, from vineyard management to processing, logistics, and distribution, all of which generate environmental impacts, which is forcing firms to progressively adopt green supply chain management practices as a means to improve environmental responsibility while maintaining or improving competitive performance [14,15].

Green supply chain management is defined as the incorporation of environmental considerations into all stages of the supply chain, including sourcing, production, logistics, distribution, and waste management, and involves practices designed to reduce environmental impacts, improve resource efficiency, and encourage collaboration with suppliers and partners to achieve ecological objectives,

which encourage firms to establish closer collaboration with suppliers, promote eco-friendly production methods, and create systems that reduce emissions, waste, and inefficiencies throughout the supply chain [16,17,18]. The intersection between digital transformation and green supply chain management offers opportunities for firms to strengthen their sustainability outcomes, since digital technologies can support green supply chain initiatives by enabling real-time monitoring, improving data accuracy, and facilitating the coordination of environmentally responsible actions across the different stages of the supply chain, while green supply chain practices can reinforce the value of digital transformation by fostering a culture of continuous improvement, transparency, and efficiency, which can drive corporate performance in the long term [19,20,21].

The concept of sustainable corporate performance refers to the extent to which a firm achieves balanced progress across its economic, environmental, and social dimensions, and captures the capacity of the organization to remain competitive while minimizing negative ecological impacts, contributing to social well-being, and ensuring responsible long-term value creation [22,23]. Within this broader context, supply chain performance has emerged as a key mechanism that can strengthen the connection between strategic choices and sustainability outcomes, to the extent that if the supply chain functions effectively, firms can respond more quickly to market demands, optimize the use of resources, reduce operational disruptions, and facilitate the deployment of green initiatives and digital tools, driving tangible improvements in environmental and corporate results [24,25]. Supply chain performance is understood as the ability of the supply chain to coordinate operations, reduce waste, optimize resource use, maintain product quality, and ensure timely delivery in an effective and reliable manner, thereby supporting the firm's strategic and operational aims [26,27].

Existing research has examined the importance of environmental practices, technological innovation, and supply chain management for improving firm performance, yet several limitations remain unresolved, since previous studies have tended to analyze digital transformation and green supply chain management in isolation, without considering how their interaction may shape sustainable corporate performance. Moreover, most empirical evidence has focused on manufacturing or high-technology sectors, offering limited insight into traditional, resource-dependent industries such as wine production, where environmental and operational pressures coexist with strong cultural and market-specific dynamics, and research also often overlooked the mechanisms that explain why some firms translate these strategic initiatives into stronger sustainability results while others do not, particularly the contribution of supply chain performance as an intermediate organizational capability. These gaps highlight the need for integrated, context-sensitive analyses that explore how digital and environmental strategies can influence sustainable corporate performance through supply chain functioning.

The main objective of this research is to examine the relationship between digital transformation strategy, green supply chain management, supply chain performance, and sustainable corporate performance. The novelty of this research lies in its particular approach, since it analyzes these strategic dimensions within a traditional agri-food industry, offering evidence on how digitally driven and environmentally oriented practices can shape organizational outcomes, drawing on primary data collected from a sample of 203 Spanish wine firms that was analyzed using the PLS-SEM technique. Theoretically, the study contributes to a more integrated understanding of how digital transformation strategy and green supply chain management relate to sustainable corporate performance, and it highlights the mediating role of supply chain performance as a key organizational mechanism that explains these relationships, thus advancing current debates by showing that sustainability outcomes in traditional industries depend on the alignment between digital, environmental, and operational capabilities.

From a managerial perspective, the results underscore the strategic value of investing in digital technologies and environmentally oriented practices in a coordinated manner, indicating that firms can strengthen their competitiveness and long-term resilience by improving supply chain functioning, and suggest that managers should prioritize digital tools that enhance visibility, traceability, and resource optimization, while simultaneously fostering green practices across the supply chain. From a policy perspective, the study provides insights that can inform the design of support programs aimed at promoting digitalization and sustainability in agri-food industries, highlighting the benefits of initiatives that encourage technological adoption, environmental certification, supplier collaboration, and capacity building, particularly among small and medium-sized enterprises. After this section, the literature review develops the theoretical foundations that support the proposal of the hypotheses tested, the methodology describes the research design, sample, and analytical procedures, the results present the empirical findings, the discussion interprets the implications for theory and practice, and the conclusions summarize the contributions, limitations, and future research directions.

## 2. Theoretical background

### *2.1 Digital transformation strategy and sustainable corporate performance*

Digital transformation strategy has become an essential component of contemporary strategic management, especially because it strengthens the organization's capacity to sense changing conditions, reconfigure resources, and adapt to emerging expectations by enabling the systematic use of data-driven insights, the redesign of operational routines, and the development of more flexible and responsive structures that support continuous improvement and long-term competitiveness [12,13,28]. From the perspective of dynamic capabilities theory, this strategic orientation can be

understood as a deliberate effort to enhance the ability to acquire, process, and utilize information in ways that support more effective decision-making, improve operational precision, and foster long-term adaptability, enabling firms to overcome structural rigidities, enhance coordination, and generate solutions that contribute simultaneously to economic, environmental, and social outcomes [29,30,31]. In connection with the above, stakeholder theory suggests that firms create sustainable value when they respond to the expectations of customers, regulators, communities, and supply chain partners, and digital transformation strategy reinforces this alignment by enhancing traceability, improving the monitoring of environmental and social impacts, and supporting more informed and transparent decision-making processes, so that as firms adopt digital practices, organizational processes evolve in ways that directly affect how supply chains operate [32,33,34].

Digital transformation strategy can influence decision-making processes and enable the early reconfiguration of operational processes [13,35]. Within supply chain settings, such strategic commitment supports the progressive adoption of digital technologies, strengthens coordination mechanisms, and enhances integration and agility, which are associated with observable improvements in supply chain and sustainability performance even in the absence of full digital maturity [36,37,38]. Furthermore, it can drive the development of organizational capabilities and short-term operational adjustments in digitally intensive and sustainability-sensitive supply chains, while also facilitating the rapid deployment of smart technologies and eco-innovative practices, thereby producing measurable performance outcomes within the same temporal window as strategic formulation [39,40]. Improvements in information flow, visibility, and responsiveness expand the organization's capacity to coordinate activities across its network of suppliers and customers, fostering smoother interactions and reducing the uncertainty that often arises in interdependent operational environments [41,42,43].

As digital practices enhance the precision and timeliness of shared information, firms are better equipped to align production and logistics decisions, anticipate variability, and allocate resources in a more deliberate and efficient manner, which tend to stabilize operational processes and support a more coherent functioning of the supply chain, gradually acquiring a more strategic role within the broader organizational system [44,45,46]. In such contexts, the supply chain becomes a space where strategic decisions, technological capabilities, and collaborative routines converge, and the extent to which interdependent actors are able to coordinate their actions and align their objectives can relate to the organization's capacity to generate value across its economic, social, and environmental dimensions [47,48,49]. The way these interdependencies are managed can shape the ability of firms to convert digital initiatives into improvements that are balanced across these dimensions, allowing technological efforts to support more resilient operations, more responsible resource use, and more

meaningful engagement with stakeholders and, consequently, the quality of supply chain functioning can determine the extent to which digital transformation contributes to long-term, multidimensional organizational outcomes [40,50,51].

Despite the relevance of these conceptual connections, prior empirical research has often analyzed these variables in separate domains, without examining how these elements interact within a unified framework, which limits understanding of the processes through which digital transformation translates into improvements in sustainable corporate performance. Existing studies have frequently focused on the availability of digital resources rather than on the organizational processes through which these resources are mobilized to influence broader corporate outcomes and have tended to evaluate the environmental performance of companies using specific indicators, overlooking the full scope of the variable sustainable corporate performance. In this sense, literature remains fragmented and does not adequately capture the extent to which strategic digital efforts extend beyond operational efficiency to contribute to more balanced and long-term organizational results, which underscores the need for empirical analysis that clarifies whether digital transformation strategy enhances sustainable corporate performance and whether this potential influence is channeled through improvements in supply chain performance, which may operate as an organizational asset to link digital initiatives with broader value creation. Based on the above, the following hypotheses are proposed:

*Hypothesis 1 (+): Digital transformation strategy is positively and significantly related to sustainable corporate performance.*

*Hypothesis 2 (+): Supply chain performance mediates the relationship between digital transformation strategy and sustainable corporate performance.*

### *2.2 Green supply chain management and sustainable corporate performance*

Environmental considerations have progressively become embedded in strategic decision-making, encouraging firms to redesign their operations to align resource use, productive activities, and collaborative arrangements with broader expectations of responsibility and long-term value creation [52,53,54]. Green supply chain management embodies this orientation by integrating environmental principles into sourcing, production, logistics, distribution, and end-of-life processes, fostering organizational routines that prioritize cleaner production methods, efficient material flows, and more conscious interactions with supply chain partners, which creates conditions that promote continuous learning, cross-functional integration, and innovation within and beyond the boundaries of the firm, facilitating more deliberate decisions regarding the use of materials, the design of processes, and the management of external relationships [18,20,55]. As organizations adopt environmentally oriented practices, their supply chains evolve into more structured networks where environmental objectives

intersect with operational execution, since the incorporation of green criteria into supplier selection, process design, and logistics can enhance transparency, reduce variability in resource consumption, and promote more stable flows of materials and information, which often lead to improvements in resource utilization, waste minimization, and compliance with environmental requirements, creating operational benefits that extend beyond ecological considerations [56,57,58].

In this sense, supply chains become platforms where firms consolidate environmental values, reinforce collaborative expectations, and establish routines that support both efficiency and responsibility, to the extent that when suppliers and customers engage in shared environmental commitments, coordination becomes more fluid, mutual expectations become clearer, and the scope for joint improvements expands, contributing to a more coherent approach to value creation across economic, social, and environmental dimensions [59,60,61]. The implications of green supply chain management therefore extend to sustainable corporate performance, a multidimensional outcome that reflects the capacity to reduce environmental impact, improve economic robustness and generate social value, contributing to a more balanced and long-term orientation and aligning operational and strategic decisions with the broader value creation goals embedded in sustainable corporate performance [8,62,63,64]. However, the extent to which these practices influence organizational outcomes depends in part on how effectively they are translated into operational routines and inter-organizational dynamics across the supply chain, which often requires redesigning processes, strengthening information sharing, and developing new collaborative routines, all of which can reinforce the ability of the supply chain to function with greater reliability, responsiveness, and coherence, reducing disruptions and promoting the stable flow of materials and information [6,65,66,67].

When environmentally oriented practices are embedded in well-functioning supply chains, their contribution to organizational outcomes can be amplified, as the supply chain becomes the conduit through which environmental priorities shape decisions and behaviors across actors, so that it can influence the degree to which green practices evolve from isolated initiatives into organizational capabilities that underpin broader value creation [56,68,69]. However, existing empirical research has frequently examined environmental practices and organizational outcomes in isolation or through specific indicators, without incorporating a broader view that reflects the capacity of firms to create value in a responsible manner over time, which limits the understanding of the processes through which environmental practices can relate to business performance. An empirical examination is therefore necessary to clarify whether green supply chain management contributes to sustainable corporate performance and whether this potential influence is channeled through the quality of supply

chain functioning, which may serve as an organizational asset that links environmental initiatives with broader organizational results. Based on the above, the following hypotheses are proposed:

*Hypothesis 3 (+): Green supply chain management is positively and significantly related to sustainable corporate performance.*

*Hypothesis 4 (+): Supply chain performance mediates the relationship between green supply chain management and sustainable corporate performance.*

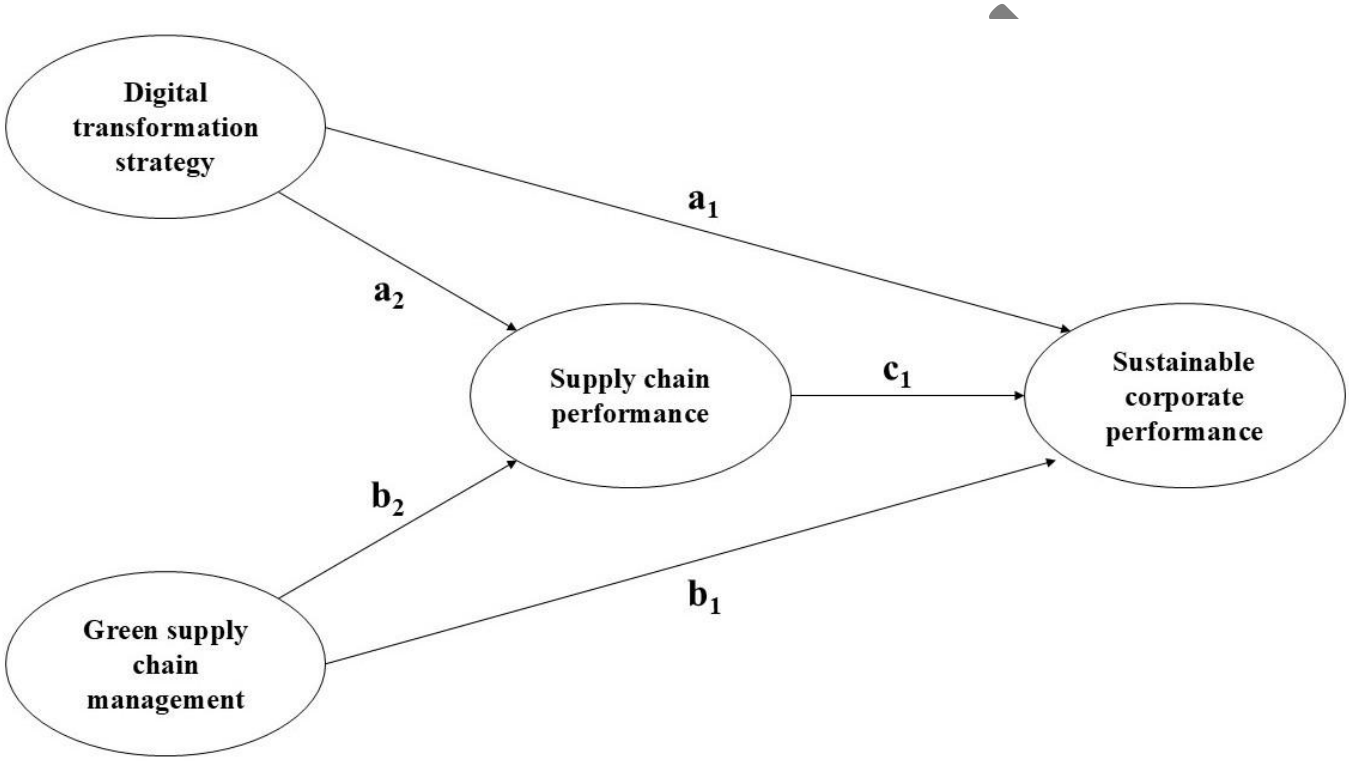


**Figure 1.** Nomogram of the proposed model

H1 = a1: Digital transformation strategy→ Sustainable corporate performance; H2 = a2 x c1: Digital transformation strategy → Supply chain performance → Sustainable corporate performance; H3 = b1: Green supply chain management → Sustainable corporate performance; H4 = b2 x c1: Green supply chain management → Supply chain performance → Sustainable corporate performance.



### *3. Methodology*

This empirical study examines Spanish companies in the wine sector, a vital component of Spain's economy. As of 2024, 3995 firms were active in this industry, which contributed over 20 billion euros to the Spanish GDP, employing approximately 364,000 workers. Spain holds the leading position globally in vineyard area, covering over 913,695 hectares, as well as of ecological vineyards, with 166,285 hectares. It ranks as the third-largest wine producer by volume, with 32.4 million hectoliters, and is the third exporter by value, reaching 3 billion euros and 189 countries. A structured

questionnaire was sent to the chief executive officers of firms in the Spanish wine sector, and the period of data gathering lasted around five and a half months, from September 3, 2024, to February 21, 2025, using the *Qualtrics* and Microsoft Outlook platforms. A total of 203 valid responses were obtained, reflecting a response rate of 5.08%. To determine whether the sample size was adequate, the minimum $R^2$ method was applied [70]. The sample is representative of the broader population, as the regional distribution of responding firms is proportional to that of the population at the provincial level.

Variables in this study were assessed using a seven-point Likert scale. The independent variables digital transformation strategy and green supply chain management were evaluated through three and four items adapted from the research paper of Tsou and Chen [35] and Le *et al.* [71], respectively. The mediating variable supply chain performance was measured using four items based on the validated scale of Ye *et al.* [72], and the dependent variable sustainable corporate performance was quantified using five items based on Le *et al.* [71]. The validated scales of the variables are displayed in Annex 1. Regarding the variable green supply chain management, it is worth explaining the inclusion of ISO 9001:2018 alongside ISO 14001, which is justified because quality management systems support the formalization, standardization, and continuous improvement of organizational processes across the supply chain, thereby facilitating the implementation, coordination, and monitoring of environmentally oriented practices. Accordingly, ISO 9001 complements environmental standards by strengthening process integration, traceability, and collaboration with supply chain partners, which are consistent with the operationalization of green supply chain management. The partial least squares structural equation modeling (PLS-SEM) method was employed, using *SmartPLS* software to analyze the data, which is noted for its effectiveness in social sciences due to its ability to manage complex models with multiple constructs and indicators [73].

## 4. Results

The evaluation process begins with an assessment of the measurement models, a fundamental step to guarantee construct reliability and validity, which involves analyzing internal consistency to unveil the degree of interrelation among the items within a construct using composite reliability indicators such as rho_A, as well as verifying convergent validity to determine whether the indicators of a construct converge in representing the same underlying concept, commonly evaluated through the average variance extracted (AVE). As shown in Table 1, all constructs demonstrate rho_A values significantly exceeding the conventional benchmark of 0.7, thereby supporting their internal consistency, and AVE values for all constructs surpass the 0.5 threshold, which is generally accepted as the minimum for confirming adequate convergent validity, indicating that the majority of the

variance in the observed variables is explained by their respective latent constructs [74]. The external loads of all indicators, reflecting their strength of association with the respective constructs, are above 0.7, providing additional support for convergent validity and affirming that each item accurately reflects the construct it intends to measure [73]. Furthermore, to ensure the absence of multicollinearity issues among the constructs, variance inflation factor (VIF) values are examined, all of them falling below the critical value of 3, suggesting that multicollinearity is not a concern and that the constructs are sufficiently independent for inclusion in the structural model.

**Table 1**. Internal consistency and convergent validity

| | rho_A | | AVE | |
|---|---|---|---|---|
| **Digital transformation strategy** | 0.726 | | 0.640 | |
| **Green supply chain management** | 0.837 | | 0.667 | |
| **Supply chain performance** | 0.819 | | 0.647 | |
| **Sustainable corporate performance** | 0.899 | | 0.707 | |
| **EXTERNAL LOADS** | **DTS** | **GSCM** | **SCHP** | **SCOP** |
| **Digital transformation strategy 1** | 0.816 | | | |
| **Digital transformation strategy 2** | 0.810 | | | |
| **Digital transformation strategy 3** | 0.773 | | | |
| **Green supply chain management 1** | | 0.822 | | |
| **Green supply chain management 2** | | 0.815 | | |
| **Green supply chain management 3** | | 0.826 | | |
| **Green supply chain management 4** | | 0.803 | | |
| **Supply chain performance 1** | | | 0.809 | |
| **Supply chain performance 2** | | | 0.743 | |
| **Supply chain performance 3** | | | 0.842 | |
| **Supply chain performance 4** | | | 0.818 | |
| **Sustainable corporate performance 1** | | | | 0.847 |
| **Sustainable corporate performance 2** | | | | 0.838 |
| **Sustainable corporate performance 3** | | | | 0.875 |
| **Sustainable corporate performance 4** | | | | 0.814 |
| **Sustainable corporate performance 5** | | | | 0.830 |
| **VIF** | **DTS** | **GSCM** | **SCHP** | **SCOP** |
| **Digital transformation strategy** | | | 1.114 | 1.261 |
| **Green supply chain management** | | | 1.114 | 1.247 |
| **Supply chain performance** | | | | 1.370 |
| **Sustainable corporate performance** | | | | |

Source: Own elaboration. Note: DTS: Digital transformation strategy; GSCM: Green supply chain management; SCHP: Supply chain performance; SCOP: Sustainable corporate performance; AVE: Average variance extracted.

In addition, discriminant validity is assessed to establish the robustness of the research model, as it verifies that the constructs measure distinct concepts and that any associations observed are not the result of conceptual overlap, using the Fornell-Larcker method, which requires that the square root of the AVE for each construct is higher than its correlations with any other construct, and the HTMT

ratio, a more recent and increasingly favored approach, considered more robust in identifying issues with discriminant validity [75]. As shown in Table 2, the condition for the first one is met, since the diagonal elements, representing the square roots of the AVEs are greater than the off-diagonal correlations in their respective rows and columns, thereby confirming discriminant validity through this criterion, while all HTMT scores fall below the commonly accepted threshold of 0.85, suggesting that the constructs are empirically distinct [76].

**Table 2.** Evaluation of discriminant validity

| FORNELL-LARCKER | DTS | GSCM | SCHP | SCOP |
|---|---|---|---|---|
| **Digital transformation strategy** | 0.800 | | | |
| **Green supply chain** | 0.320 | 0.817 | | |
| **Supply chain performance** | 0.427 | 0.417 | 0.804 | |
| **Sustainable corporate** | 0.486 | 0.608 | 0.543 | 0.841 |
| **HTMT** | **DTS** | **GSCM** | **SCHP** | **SCOP** |
| **Digital transformation strategy** | | | | |
| **Green supply chain** | 0.409 | | | |
| **Supply chain performance** | 0.551 | 0.499 | | |
| **Sustainable corporate** | 0.598 | 0.700 | 0.630 | |

Source: Own elaboration. Note: DTS: Digital transformation strategy; GSCM: Green supply chain management; SCHP: Supply chain performance; SCOP: Sustainable corporate performance.

The assessment of the structural model represents a fundamental step in the analytical process, following the methodological framework proposed by Hair *et al.* [73]. This ensures a thorough and methodical evaluation of the hypothesized relationships within the research model, encompassing the analysis of direct, indirect, and total effects to validate the proposed hypotheses and deepen the understanding of the underlying theoretical constructs. To begin, a PLS *Algorithm* analysis is conducted to detect any potential multicollinearity among the exogenous variables and confirm that predictor variables maintain independence. Subsequently, the *bootstrapping* technique is applied in its full form, allowing for the calculation of confidence intervals at the 95% level, with coefficients ranging between 0 and 1, which reflect the magnitude and significance of the influence exerted by one construct upon another, thereby offering empirical support for the proposed interrelationships. As shown in Table 3, the results display both the magnitude and direction of the direct and indirect relationships among the constructs, the associated standard deviations serve to demonstrate the stability of the estimates, indicating that the identified relationships are not driven by anomalies within the sample, and the consistently low p-values across the structural paths suggest that the relationships are statistically meaningful, offering strong empirical support for the theoretical model. To further aid interpretation, Figure 2 visually displays these relationships, offering a clear representation of the structural model's results.

**Table 3.** Direct and indirect effects

| Effects | Coef. (β) | S.D. | P- | T | C.I. 95% |
|---|---|---|---|---|---|
| Direct effect of DTS on SCHP | 0.327** | 0.072 | 0.000 | 4.557 | [0.185- |
| Direct effect of DTS on SCOP | 0.237** | 0.063 | 0.000 | 3.739 | [0.112- |
| Direct effect of GSCM on SCHP | 0.312** | 0.059 | 0.000 | 5.284 | [0.197- |
| Direct effect of GSCM on SCOP | 0.422** | 0.060 | 0.000 | 7.062 | [0.302- |
| Direct effect of SCHP on SCOP | 0.266** | 0.064 | 0.000 | 4.135 | [0.140- |
| Indirect effect of DTS on SCOP through | 0.087** | 0.030 | 0.004 | 2.908 | [0.036- |
| Indirect effect of GSCM on SCOP through | 0.083** | 0.024 | 0.001 | 3.424 | [0.040- |
| Total effect of DTS on SCOP | 0.324** | 0.060 | 0.000 | 5.364 | [0.203- |
| Total effect of GSCM on SCOP | 0.505** | 0.055 | 0.000 | 9.191 | [0.394- |

Note: DTS: Digital transformation strategy; GSCM: Green supply chain management; SCHP: Supply chain performance; SCOP: Sustainable corporate performance; S.D.: Standard deviation; β: Coefficient β; C.I.: Confidence interval; ** Statistically significant at 1%.

To assess the impact of the structural relationships, effect sizes ($f^2$) were examined. The results suggest that the exogenous constructs make meaningful contributions to explaining variance in the endogenous variables. Furthermore, the model's predictive relevance ($Q^2$) was evaluated using a *PLSpredict* procedure, and the findings reveal that the model possesses substantial out-of-sample predictive relevance, thereby supporting the robustness and predictive capability of the proposed framework. These values are shown in Table 4.

**Table 4.** Effect sizes and predictive power

| Variable | f2 |
|---|---|
| Direct effect of DTS on SCHP | 0.132 |
| Direct effect of DTS on SCOP | 0.092 |
| Direct effect of GSCM on SCHP | 0.120 |
| Direct effect of GSCM on SCOP | 0.295 |
| Direct effect of SCHP on SCOP | 0.106 |
| **Variable** | **Q2** |
| Supply chain performance | 0.247 |
| Sustainable corporate performance | 0.446 |

Note: DTS: Digital transformation strategy; GSCM: Green supply chain management; SCHP: Supply chain performance; SCOP: Sustainable corporate performance.

The predictive capability of the model is evaluated using $R^2$ values. The explanatory power of the model is significant, since it explains 27.0% and 51.6% of the variance in supply chain performance and sustainable corporate performance, respectively, which validates the proposed theoretical framework and highlights the essential interaction among the variables analyzed. Moreover, to further assess the strength of the mediation effects, the "variance accounted for" (VAF) ratio was calculated as the proportion of the indirect effect relative to the total effect. For the relationship between digital transformation strategy and sustainable corporate performance, the indirect effect through supply

chain performance is 0.087 and the total effect is 0.324, yielding a ratio of 26.9%, while for the relationship between green supply chain management and sustainable corporate performance, the indirect effect through supply chain performance is 0.083 and the total effect is 0.505, so that the ratio is 16.4%, which indicates statistically significant partial mediation in both cases.

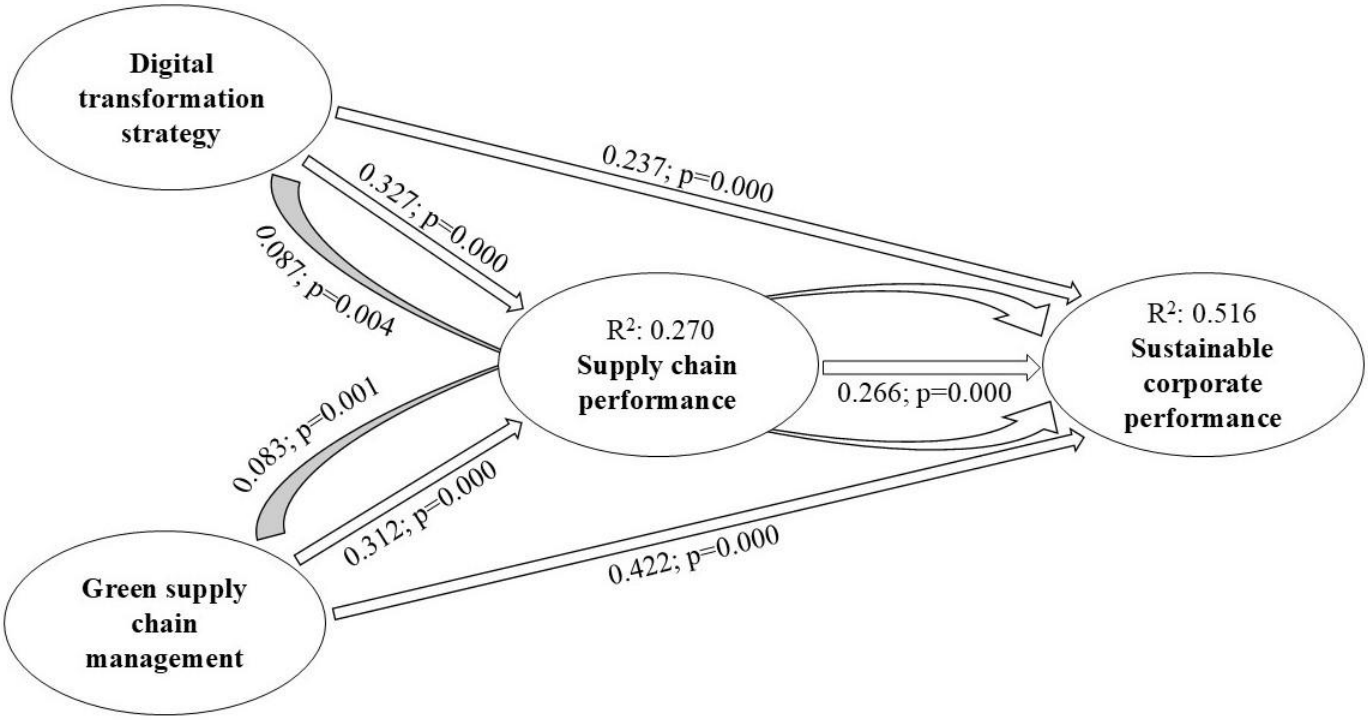


**Figure 2.** Structural model results

## 5. Discussion

The empirical evidence presented in this study sheds light on how sustainability-oriented outcomes emerge in traditional agri-food industries when digital and environmental strategies are coherently embedded in organizational and operational processes, by examining the relationship between digital transformation strategy, green supply chain management, supply chain performance, and sustainable corporate performance. In this sense, this research moves beyond a technology-centric or environmentally deterministic view of sustainability and provides empirical evidence about the main factors that may foster the capability-driven variable sustainable corporate performance, which can be shaped by the way firms integrate strategic orientations into the functioning of their supply chains. The positive relation between digital transformation strategy and sustainable corporate performance suggests that digitalization contributes to sustainability when it is framed as a strategic process, and not as the adoption of isolated technologies, improving coordination, information quality, and traceability across supply chain activities, and enabling firms to monitor resource use more effectively, respond to environmental requirements, and align operational decisions with long-term sustainability objectives. This interpretation is consistent with prior research emphasizing that digital

transformation strategies serve as organizational enablers that translate technological potential into performance gains through process reconfiguration and strategic alignment [13,35].

In this vein, the results indicate that the relationship between green supply chain management and sustainable corporate performance is positive and significant, so that environmental practices implemented across supply chain stages can directly influence both environmental performance and broader organizational results through green purchasing, supplier collaboration, environmentally responsible logistics, and waste reduction practices. These findings reinforce earlier empirical evidence showing that green supply chain management strengthens firms' environmental credibility while simultaneously supporting economic and social dimensions of performance, which is of great importance in the wine industry, where environmental and social actions are increasingly linked to brand value and market differentiation [16,20,66]. Beyond these direct relationships, this investigation highlights supply chain performance as a mechanism that connects strategic orientations with sustainable corporate outcomes, indicating that digital transformation strategy and green supply chain management generate sustainability benefits that are channeled through their impact on supply chain performance, and these improvements in visibility, reliability, flexibility, and coordination allow firms to convert strategic commitments into tangible outcomes, which underscores the idea that sustainability is not achieved through strategy alone, but through the operationalization of strategy in everyday supply chain activities [25,26,27]. In this regard, it is worth noting that although the hypothesized directional relationships are theoretically grounded in dynamic capabilities and stakeholder theory, the cross-sectional nature of the data limits the ability to draw definitive causal inferences, and the findings should therefore be interpreted as evidence of statistically significant associations rather than absolute causality.

The relevance of these findings becomes especially clear when situated within the current economic and institutional environment, since agri-food supply chains are facing unprecedented challenges related to environmental regulation, climate-related risks, and growing market volatility, and digital technologies are rapidly reshaping how firms interact with suppliers, distributors, and consumers [5,77]. The results of this study suggest that firms operating in traditional sectors can enhance their resilience and sustainability by aligning digital and green strategies around the shared objective of strengthening supply chain performance, which aligns with recent evidence showing that digitally enabled supply chains are better positioned to absorb shocks and maintain performance under conditions of uncertainty [78,79,80]. From a theoretical perspective, this research advances ongoing debates in sustainability, digital transformation, and supply chain management by offering an integrated explanation of how these domains interact in shaping sustainable corporate performance, conceptualizing sustainability not as the direct consequence of isolated strategic orientations, but as

an emergent outcome arising from their alignment and effective operationalization within supply chain processes [12,19,25]. The empirical evidence provided about the mediating role of supply chain performance extends capability-based and dynamic perspectives, highlighting that strategic resources such as digital transformation strategy and green supply chain management generate value when they are translated into effective coordination, visibility, and reliability across operational processes, contributing to the literature by showing their potential influence beyond predominantly linear and technology-driven explanations of sustainability outcomes [29,30,31].

In addition, by focusing on a traditional, low-technology industry, the study responds to calls for greater contextual sensitivity in sustainability research, showing that sustainability transitions in such sectors rely less on disruptive innovation and more on the reconfiguration of existing capabilities and routines, thus broadening the theoretical applicability of digital and sustainability frameworks beyond digitally intensive contexts [77,81,82]. From a managerial perspective, the findings underscore the importance of approaching digitalization and sustainability as mutually reinforcing strategic priorities that must be deliberately aligned with the functioning of the supply chain. Investments in digital technologies should therefore be guided by a clear strategic intent aimed at strengthening supply chain performance, rather than being driven solely by short-term efficiency gains or cost reduction objectives, so that managers are encouraged to prioritize digital solutions that enhance traceability, real-time data integration, and process transparency, as these tools facilitate more informed decision-making, improve coordination across supply chain actors, and support compliance with environmental and quality standards. In parallel, the relevance of green supply chain management highlights the need for managers to extend sustainability efforts beyond firm boundaries, which involves actively engaging suppliers and logistics partners in environmental initiatives, promoting shared sustainability standards, and fostering long-term collaborative relationships based on information sharing and joint problem-solving.

At a more operational level, managers are encouraged to translate digital and environmental strategies into concrete day-to-day practices within the supply chain, which may involve revising procurement and logistics routines to incorporate environmental criteria into supplier selection, using digital dashboards to monitor energy use, emissions, and waste across different stages of production, as well as standardizing data-sharing protocols with suppliers and distributors to improve transparency and traceability. Coordination mechanisms can be strengthened through regular cross-functional meetings that bring together operations, sustainability, and information systems teams to jointly assess supply chain performance and identify areas for improvement. In this sense, developing internal capabilities related to performance monitoring and continuous improvement is essential, so that managers are encouraged to implement key performance indicators that simultaneously track operational efficiency

and environmental impact, or establish internal review processes that use digital data to evaluate progress against sustainability targets. Cross-functional integration, supported by shared digital platforms and clear responsibility structures, enables firms to align strategic sustainability commitments with operational decisions, thereby ensuring that digital and green initiatives lead to consistent and measurable improvements in supply chain and sustainability performance.

At the policy level, the findings suggest that public initiatives aimed at promoting sustainability and digitalization in agri-food sectors should adopt a more integrated and practice-oriented approach, since policies that address digital transformation and environmental management as separate objectives risk overlooking the complementarities between these domains and may therefore produce limited or fragmented results. Policymakers are encouraged to design support programs that explicitly link digital adoption to sustainability goals, by incentivising the use of digital traceability systems, environmental monitoring platforms, and data-sharing tools that improve supply chain transparency and environmental reporting, among other general actions. More specifically, public authorities could support the development of shared digital infrastructures, such as sector-level platforms for traceability, certification, or logistics coordination, which are particularly valuable for small and medium-sized firms that lack the resources to invest in such systems individually, as well as foster collaborative networks among producers, suppliers, logistics providers, and technology firms, since this can facilitate the diffusion of best practices and reduce the costs associated with sustainability and digitalization initiatives. Capacity-building measures can also play a critical role, so that training programs focused on digital skills, environmental management practices, and supply chain coordination can help firms develop the organizational capabilities needed to operationalize sustainability strategies, while specific advisory services, pilot projects, and co-funded demonstration initiatives may further assist traditional agri-food industries in translating policy objectives into measurable and enduring sustainability outcomes.

## 6. Conclusions

This research examines how digital transformation strategy and green supply chain management jointly contribute to sustainable corporate performance, with particular attention to the mediating role of supply chain performance, within the context of the wine industry. Drawing on primary data from Spanish wine firms and using a PLS-SEM approach, the study provides novel empirical evidence that sustainability outcomes emerge not from isolated strategic orientations, but from their coherent alignment and effective operationalization within supply chain processes. From a theoretical approach, the study contributes to the sustainability and digital transformation literature by offering an integrated perspective that connects digital and environmental strategies through operational

capabilities. By empirically demonstrating the mediating role of supply chain performance, the research highlights the importance of understanding how strategic orientations are translated into practice, extending capability-based perspectives to traditional and low-technology industries, showing that sustainability transitions in these contexts rely less on disruptive innovation and more on the reconfiguration and coordination of existing processes and routines. The findings also yield relevant implications for managerial practice, suggesting that firms seeking to enhance sustainable performance should approach digitalization and environmental management as complementary strategic priorities linked to supply chain functioning, and emphasizing the importance of aligning digital investments and green practices with operational integration, coordination, and performance monitoring, thereby enabling firms to transform strategic commitments into consistent and measurable outcomes.

At the policy level, the study highlights the value of integrated public support frameworks that simultaneously address digitalization, sustainability, and supply chain capability development, suggesting that policies fostering collaboration, shared infrastructures, and capacity building may be especially effective in supporting sustainability transitions in agri-food sectors dominated by small and medium-sized enterprises. However, despite these contributions, the study is subject to certain limitations, such as the cross-sectional research design, which does not allow for the examination of dynamic effects over time, and the focus on a single national context may limit the generalizability of the findings. These aspects, however, represent opportunities for future research, since new longitudinal studies could explore how digital and green strategies co-evolve and how their impact on sustainability performance unfolds over time, and comparative research across countries or agri-food subsectors could further enrich understanding of contextual influences. Moreover, future studies may consider incorporating governance mechanisms, institutional pressures, or behavioral factors to deepen insights into how sustainability-oriented strategies are implemented within supply chains.

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Data availability: Data will be made available upon request.



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## Annex 1

| Latent variable | Items | Source |
|---|---|---|
| Digital transformation strategy | My company has strategically anticipated the implementation of digital innovations that are relevant to its operations. | Tsou & Chen (2023) |
| | My company has integrated into its strategic planning actions that enable it to effectively identify the value generated by digital transformation. | |
| | My company's management team is informed about valuable digital technology options before any strategic decision on digital transformation is made. | |
| Green supply chain management | The management of my company is governed by ISO 14001, ISO 9001:2018, and ISO 26000 standards. | Le *et al.* (2024) |
| | My company implements an eco-friendly distribution process and a sustainable marketing strategy. | |
| | My company has standard operating systems and procedures for stakeholders to collaborate and increase awareness of supply chain partners. | |
| | My company has expert resources, environmental management systems and preferences for performance measures to assist stakeholders in performing green supply chain management practices. | |
| Supply chain performance | In my company supply chain delivered zero defect product to the end customers. | Ye *et al.* (2022) |
| | In my company supply chain delivered the products on time to the end customers. | |
| | In my company supply chain can minimize channel safety inventory. | |
| | In my company supply chain can provide value-added services to the end customers. | |
| Sustainable corporate performance | My company has increased its efficiency in the use of materials and resources in recent years. | Le *et al.* (2024) |
| | My company has reduced the costs associated with waste management in recent years. | |
| | My company has increased its operational productivity in recent years. | |
| | My company has increased its returns on sales, investment, and equity in recent years. | |
| | My company has improved its relationship with customers and suppliers in recent years. | |