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The Role of Green Agriculture and Green Supply Chain Management in the Green Intellectual Capital–Sustainable Performance Relationship: A Structural Equation Modeling Analysis Applied to the Spanish Wine Industry

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Abstract: The objective of this research is to analyze the mediating role of Green Supply Chain Management (GSCM) in the main Green Intellectual Capital (GIC) and Sustainable Performance (SP) relationship, as well as the moderating role of Green Agriculture (GA) in the GSCM–SP relationship. To achieve this objective, a theoretical model is proposed based on the literature review and then analyzed using structural equation modeling (PLS-SEM) based on a sample of 196 Spanish wineries collected from September 2022 to January 2023. The results reveal that while GSCM partially mediates the GIC–SP relationship, GA positively but not significantly moderates the GSCM–SP relationship. To the best of our knowledge, there are no previous studies that have contextualized the model proposed in the wine industry, so the study represents the generation of new knowledge about the meaning of the relationships presented. Furthermore, no previous research has analyzed the moderating role of GA in the GSCM–SP relationship, so the study advances understanding of the variables that may affect this link (GSCM–SP).

Keywords: green agriculture; green supply chain management; sustainable performance; wine industry

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1. Introduction

Increased competitiveness, globalization and an increasingly turbulent environment make it difficult for companies to obtain sustainable competitive advantages over time [1]. In this context, organizations are focusing their interests on organizational capabilities and routines that allow them to differentiate themselves from their competitors and, as a consequence, obtain superior performance [2]. In addition to the factors described above, the wine industry has to face challenges specific to the sector that threaten its survival, such as global warming, energy scarcity and water scarcity [3]. Faced with this situation, wineries are beginning to align their economic interests with social and environmental ones, since their survival depends on caring for and respecting the environment and the society in which they operate [4].

In order to protect the environment while achieving economic performance, wineries can develop different capabilities to reduce and reuse the resources used in their production process, thus reducing their operating costs and increasing their differentiation in the market [5]. In fact, according to the Natural Resource-Based View (NRBV), resources and organizational capabilities aimed at protecting the environment represent the main source of competitive advantage, since they allow cost savings and differentiation to be achieved at the same time [6].

Organizational capabilities linked to environmental protection can be achieved through the generation of green knowledge of a human, structural and relational nature. This set of green intangibles was coined in the academic literature as Green Intellectual Capital (GIC), referring to the sum of knowledge and skills of the company oriented to environmental protection, and being divided into three blocks: Green Human Capital (GHC), Green Structural Capital (GSC) and Green Relational Capital (GRC) [7]. This set of green intangibles has different benefits for companies, which can be understood through the joint comprehension of the NRBV and the Intellectual Capital-Based View (ICBV). On the one hand, the ICBV holds that the intangible assets of companies have a high strategic character, given that they are difficult to imitate and reproduce due to their intangible nature, resulting in the improvement of their competitiveness [8]. On the other hand, the NRBV considers that the environmental actions developed by companies can become a source of competitive advantage, thus guaranteeing their survival in the market [9]. GIC allows them to combine both benefits, catalyzing the generation of new organizational capabilities, as well as performance in its triple dimension, i.e., Sustainable Performance (SP).

The exploitation of GIC by companies can lead to the improvement of Green Supply Chain Management (GSCM) by providing new knowledge to improve environmental management at different stages of the production process [10]. GSCM is defined as the set of activities focused on improving the environment at different stages of the production process [11]. GSCM can involve different actions at different stages of the production process, such as requiring green certificates from suppliers (provisioning), developing environmentally friendly products and processes (production) or developing green innovations for product packaging (distribution). For this reason, GSCM requires the linking of organizational capabilities with the development of green know-how [12].

GSCM, in turn, can improve the SP of companies as a result of the savings in operating costs and the improved positioning and reputation that such management implies [13]. In the wine context, GSCM involves the introduction of environmental actions in the stages of viticulture, winemaking and distribution of wine, allowing for improvements in the performance of wineries in its triple dimension through different ways such as cost reduction, increased competitiveness, improved differentiation and consumer positioning, among others. In this sense, the Green Agriculture (GA) actions carried out by wineries play a decisive role in enhancing the GSCM–SP relationship, since, on the one hand, it improves the environmental development of viticulture and, on the other hand, it enables the production of organic, natural and biodynamic wines in the market, with the consequent benefit that this entails [14].

There are previous studies that point to the existence of a positive relationship between GIC and SP, as well as the positive influence of GIC on GSCM [15–17]. However, to the best of our knowledge, there have been no previous studies that have addressed these relationships in the wine context. Moreover, no study has analyzed the moderating role that GA may play in the GSCM–SP relationship. To overcome these gaps in the academic literature, the study aims to analyze the effect of GIC on SP, as well as the mediating impact of GSCM and the moderating role of GA in this linkage. Therefore, the article is intended to answer the following three research questions (RQs): RQ1 does GIC have a positive effect on the SP of wineries? RQ2 does GSCM mediate the GIC–SP relationship in wineries? and RQ3 does GA moderate the GSCM–SP relationship in wineries? These questions are answered by testing the theoretical model proposed in this research using structural equation modeling.

To facilitate an adequate understanding of the study, it is structured as follows. First, after this brief introduction, Section 2 sets out the theoretical model to be tested, Section 3 presents the methodology followed to achieve the research objectives, Section 4 shows the main results, Section 5 discusses these results and, finally, Section 6 reflects on the main conclusions, limitations and future lines of research.

2. Literature Review and Hypothesis Formulation

2.1. Green Intellectual Capital and Sustainable Performance

Nowadays, companies strive to balance their economic objectives with the generation of social welfare and attention to the environmental needs of different stakeholders. In this context, organizations must be able to improve their economic performance while taking into account the negative externalities arising from their activity and improving the life of the society in which they operate [18].

GHC refers to the set of environmental intangibles derived from the knowledge of the people who make up the organization. This typology of green intangibles is highly strategic to achieve a sustainable competitive advantage over time, since it is based on the knowledge of people, with the consequent difficulty for competitors to imitate these resources [8]. GHC makes it possible to improve the environmental performance of the organization through the knowledge of employees linked to the environment [19]. Thus, the higher GHC, the more knowledge the organization possesses to mitigate the negative externalities generated by its activity [20]. However, not only does GHC improve environmental performance, since better management of the resources used during the production process can lead to savings in operating costs, thus improving the company's business performance; but this improvement in economic performance can also translate into increased business survival and, therefore, employee welfare, by maintaining and even creating new jobs [21].

Furthermore, interaction between companies and their partners can substantially increase the organization's ability to meet its environmental challenges, since they can improve their environmental knowledge through the generation of close links with customers and distributors [22]. Interaction with stakeholders can involve the sharing of resources and capabilities to ultimately improve the SP of companies [18]. Thus, GRC can improve environmental performance through the ecological knowledge achieved, as well as the economic and social performance derived, on the one hand, from the improvement in business competitiveness and, on the other hand, from the improvement of employees' working conditions and the further promotion of territorial development [23].

However, even if employees have a high level of environmental knowledge and companies develop close links with their stakeholders to improve their environmental management, they must crystallize this knowledge through organizational capabilities and routines [24]. In other words, companies need to foster their GSC in order to capitalize on the environmental knowledge possessed by their employees and that derived from stakeholder relations. Some examples of intangibles that belong to the CSM and that, therefore, can institutionalize green knowledge in the company are: the green organizational culture, the corporate brand linked to sustainability, the flat organizational structure or the databases to improve organizational processes [25]. These intangibles improve the economic performance of companies, given the reputation and differentiation that their position in the market implies, as well as their social and environmental performance, since they help reduce the materials used in the production process and, in addition, workers tend to improve their productivity and satisfaction when they see the company's involvement with the environment [26].

In the wine context, Marco-Lajara et al. [27] and Marco-Lajara et al. [28] recently demonstrated the positive relationship between GIC and the green performance of Spanish wineries. However, the effect has been measured only in one of the three dimensions that compose SP. Therefore, in order to overcome this research gap and based on the literature review, the following hypothesis is proposed:

H1. *GIC has a positive effect on the SP of wineries.*

2.2. Green Intellectual Capital, Green Supply Chain Management and Sustainable Performance

GIC can catalyze the achievement of GSCM, since the ecological knowledge derived from the workers (GHC), from the company (GSC) and from its relations with its stakeholders (GRC) can lead to the improvement of environmental management at all stages of the value chain [29]. Therefore, the set of green intangibles of the company allows the integration of environmental aspects in all phases of the production process, thus increasing the company's SP [30].

Improved GSCM can add value to the organization through the implementation of environmentally friendly processes, as well as through the integration of technology to mitigate the harmful effects of traditional supply chain management [31]. By assessing the environmental effects at the production process stages, organizations can derive numerous benefits, such as reducing operating costs or improving their organizational reputation [32].

There are several studies that point to the existence of a close relationship between GHC and GSCM, given that, although knowledge is difficult to retain given the inability of people to store ideas, the green knowledge possessed by employees can lead to the generation of sustainable competitive advantages over time, as a result of the development of innovations [33]. In this sense, as Roh et al. [34] and Maaz et al. [35] point out, the green knowledge stock of employees represents a key element for the success of GSCM, since, through this green knowledge stock, the organization can address environmental problems, improve the efficiency of its production processes and encourage the generation of green innovations that improve the supply chain. In fact, the higher the GHC, the greater the willingness to receive training focused on the environmental management of the organization, which ultimately improves the efficiency of the GSCM.

GSC, for its part, enables the development of initiatives linked to environmental protection by offering support infrastructures for this purpose, such as good practice manuals, the generation of databases or the existence of a decentralized organizational structure [8]. Similarly, such a set of intangible assets owned by the company can lead to a greater effort on the part of top management to develop an organizational culture sensitive to environmental protection, as well as to implement environmental best practices. GSC thus improves the exploitation of technological capabilities and knowledge related to environmental protection, improving GSCM and, as a consequence, SP [36].

With regard to GRC, this enables companies to meet the demands of different stakeholders related to environmental protection, contributing to the achievement of a sustainable competitive advantage over time [18]. This set of environmental intangibles generates trust between the company and its main stakeholders and improves organizational learning linked to environmental protection, which can lead to the improvement of GSCM by being able to develop ecological innovations, through the green knowledge achieved, in all phases of the production process. In this sense, Ullah et al. [24] point out that greater GRC leads to a wide sharing of environmental knowledge among the organization's suppliers and customers, resulting in the reduction and reuse of materials, as well as an increase in SP.

Therefore, GRC improves the cooperation and efficiency of GSCM, which can be translated into higher economic, social and environmental performance for the organization. In fact, the latest research in the field of GSCM highlights its value in improving economic, social and environmental performance [37]. Therefore, through environmental practices in the company's value chain, organizations can increase their SP, with the consequent competitive improvement that this entails [38].

Several recent investigations point to the existence of a positive relationship between GIC and GSCM, as well as a positive effect of the latter variable on SP. However, to the best of our knowledge, there are no previous studies that have analyzed these relationships in the wine context, which represents an opportunity to provide new knowledge about the meaning of the relationships between the variables under study. In order to overcome this research gap, the following hypotheses are formulated:

H2. *GIC has a positive effect on the GSCM of wineries.*

H3. *GSCM has a positive effect on the SP of wineries.*

H4. *GSCM mediates the relationship between the GIC and SP of wineries.*

2.3. Green Supply Chain Management, Green Agriculture and Sustainable Performance

GA practices developed by wineries improve their GSCM by improving the environmental management of the viticulture phase of the wine production process [39]. These practices make it possible to cultivate vines using less fertilizer, which results in the improvement of the final product: wine [40].

GA makes it possible to work in harmony with nature, since not using synthetic fertilizers and pesticides improves the quality of the soil, which is the basis of the food system and, therefore, of the sustenance of living beings [41]. However, GA entails not only the replacement of synthetic chemicals with natural methods, but also includes the adoption of grape varieties adapted to local climatic conditions, thus improving the natural fertility of the soil and, as a consequence, the production of organic wine within the winery's GSCM [42].

Moreover, GA allows the production of organic, natural and biodynamic wine within the wineries, which results in greater differentiation in the market [43]. In fact, this differentiation goes hand in hand with the new demands of wine consumers, since it has been empirically demonstrated that they are more likely to select a wine made with GA practices than a traditional wine [44]. Therefore, these practices represent an opportunity to improve business results while favoring environmental protection and territorial development [45].

GA can serve, therefore, both to improve GSCM and to increase the SP of wineries, since, on the one hand, it guarantees the incorporation of sustainable practices in viticulture, as well as the possibility of offering organic, natural and biodynamic wine to the market and, on the other hand, it increases differentiation and environmental protection, thus having a positive impact on SP of wineries [46]. Despite the ability of GA to catalyze GSCM and SP, little academic literature has attempted to link these variables. In fact, to the best of our knowledge, there are no previous studies that have analyzed the role of GA in the GSCM–SP relationship in the wine context (see Figure 1). To overcome this research gap and based on the literature review conducted, the following hypothesis is put forward:

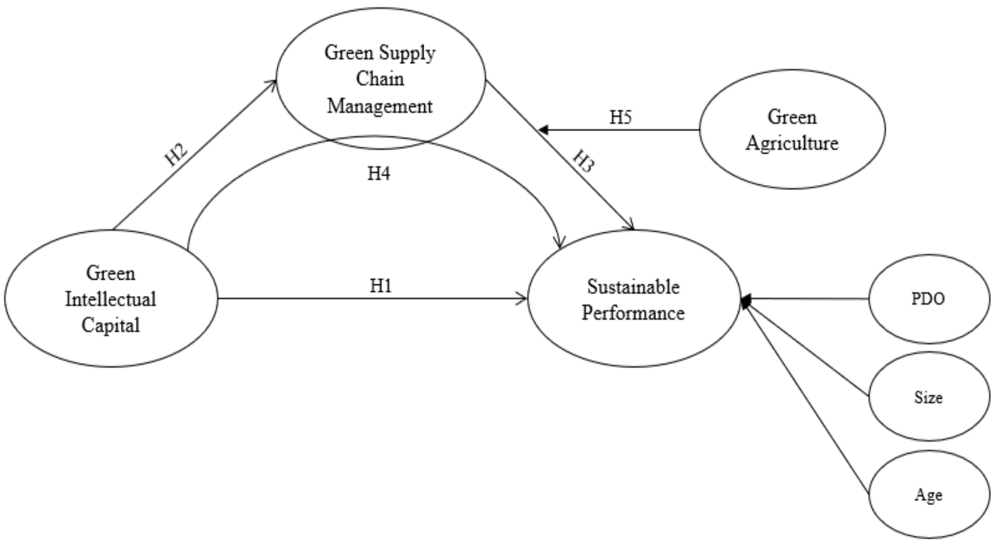


Figure 1. Proposed theoretical model. Source: Authors' own elaboration.

H5. *GA moderates the relationship between the GSCM and SP of wineries.*

3. Methodology

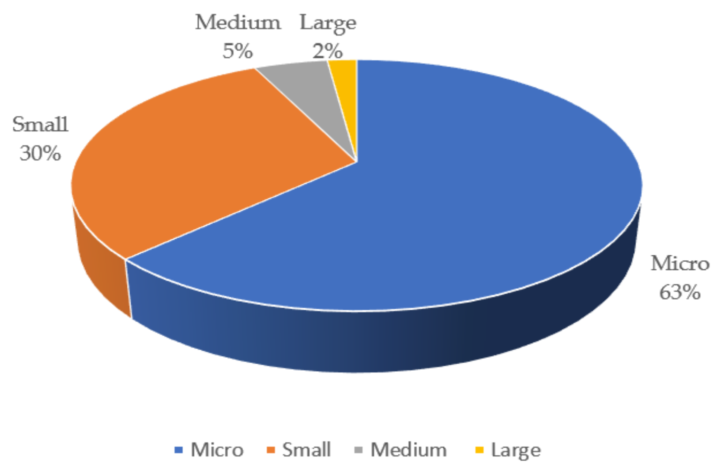
To facilitate proper understanding and comprehension of the methodological section, it is divided into the following four blocks: (1) research context, (2) population and sample, (3) variables used and (4) analysis technique.

3.1. Research Context

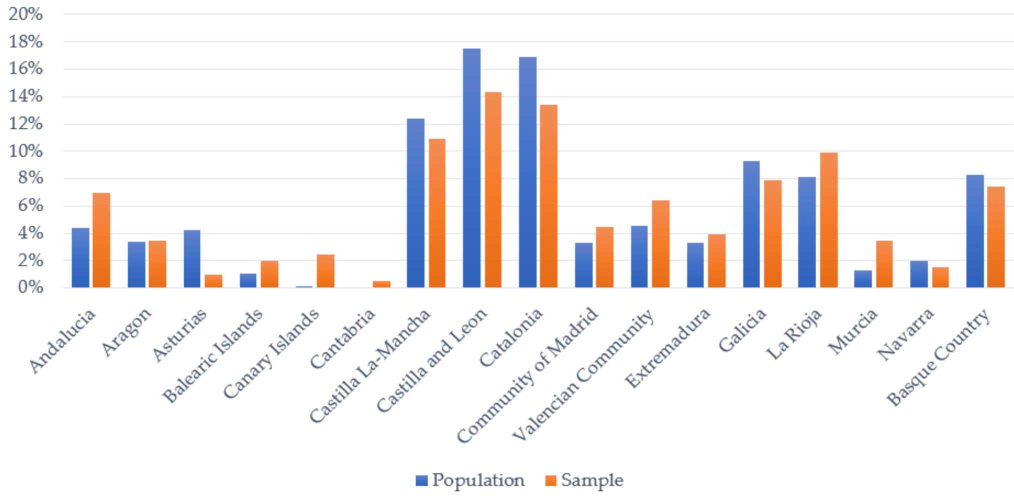
The study is contextualized in the Spanish wine industry for several reasons. First, this industry has a high weight in the Spanish economy, representing 2.2% of the Gross Value Added (GVA) of its economy in 2022 [47]. Second, the Spanish wine industry stands out not only for its economic weight, but also for its contribution to social welfare and the preservation of the environment and wine heritage [48]. Thirdly, the industry has undergone a notable change in recent years, shifting its focus from the quantity to the quality of wine [49]. This has made the sector increasingly knowledge-intensive, with GIC being an essential element in guaranteeing the success of Spanish wineries in international markets [50]. Fourthly, Spanish wineries are increasingly seeking to make their supply chain transparent, so that this can result in possible cost savings, as well as improving their performance [51].

The population under study is made up of all those companies engaged in winemaking in Spain. According to the data provided by the Iberian Balance Sheet Analysis System (SABI, by its Spanish acronym) database, there are a total of 4373 wineries located in Spain, which is therefore our population. The sample of the present research, therefore, is composed of 196 wineries, obtained by sending a structured online questionnaire during the period from 15 September 2022 to 15 January 2023. It should be noted that before sending the questionnaire, a pretest was carried out to check the degree of understandability and comprehensibility of the questions asked of the winemakers, corroborating the validity of the items used for each variable.

With regard to the size of the companies in the sample, it is possible to observe that 63% are micro-companies, that is, they have fewer than 10 workers; 30% are small, with between 10 and 50 workers; 5% are medium-sized, with between 50 and 250 employees; and the least represented category is the large companies, which account for barely 2% of the sample (see Scheme 1). Likewise, regarding the geographic location of each of the wineries in the sample, Scheme 2 shows the percentage of wineries in the sample and in the population based on their geographic distribution (see Scheme 2). Thus, it can be seen that the autonomous communities that have a greater weight in the population are those that also have a greater weight in the sample. These are Castilla and Leon, Catalonia, Castilla La-Mancha and La Rioja.



Scheme 1. Size of the sample companies. Source: own elaboration.



Scheme 2. Geographical distribution of the sample companies and the study population. Source: Authors' own elaboration.

It should be noted that the questionnaire was designed to be answered by the general managers of the wineries, since they have a broader and more strategic knowledge of the operation of their companies and can answer the questions formulated in the questionnaire with greater precision. Thus, the observations relate to 196 general managers from 196 different wineries. The general managers responded to the items of the constructs explained in the following subsection, with the descriptive analysis of the sample shown in Table 1.

Table 1. Values of the mean, minimum value, maximum value and standard deviation of the variables analyzed.

	Mean	**Min**	**Max**	**Standard Deviation**
GIC	5.127	1	7	1.134
GSCM	4.836	1	7	1.261
SP	4.968	1	7	1.027
GA	0.531	0	1	0.852
PDO	0.769	0	1	0.896
SIZE	11.121	1	186	0.923
AGE	17.210	1	167	0.814

Source: own elaboration.

3.2. Variables Used

The variables used for the analysis have been previously validated to ensure the validity and reliability of the constructs used. First, the Zaragoza-Sáez et al. [52] scale was used to measure the GIC construct, consisting of seven items. Second, the Zhu et al. [53] variable was adapted to measure GSCM, being a multidimensional construct formed by the first-order variables: green design (4 items), green purchasing (9 items) and cooperation with customers including environmental requirements (7 items). Third, the GA variable was measured based on the guidelines of Fuentes-Fernández et al. [14], who consider this as a dichotomous variable. Fourth, a scale adapted from Wang and Wang [54], Paulraj [55] and Paillé et al. [56] was used to measure SP, this being a second-order variable formed by: economic performance (4 items), social performance (6 items) and environmental performance (5 items). It should be noted that the GIC, GSCM and SP scales were all Likert-type scales with seven response options (1–7). Finally, size, age and PDO membership were introduced as control variables. The size of each organization was measured based on the number of workers in the organization, following the standards of the Organization for Economic Co-operation and Development [57]. As for the age of the organization, this variable was calculated by measuring the total number of years between the creation of the company and the year the study took place (2023). Membership of a PDO was analyzed as a dichotomous variable, taking the value 1 when the winery adhered to the conditions of at least one PDO and 0 when it did not adhere to the conditions of this quality label (see Appendix A Table A1).

3.3. Analysis Technique

The technique employed for the analysis was structural equation modeling using a multivariate analytical approach, i.e., PLS-SEM. This technique is especially useful in the field of social sciences in general and the management discipline in particular, since it allows analysis of the relationship between variables that are not directly observable, i.e., latent variables [58]. This technique is also valid for analyzing mediating and moderating relationships [59], thus serving to test the theoretical model formulated. The software used to perform the analysis was SmartPLS version 3.9.

4. Results

Given the multidimensional nature of the variables used, a two-stage model based on the scoring of latent variables is used for the study [60]. Thus, first, the latent scores of each of the first-order variables are calculated and, second, these scores are considered as indicators of the second-order variables. The results are structured following the recommendations of Hair et al. [61], who advise reporting the results in three stages: (1) the evaluation of the global model, (2) the evaluation of the measurement model and (3) the evaluation of the structural model.

First, as regards the evaluation of the global model, it is possible to affirm that the model presents an adequate fit, since the Standardized Root Mean Square Residual (SRMSR) is less than 0.08 (0.068 < 0.080), which implies that the model is able to explain the phenomena analyzed and, therefore, cannot be rejected. Table 2 shows the results relative to this evaluation, demonstrating both the SRMR and the values relative to the unweighted least squares discrepancy (d_ULS) and the geodesic discrepancy (d_G). As can be seen, these last two indicators are within the confidence intervals after bootstrapping, being therefore below HI95 and HI99.

Table 2. Overall model fit.

	Value	**HI95**	**HI99**
SRMR	0.068	0.081	0.094
d_ULS	0.241	0.436	0.574
d_G	0.126	0.297	0.319

Source: Compiled by authors.

Second, regarding the analysis of the measurement model, it should be noted that the criteria established by Hair et al. [61] are based on the analysis of the reliability of the indicators, the evaluation of the internal consistency, the verification of the convergent validity and the evaluation of the discriminant validity. Table 3 shows the individual confidence of the indicators that make up the constructs, since the loads exceed the value of 0.707 established in the academic literature [62]. Furthermore, the loads are statistically significant after applying the bootstrapping procedure. This table also makes it possible to demonstrate the existence of internal consistency and convergent validity. On the one hand, internal consistency refers to the degree of association between the indicators that form the same construct [63]. Values greater than 0.8 relative to Cronbach's alpha, composite reliability (Pc) and the Dijkstra–Henseler (Pa) criterion allow us to corroborate the existence of internal consistency [64]. On the other hand, convergent validity refers to the degree to which a measure is positively correlated with alternative measures of the same construct, this type of validity existing when the Average Variance Extracted (AVE) exceeds the

0.5 level [65]. As can be seen in Table 3, the AVE values for the four constructs analyzed are greater than 0.5.

Table 3. Measurement model analysis: external loadings, construct reliability and convergent validity.

Construct/Items	Outer Loadings	Rho_c (Pc)	Rho_a (Pa)	Cronbach's Alpha	AVE
Green Intellectual Capital (GIC)		0.907	0.880	0.880	0.584
GIC 1	0.753				
GIC 2	0.774				
GIC 3	0.718				
GIC 4	0.826				
GIC 5	0.852				
GIC 6	0.714				
GIC 7	0.699				
Green Supply Chain Management (GSCM)		0.918	0.873	0.867	0.789
GSCM 1	0.906				
GSCM 2	0.857				
GSCM 3	0.901				
Green Agriculture (GA)		1.000	1.000	1.000	1.000
GA 1	1.000				
Sustainable Performance (SP)		0.919	0.869	0.829	0.573
SP 1	0.774				
SP 2	0.728				
SP 3	0.852				

Note: The indicators for the second-order variables are: GSCM 1 = Green Design; GSCM 2 = Green Purchasing; GSCM 3 = Cooperation with Customers Including Environmental Requirements; SP 1 = Economic Performance; SP 2 = Social Performance; SP 3 = Green Performance. Source: Compiled by authors

For the analysis of discriminant validity, for its part, the Heterotrait–Monotrait (HTMT) criterion was followed, allowing us to know to what extent the constructs were different from each other [66]. Table 4 shows the values relative to the HTMT ratio, these being clearly less than 0.85. This means that the constructs analyzed in the research are different from each other and, therefore, capture different realities [67].

Table 4. Discriminant validity analysis based on the Heterotrait–Monotrait criterion.

	AGE	GA	GIC	GSCM	PDO	SIZE	SP
AGE							
GA	0.024						
GIC	0.068	0.093					
GSCM	0.154	0.085	0.483				
PDO	0.014	0.262	0.067	0.047			
SIZE	0.129	0.133	0.177	0.217	0.093		
SP	0.135	0.063	0.644	0.775	0.071	0.349	

Source: Compiled by authors.

Third, once the reliability and validity of the constructs had been verified, the structural model was evaluated. This evaluation, following the recommendations of Hair et al. [61], consisted of the analysis of the path coefficients, and the predictive relevance of Q2. On the one hand, Figure 2 shows the data regarding the path coefficient based on a bootstrap test with 5000 subsamples and the R-values. This shows that all the direct and indirect relationships are positive and statistically significant. This implies that GSCM partially mediates the relationship between GIC and SP, since both the direct (0.302) and indirect (0.178) effects are positive and statistically significant, with a total effect of GIC on SP of

0.480 ($p < 0.000$). The moderating relationship is positive but not significant, so the results for this relationship cannot be extrapolated to the study population.

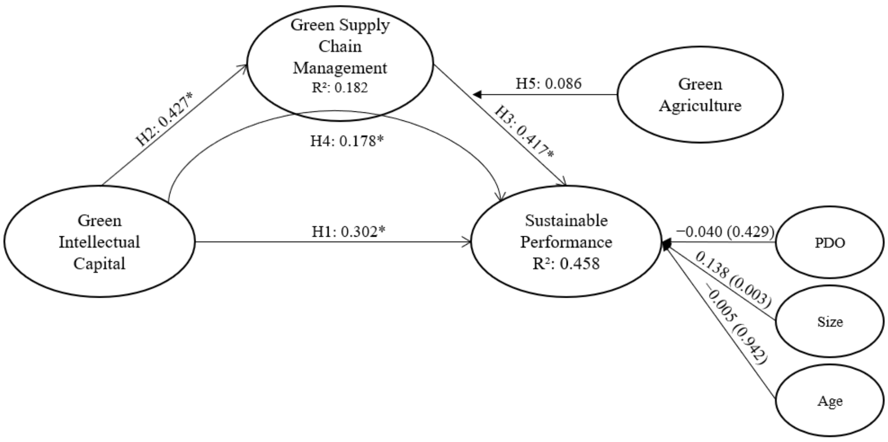


Figure 2. Theoretical model with R-squared, path coefficients (β) and significance. Source: Authors' own elaboration. Note: * $p < 0.001$.

The results of the model allow us to verify four of the five hypotheses, given that there is a positive and significant effect of GIC on SP (H1. $\beta = 0.302$; $p < 0.000$), there is a positive and significant effect of GIC on GSCM (H2. $\beta = 0.427$; $p < 0.000$), there is a positive and significant effect of GSCM on SP (H3. $\beta = 0.417$; $p < 0.000$), GSCM mediates the GIC–SP relationship (H4. $\beta = 0.178$; $p < 0.000$) and GA shows a positive but non-significant moderation effect in the GSCM–SP relationship (H5. $\beta = 0.086$; $p < 0.195$). The results show that the GIC developed by wineries is the strongest predictor of GSCM. The strongest predictor of the SP variable is, in turn, GSCM (see Table 5). As for the control variables, the results show that while winery size has a positive and significant on SP ($\beta = 0.138$; $p < 0.003$), PDO membership ($\beta = -0.040$; $p < 0.429$) and age ($\beta = -0.005$; $p < 0.942$) show a negative and non-significant relationship. Finally, to analyze the quality of the model, the Geisser test (Q2) was performed, which must present estimated values greater than 0 (Q2 > 0). According to Hair et al. [61], Q2 values greater than 0, 0.25 and 0.50 show, respectively, situations of small, medium and large predictive relevance. Table 6 shows the medium predictive relevance of the model, given that the values were greater than 0.25 [63].

Table 5. Results of the structural model for the mediation model.

Direct Effects	**Path Coefficient**	**t-Value**	***p* Value**	**95% BCCI**	**Hypothesis**
GIC → SP	0.302	4.268	0.000 *	[0.171; 0.442]	H1 supported
GIC → GSCM	0.427	6.002	0.000 *	[0.280; 0.551]	H2 supported
GSCM → SP	0.417	6.220	0.000 *	[0.287; 0.548]	H3 supported
Indirect Effects	Path Coefficient	t-Value	*p* Value	95% BCCI	Hypothesis supported
GIC → GSCM → SP	0.178	4.252	0.000 *	[0.105; 0.265]	H4 supported
Moderating Effect	Path Coefficient	t-Value	*p* Value	95% BCCI	Hypothesis
GSCM → GA → SP	0.086	1.299	0.195	[−0.092; 0.098]	H5 rejected

Notes: BCCI = Bias Corrected Confidence Intervals; * $p < 0.001$. Source: Compiled by authors.

Table 6. Construct cross-validated redundancy (predictive relevance).

	SSO	SSE	Q^2 (=1 − SSE/SSO)
AGE	196	196	
GA	196	196	
GIC	1372	1372	
GSCM	588	507.286	0.247
PDO	196	196	
SIZE	196	196	
SP	588	447.825	0.278

Source: Compiled by authors.

5. Discussion

The results offered in this research are very useful for both academics and professionals in the wine sector who wish to learn about the mechanisms through which the economic, social and environmental performance of Spanish wineries can be improved. In particular, the study empirically demonstrates the antecedent role of GIC and GSCM to improve SP, highlighting the importance of developing environmental intangibles of a human, structural and relational nature in order to improve the performance of wineries in its triple dimension.

The set of winery intangibles aimed at improving the environment can improve SP for several reasons. Firstly, as employees' environmental knowledge increases, the winery's environmental management will improve, reducing the materials and resources used in the production process and, consequently, improving the winery's environmental performance. However, this improvement in the winery's environmental actions may represent not only an improvement in environmental performance, but also an improvement in social and economic performance, given that, on the one hand, workers will be happier to work in a company with high environmental awareness and, on the other hand, these actions may lead to an improvement in business differentiation, with the consequent improvement in organizational performance. Secondly, the different elements of GSC, such as collaborative culture, decentralized organizational structure or linking the brand to sustainability, allow the institutionalization of the wineries' sustainable approach, providing them with mechanisms for acquiring, transferring and applying new green knowledge that will improve SP. Thirdly, the relationships that wineries establish with the rest of their stakeholders with the aim of improving the environment can lead to the acquisition of green knowledge, as well as the generation of business opportunities that result in improved business performance. The results derived from the research are in line with the research of Yusoff et al. [19], Malik et al. [8] and Ullah et al. [24], who demonstrate the existence of a positive and significant relationship between the two variables in the manufacturing context of Malaysia, Pakistan and China, respectively.

In this sense, the GIC of wineries can also improve their GSCM, since the incorporation of sustainable practices into the different stages of the wine value chain can be achieved through the increased environmental knowledge of employees, the codification of this knowledge so that it is accessible to the entire company and the imposition of environmental requirements on suppliers with whom wineries cooperate. The improvement of GSCM, in turn, can lead to the improvement of SP, since the improved sustainability of the wine chain implies improvement in its efficiency, with positive repercussions in economic, social and environmental terms. Regarding the moderating role of GA in the GSCM–SP relationship, the study points to the existence of a positive and significant link. Therefore, although GA exerts a positive moderating effect on this relationship in the sample wineries, this effect cannot be extrapolated to the population under study. This may be due to the fact that GA mainly improves viticulture within GSCM and environmental performance within SP, thus weakening the effect of GA on this relationship. The results concerning the GIC–GSCM–SP sequence are in line with recent research in the field of environmental management, such as those of AL-Khatib and Shuhaiber [31] and Xi et al. [68], who contextualize their studies in the manufacturing sectors of Jordan and China, respectively.

6. Conclusions

The present research highlights the importance of GIC in catalyzing both GSCM and SP. It also allows us to demonstrate the positive and significant mediating role of GSCM in the GIC–SP relationship, as well as the moderating effect of GIC on SP.

A series of theoretical and practical implications are derived from the results of the study. With regard to the theoretical implications, the study is pioneering in the contextualization of the model proposed for the Spanish wine industry. Moreover, to the best of our knowledge, there were no previous studies that analyzed the moderating role of GA in the GSCM–SP relationship, so the research represents the generation of new scientific knowledge in the field of environmental management and management. In terms of practical implications, the research may be useful for winemakers who are considering improving their environmental intangibles in their wineries, as well as developing environmental practices along their value chain, since, as demonstrated, this will improve the SP of their wineries. Despite the lack of significance of GA, the study shows its importance in improving environmental practices in viticulture and the environmental performance of wineries, so that winery managers may consider including it in the practices developed in their companies.

Despite the important contributions of the study, it should be noted that the research suffers from certain limitations. First, given that the study was contextualized in the Spanish wine industry, its study is necessary in other wine contexts. In this sense, as a future line of research, it is proposed to contextualize the theoretical model proposed in the Californian wine industry to learn about the similarities and differences between the two wine contexts. Secondly, the study has the limitation of cross-sectional research, since the results correspond to a specific moment in time. In order to overcome this deficiency, as a future line of research we intend to carry out a longitudinal study with the companies in the present sample.

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Appendix A

Table A1. Measures of the variables used in the research.

Variable	Questions/Items	Authors
Control Variables (CV)	CV 1. Is the winery adhered to at least one Protected Designation of Origin?	Marco-Lajara et al. [17]
	CV 2. When was the winery founded?	Marco-Lajara et al. [17]
	CV 3. How many employees does the winery have?	OECD [57]

Table A1. *Cont.*

Variable	Questions/Items	Authors
Green Agriculture (GA)	GA 1. Does the winery produce organic, natural or biodynamic wine?	Fuentes-Fernández et al. [14]
Green Intellectual Capital (GIC)	GIC 1. Our employees care about the environment	Zaragoza-Sáez et al. [52]
	GIC 2. Our employees have the knowledge and skills to protect the environment	
	GIC 3. Our employees cooperate in working groups to address environmental issues	
	GIC 4. Our employees cooperate with our suppliers to protect the environment	
	GIC 5. Our employees cooperate with our customers/distributors to protect the environment	
	GIC 6. Our company implements innovations to protect the environment	
	GIC 7. Our company invests in facilities to protect the environment	
Sustainable Performance (SP)	SP 1. Our company's average return on investment is above the industry average over the past five years	Wang and Wang [54]
	SP 2. Our company's average profit is above the industry average over the last five years	
	SP 3. Our company's earnings growth is above the industry average over the last five years	
	SP 4. Our company's average return on sales is above the industry average over the last five years	
	SP 5. Our company has improved the well-being of its stakeholders compared to its competitors over the last five years	Paulraj [55]
	SP 6. Our company has improved the health and safety of the community in which it operates over its competitors in the last five years	
	SP 7. Our company has reduced its environmental impact and risks to the general public compared to its competitors over the last five years	
	SP 8. Our company has improved employee occupational health and safety relative to our competitors over the past five years	
	SP 9. Our company has protected the claims and rights of its stakeholders vis-à-vis its competitors over the past five years	
	SP 10. Our company has reduced waste and emissions from operations relative to its competitors over the past five years	Paillé et al. [56]
	SP 11. Our company has reduced the environmental impact of its products/services compared to its competitors over the last five years	
	SP 12. Our company has reduced its environmental impact by establishing partnerships with its competitors over the last five years	
	SP 13. Our company has reduced the risk of environmental accidents, spills and emissions compared to its competitors over the last five years	
	SP 14. Our company has reduced purchases of non-renewable materials, chemicals and components relative to its competitors over the past five years	

Table A1. *Cont.*

Variable	Questions/Items	Authors
Green Supply Chain Management (GSCM)	GSCM 1. We design products to reduce material/energy consumption	Zhu et al. [53]
	GSCM 2. We design products for reuse, recycling and recovery of materials and components	
	GSCM 3. We design products to avoid or reduce the use of hazardous products	
	GSCM 4. We design processes to minimize waste	
	GSCM 5. We provide our suppliers with design specifications that include environmental requirements for sourcing	
	GSCM 6. We cooperate with our suppliers to achieve environmental objectives	
	GSCM 7. We conduct environmental audits of our suppliers' internal management	
	GSCM 8. We require ISO 14000 certification of suppliers	
	GSCM 9. We evaluate the environmental practices of our second-tier suppliers	
	GSCM 10. We adopt a "just-in-time" logistics system to minimize the volume of stocks in our warehouses	
	GSCM 11. We apply environmental criteria in the selection of suppliers	
	GSCM 12. We cooperate with our suppliers to reduce packaging material	
	GSCM 13. We require our suppliers to use environmentally friendly packaging (degradable and non-hazardous)	
	GSCM 14. We cooperate with customers to develop and implement environmentally friendly designs	
	GSCM 15. We cooperate with customers for cleaner production	
	GSCM 16. We cooperate with customers to develop and implement environmentally friendly packaging	
	GSCM 17. We cooperate with customers to use less energy in transporting products	
	GSCM 18. We outsource logistics to third party companies	
	GSCM 19. We cooperate with customers to return defective or residual products	
	GSCM 20. We cooperate with customers on reverse logistics	

Source: Authors' own elaboration.

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