

# **Wine tourism as a catalyst for green performance: The mediating role of green knowledge sharing**

## **Abstract**

This research focuses on analyzing the impact of Wine Tourism (WT) on the Green Performance (GP) of Spanish wineries, as well as the mediating effect of Green Knowledge Sharing (GKS) on this linkage. In addition, age, size and membership in a Protected Designation of Origin (PDO) are introduced as control variables to increase the precision of the cause-effect relationships examined. The study proposes a conceptual model based on previous studies, which is tested using structural equations (PLS-SEM) with data collected from 196 Spanish wineries between September 2022 and January 2023. The findings of the research reveal the existence of a positive and significant relationship between the development of WT and the GP of Spanish wineries, as well as the partial mediation of GKS in this association. The uniqueness and significance of this study can be attributed to several crucial factors. First, it enhances the understanding and knowledge regarding the advantages associated with WT development. Second, no prior research has conducted a comprehensive study on WT as a catalyst for GP within the context of Spanish wineries. Third, to the best of the authors' knowledge, no previous study has analyzed the mediating role of GKS as mediator in the relationship between WT and GP of wineries.

**Keywords:** Wine Tourism, Green Performance, Green Knowledge Sharing, Wine industry, Spain.

**Paper type:** Research paper

## **Introduction**

Wine Tourism (WT), a multidimensional phenomenon that combines the appreciation of wine with the intrinsic desire to explore its provenance, has gained considerable relevance in recent decades, becoming a mainstay for many wine regions (Festa et al., 2020). This form of tourism not only boosts the local economy through the influx of visitors, but also acts as a vehicle for cultural and educational transmission, promoting appreciation of wine heritage and sustainable production methods (Santos et al., 2019).

WT, at its core, offers an experience that goes beyond the simple act of tasting wine, as it involves an immersion in local culture, landscape and agricultural practices, providing visitors with a deeper understanding of the laborious symbiosis between man and nature required to produce each bottle of wine (Trigo and Silva, 2022). Thus, a unique opportunity presents itself: through this educational interaction, there is the potential to foster an environmental ethic among consumers and producers, a transfer of value that could positively influence green practices throughout the industry (Santos et al., 2022).

The study of WT, therefore, becomes a crucial area of academic interest, especially in the context of a world increasingly aware of environmental challenges, as investigating how WT can affect the sustainability of wine production is not only relevant, but imperative, considering the increasing scarcity of resources and the impacts of climate change (Eusébio et al., 2023). Furthermore, at a business level, WT can encourage wineries to adopt greener practices, which in turn can enhance their brand image, strengthen their connection with consumers and ultimately boost their Green Performance (GP) (Serra-Cantallops et al., 2021). In this sense, a detailed analysis of WT becomes essential to unravel its capacity to serve as a catalyst for change towards sustainability in the wine industry through the Green Knowledge Sharing (GKS), i.e. through the systematic dissemination of environmental knowledge within the wineries and between these and their stakeholders.

Therefore, the present research aims to unravel the effect of WT on GP of wineries, paying particular attention to the mediating role that GKS can play in this relationship. In doing so, this work seeks not only to fill a gap in the existing literature, but also to bring together scattered threads of previous research into a coherent and multifaceted narrative that addresses sustainability, wine culture and knowledge sharing. The research therefore aims to answer the following two Research Questions (RQs): (RQ1) does WT have a positive effect on the GP of wineries? and (RQ2) does GKS mediate the WT-GP relationship? To answer the following RQs, a theoretical model is proposed and then tested through structural equation modelling with data from Spanish wineries collected between September 2022 and January 2023.

The selection of the Spanish WT context is based on its intrinsic uniqueness, emblematic in the global wine scene. Spain stands as a microcosm where tradition and innovation converge, offering a diverse and multifaceted scenario for analysis. This country, famous for its vast and rich wine tapestry, not only presents an amalgam of oenological styles sustained by its geography and microclimates, but has also been the cradle of a sectoral transformation, where WT is revealed as a catalyst (Marco-Lajara et al., 2023a). Moreover, Spain is at the forefront of sustainability in viticulture, with wineries committed to ecological practices and the largest extension of organic vineyards in the world, constituting a palpable example of the potential intersection between WT and ecology (Martínez-Falcó et al., 2023a). This synergy not only demonstrates the capacity of WT to disseminate environmental values, but also underlines its role in shaping new regulations and market expectations (Vazquez-Vicente et al., 2021). Thus, the Spanish wine environment provides an invaluable context for exploring the reciprocal influence between WT and sustainable practices, framed in a sector that reflects both the cultural heritage and contemporary projection of the industry.

From a theoretical perspective, this analysis enriches the academic dialogue by providing a deeper understanding of how WT development can directly and indirectly influence wineries' GP, shedding light on the mechanics of GKS as a catalyst for sustainability, an area that offers fertile ground for future academic research. In practical terms, the findings have significant implications for vineyard owners, policy makers and tourism enthusiasts, as by highlighting how WT can be a strategic tool for improving GP, this study promotes the development of future strategies and policies to strengthen practices.

To fulfill the objectives of this study, subsequent to this introduction, a thorough exploration into the intricate relationship between WT, GKS and GP of wineries is embarked upon, as elucidated in Section 2. A comprehensive methodology, critical to achieving the study's aims, is articulated in Section 3, encompassing a meticulous procedural narrative. Progressing, the insights derived from the assiduous evaluation of the global, measurement, and structural model are unfolded in Section 4. Concluding this scholarly endeavor, Section 5 offers a synthesis of the pivotal deductions, coupled with a candid recognition of the research constraints, and propositions for ensuing scholarly inquiries are tendered.

### **Theoretical underpinning: The Natural Resource-Based View and the Knowledge-Based View**

The relationships examined in the present research can be conceived through a joint understanding of Resource-Based View (RBV) and Knowledge-Based View (KBV), as both theories offer a profound conceptual framework for understanding how natural resources and green knowledge become crucial instruments for value creation and environmental sustainability in the context of WT.

From the perspective of the RBV, wineries are seen as accumulations of tangible and intangible resources that, if strategically managed, can result in a sustainable competitive advantage (Duarte-Alonso and Bressan, 2016). In the field of WT, natural resources are presented not only as fundamental inputs for wine production, but also as an integral part of the tourism experience (Duarte-Alonso *et al.*, 2020). The preservation of the landscape, the biodiversity of the vineyard and the quality of the natural environment are valuable resources that attract wine tourists and simultaneously impose prudent environmental management as an intrinsic requirement for business sustainability (Crick *et al.*, 2020). The strategic management of these natural resources, under the RBV paradigm, encourages wineries to adopt ecologically sustainable practices to protect and enhance these unique assets, fostering GP that is, in itself, a valuable resource for differentiation in the marketplace (Guedes and Rebelo, 2019).

KBV, on the other hand, amplifies this relationship by placing ecological knowledge as a central asset in this dynamic, as the transfer of ecological knowledge is not limited to the dissemination of information on sustainable practices; it is an essential mediation that nurtures the relationship between WT and GP. In this context, knowledge is not static, but is built and shared through interactions, experiences and the continuous exchange between staff, visitors and the local community (Duarte-Alonso *et al.*, 2022), fostering a culture of learning and adaptation (Santos *et al.*, 2022), where ecological knowledge becomes an integral part of the WT experience, as well as enabling better strategic decision-making that has direct implications for environmental sustainability (Duarte-Alonso *et al.*, 2019).

By merging RBV with KBV, a synergistic approach is revealed in which natural resources and ecological knowledge are intertwined. In this interweaving, WT emerges as an enabler that motivates wineries to harmonize environmental protection with the creation of enriching experiences, driving a GP that is sustained and enhanced through the strategic transfer and management of ecological knowledge. In the following sub-sections, each of these relationships is explored in detail.

### *Wine Tourism and Green Performance*

WT has emerged as a transformative force in the wine industry, significantly impacting multiple dimensions, including the environmental sustainability of wineries (Martínez-Falcó *et al.*, 2023b). At the intersection between tourism and wine production, WT offers unique opportunities for wineries, not only in terms of economic diversification and enrichment of the visitor experience, but also as a catalyst for the adoption of more environmentally responsible practices (Sun and Drakeman, 2022).

In the context of the active promotion of regional resources, WT encourages the preservation of terroir, understood as the unique interaction between the genotype of the vine, the geophysical characteristics of the terroir and the regional climate (Nave *et al.*, 2021). This preservation is manifested in the adoption of sustainable agricultural practices and the maintenance of biodiversity, aspects that are valued by a growing segment of wine tourists in search of authenticity and environmental commitment (Szolnoki and Tafel, 2022). Similarly, as Trigo and Silva (2022) point out, the local economy is fostered through the valorization of indigenous products and ecosystem services, generating a value chain that benefits the community and the environment.

Likewise, the intersection of WT and environmental sustainability also manifests itself prominently in the architecture and design of winery interiors (Martínez-Falcó *et al.*, 2023c). The adoption of green building principles is not merely an aesthetic trend, but a reflection of a deep commitment to energy efficiency and minimizing ecological impact (Parlato *et al.*, 2022). By incorporating bioclimatic techniques, wineries not only optimize the use of natural light and thermal regulation, thereby reducing their carbon footprint, but also create spaces that resonate with the natural environment, enhancing the sensory experience for visitors (Lamoureux *et al.*, 2022). The use of sustainable materials, meanwhile, underscores environmental responsibility and can serve as an educational talking point during visits, encouraging a dialogue on sustainability (Oltean and Gabor, 2022).

This commitment to sustainability extends to the wineries' human capital, as the training of staff in sustainable practices and their active participation in the implementation of these initiatives not only ensures a genuine and coherent WT experience, but also reinforces the culture of sustainability within the organization (Karagiannis and Metaxas, 2020). Thus, Fuentes-Fernández *et al.*, 2022 state that, endowed with knowledge and conviction, employees become ambassadors of the winery's ecological values, capable of passionately transmitting these principles to visitors. At the same time, activities that celebrate wine culture, from an artistic or historical perspective, have the power to foster a sense of ownership and stewardship of the region's natural and cultural heritage among participants (Andrade-Suárez and Caamaño-Franco, 2020). By including educational elements about local ecology and sustainable viticulture practices, these activities enrich the visitor's understanding of the interdependence between the winery and its ecosystem, promoting an ethic of environmental responsibility (Amarando *et al.*, 2019). It is therefore imperative to recognize that sustainability in the wine industry transcends the day-to-day operations of growing and producing wine; it is an integrated philosophy that permeates all aspects of WT (Sun and Drakeman, 2022). Furthermore, as Duarte-Alonso and Kok (2020) indicate, visitors, by learning about sustainable practices and witnessing their implementation, can become advocates of sustainability and this, in turn, can have a ripple effect, influencing consumer preferences and encouraging greater environmental responsibility in the wider industry.

In this way, WT represents a strategic platform from which wineries can cultivate a green identity, committing not only to economic prosperity, but also to environmental sustainability (Chiodo *et al.*, 2020). Through education and direct involvement, WT has the potential to induce positive change in environmental practices, thereby safeguarding the wine legacy for the enjoyment and benefit of future generations (Esau and Senese, 2022). However, despite the capacity of WT development to catalyze environmental outcomes, there are two fundamental shortcomings in the

study of this relationship. On the one hand, scientific production on the subject has focused mainly on the study of the effect of WT on the economic performance of wineries, leaving the social and environmental dimension in the background. On the other hand, to the best of the authors' knowledge, there are no previous studies that have tried to link WT with GP in the wine context under study. In order to overcome both shortcomings and based on the literature review carried out, the following hypothesis is proposed:

H1. WT has a positive effect on GP of wineries

#### *Wine Tourism, Green Knowledge Sharing and Green Performance*

Within the WT framework, GKS is conceived as a bidirectional process, since, on the one hand, viticulturists and winemakers share their agricultural practices, innovations in natural resource management and sustainable production techniques with visitors (Marco-Lajara *et al.*, 2023b). This exchange allows tourists to understand the interdependence between viticulture and its ecosystem, promoting an environmental awareness that transcends the visit and can influence their decisions and lifestyle, thus extending the ecological impact of these practices (Woodfield and Husted, 2017). On the other hand, tourists, often equipped with their outside perspectives and knowledge, can inspire reflection and sometimes contribute eco-innovative practices, which are adopted and adapted by producers (Duarte-Alonso *et al.*, 2022). This symbiosis becomes as Carvalho *et al.* (2021) indicate an engine of change and adaptation, where sustainable practices are questioned, refined and optimized, fostering a viticulture that cooperates with its natural environment rather than disturbing it.

WT and GKS are intrinsically linked to the improvement of GP, since understanding this form of tourism as part of a broader ecosystem promotes the use of techniques that preserve biodiversity, such as organic or biodynamic agriculture. In this sense, reducing the use of pesticides, integrated water management and soil conservation, for which ecological knowledge is needed as well as its dissemination, are practices that enhance the attraction of wine tourists, directly impacting on the preservation of local ecosystems, and improving ecological outcomes (Baird *et al.*, 2022). Likewise, GKS fosters shared responsibility for GP, as visitors become an active part of environmental conservation and are more likely to support and promote sustainably produced wines (Grimstad and Burgess, 2014). In this regard, as observed by Xu *et al.* (2020), this shift in consumer demand encourages more wine regions to adopt eco-efficient practices, creating a positive feedback loop that benefits both the wine industry and global ecological health.

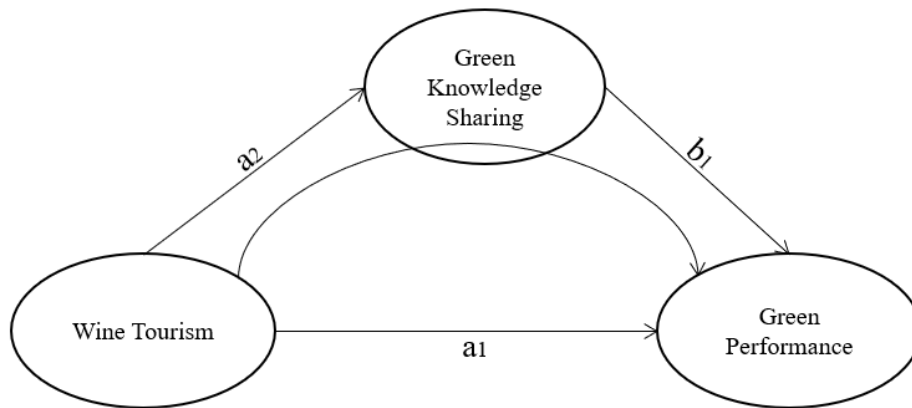
The symbiotic relationship between WT and GP is therefore reinforced by GKS. This perpetual exchange of information and expectations leads to an industry that prioritizes ecosystem well-being, fosters sustainable innovation and ultimately cements its long-term viability and resilience (Knight *et al.*, 2019). GKS is not simply an act of communication, but an active commitment to ecology and excellence in winemaking, encouraging a positive feedback loop that redefines success in the industry toward greener, more sustainable horizons (Dias *et al.*, 2023). However, despite the ability of GKS to mediate the WT-GP relationship, to the best of the authors' knowledge, no previous studies have ventured in this direction. In order to overcome this gap in scientific knowledge and based on the literature review carried out (see Figure 1), the following hypothesis is proposed:

H2. WT has a positive effect of GKS of wineries

H3. GKS has a positive effect of GP of wineries

H4. GKS positively mediates the relationship between WT and GP of wineries

Figure 1. Graphical representation of proposed theoretical model



H1 = a1: Wine Tourism → Green Performance

H2 = a2: Wine Tourism → Green Knowledge Sharing

H3 = b1: Green Knowledge Sharing → Green Performance

H4 = a2 x b1: Wine Tourism → Green Knowledge Sharing → Green Performance

Source: own elaboration

## Methodology

To attain an in-depth understanding of the methodological facets integral to this study, this segment is structured into four unique components, delineated thus: research context, population and sample aggregation, measurement of variables, and the approach to analysis. Each part is instrumental in elucidating the rigorous scholarly methods employed, ensuring a holistic grasp of the research's architectural framework.

### Research context

The choice of the Spanish wine context as the epicenter of this investigation is anchored in several compelling rationales. Spain's prominence in the global wine arena is unparalleled, commanding the forefront in vineyard surface area and wine exportation volumes, a status affirmed by contemporary reports from the International Organization of Vine and Wine (OIV). Yet, the breadth of the Spanish wine sector's relevance transcends economic metrics, weaving into the social and environmental tapestry (Calle *et al.*, 2020). The sector is a cornerstone for the populace's welfare, a guardian of the nation's cultural legacy, and a steward of the natural milieu, principles that are deeply ingrained in the wineries' operational ethos (Marco-Lajara *et al.*, 2022). Furthermore, WT crystallizes as a pivotal component for Spanish wineries, gaining momentum following the 2008 unveiling of the “Wine Routes of Spain” touristic endeavor. This initiative has galvanized an expansive spectrum of wineries to endorse and cultivate this tourism modality (Cruz-Ruiz *et al.*, 2020). The burgeoning network of 35 distinctive wine routes threading through the Spanish terrain underscores the escalating ubiquity of WT (Vázquez-Vicente *et al.*, 2021). Moreover, WT is instrumental in fortifying the resilience and flourishing of Spanish wineries, since it acts as a conduit for direct sales within the winery premises, providing a bulwark against the ebbing domestic wine patronage, while simultaneously cultivating a cadre of brand advocates (Zamarreño-Aramendia *et al.*, 2021). Thus, the strategic leverage of WT is indispensable in sustaining the vibrancy and sustainability of wineries within the Spanish wine landscape.

### Population and sample collection

This study centers its focus on enterprises engaged in viticulture within the framework of the National Code of Economic Activities (CNAE) 1102. Drawing upon the Iberian Balance Sheet Analysis System (SABI) database, the scope encompasses an aggregate of 4,373 enterprises, delineating the breadth of the research population. In pursuit of empirical data, an intricate questionnaire was crafted, underpinned by a thorough literary review within the pertinent scholarly realms. To authenticate the content validity and ensure the lucidity and intelligibility of the questionnaire's integral items, a preliminary examination was orchestrated, securing the collaborative engagement of professionals spanning environmental and quality managers to

winemakers and executive leaders from Spanish vinicultural establishments. This foundational step was pivotal in refining the instrument for the constructs under scrutiny. In the ensuing phase, data were procured through the digital dissemination of the questionnaire, facilitated by the Qualtrics platform, over an intensive period extending from September 2022 to January 2023. An ensuing subsection offers an exhaustive discourse on the rationale underscoring the choice of scales for the questionnaire. Of the 216 questionnaires retrieved initially, a stringent filtration process ensued, culminating in a corpus of 196 valid submissions deemed fit for analytical exploration. It warrants emphasis that the questionnaire's target respondents were the general managers within winery establishments. This strategic choice originated from the premise that these individuals, situated at the apex of the organizational hierarchy, are privy to a panoramic and strategic insight into vinicultural operations, thereby affirming their advanced competency in navigating the domains broached by the questionnaire.

#### *Variable Measurement*

The reliability and validity of the constructs utilized were fortified through the incorporation of validated scales within the questionnaire's framework. First, the metrics devised by Lavandoski *et al.* (2016) were harnessed, encompassing a spectrum of eight items for WT. Second, the GKS variable was assessed using a five-item scale, an intellectual contribution of Rubel *et al.* (2021). Third, GP was scrutinized through the adoption of a quintet of items from the scale by Paillé *et al.* (2014). An important methodological note is the application of 7-point Likert-type measures across all scales, with a conceptualization of the three variables as reflexive constructs. Furthermore, Protected Designation of Origin (PDO) membership, age were controlled to maintain analytical precision. PDO variable was discerned as a dichotomous variable, attributed with a singular value if the winery was in alliance with one or more PDOs, and devoid of value if otherwise unaffiliated. The winery size was quantified adhering to the norms stipulated by the Organization for Economic Co-operation and Development (OECD, 2009) and the historical depth of the wineries, or their age, was ascertained by calculating the span since their inception through to the temporal juncture of this study in 2023. This comprehensive approach ensured a methodologically sound basis for the constructs and measures employed in this scholarly investigation.

#### *Analytical approach*

This study's theoretical model underwent rigorous analysis through the application of the partial least squares structural equation modeling (PLS-SEM) methodology, implemented via the SmartPLS software, version 4.0.0. Esteemed for its analytical precision, PLS-SEM offers an intricate examination of intervariable relationships, inclusive of latent constructs. This attribute renders it exceptionally pertinent within the Social Sciences realm, notably in Management disciplines, where numerous concepts evade direct observation (Dash and Paul, 2021). Opting for PLS-SEM in the interrogation of the postulated hypotheses was an informed decision, guided by multiple considerations. Primarily, the theoretical model is comprehensive, encapsulating direct and indirect variable correlations. PLS-SEM excels in such complex evaluations, facilitating a concurrent analysis of diverse relationship categories within an inclusive model (Cepeda-Carrión *et al.*, 2019). Furthermore, the study's sample quantum satisfactorily meets the requisite threshold ( $n=100$ ) for invoking the PLS-SEM methodology (Reinartz *et al.*, 2009), thereby validating the statistical robustness of the findings. Supplementing this is the historical precedence of PLS-SEM's successful application in deconstructing constructs synonymous with WT, GKS, and GP. Such instances in scholarly precedents, including works like those of Lavandoski *et al.* (2021), attest to the method's compatibility and reliability in exploring and affirming the proposed interrelationships within this study's ambit. This confluence of analytical rigor, methodological suitability, and successful prior applications consolidates the choice of PLS-SEM as the cornerstone of this research's analytical framework.

## Results

In harmony with the protocols articulated by Hair *et al.* (2019), the exposition of the model results bifurcates into an evaluation of the measurement model followed by an assessment of the structural model. An inaugural examination of the overall fit precedes the detailed evaluations, revealing a commendable global congruence of the model. This is substantiated by the Standardized Root Mean Squared Residual (SRMSR) value, which judiciously adheres to the prescribed ceiling of 0.08, registering a figure of 0.037 and thereby affirming the model's acceptability (Hu and Bentler, 1998). Further scrutiny, as depicted in Table 1, confirms that subsequent to the affirmation of the SRMR criterion, indicators such as the unweighted least squares discrepancy (d\_ULS) and geodesic discrepancy (d\_G) prudently navigate within the bounds of confidence post-bootstrapping, specifically beneath the thresholds of HI95 and HI99.

Table 1. Assessment of overall model fit

	Value	HI95	HI99
SRMR	0.037	0.061	0.074
d_ULS	0.245	0.612	0.837
d_G	0.487	0.694	0.889

Source: compiled by authors

The analysis of the measurement model was undertaken in strict adherence to the parameters set forth by Hair *et al.* (2019), entailing a thorough scrutiny of individual indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Initiating this systematic examination, individual item reliability was confirmed, as evidenced in Table 2, with all indicators for the variables under consideration demonstrating loadings that transcend the benchmark threshold of 0.707, a standard recognized in scholarly discourse (Carmines and Zeller, 1979). The statistical significance of these loadings, reaffirmed through bootstrapping, attests to the commendable degree of reliability at an individual level. Pertaining to internal consistency, the constructs within the study were subjected to rigorous analysis, substantiating their adherence to the stipulated criteria for reliability of this nature. Cronbach's alpha, composite reliability (Pc), and the Dijkstra-Henseler (Pa) criterion all presented values in excess of 0.8, underscoring the degree of coherence among the indicators employed in gauging identical constructs (Hair *et al.*, 2021). Progressing to discriminant validity, the findings, as articulated in Table 3, derive from the application of the Heterotrait-Monotrait criterion (HTMT). The recorded values fall significantly beneath the 0.85 marker, thereby affirming the autonomy of each construct and its capacity to mirror diverse dimensions inherent in the model. This substantiation upholds the premise that the constructs employed are not merely overlapping elements but rather instrumental tools that elucidate the intricate interplay between distinct variables.

Table 2. Analysis of the measurement model

Construct/Items	Outer Loadings	Rho_c (Pc)	Rho_a (Pa)	Cronbach's Alpha	AVE
<b>Wine Tourism (WT)</b>		0.907	0.831	0.808	0.642
WT 1	0.764				
WT 2	0.864				
WT 3	0.831				
WT 4	0.814				
WT 5	0.834				
WT 6	0.793				
WT 7	0.804				
WT 8	0.767				
<b>Green Knowledge Sharing (GKS)</b>		0.911	0.884	0.821	0.664
GKS 1	0.764				
GKS 2	0.797				
GKS 3	0.784				
GKS 4	0.807				



<b>GKS 5</b>	0.898				
<b>Green Performance (GP)</b>		0.909	0.877	0.854	0.704
<b>GP 1</b>	0.914				
<b>GP 2</b>	0.812				
<b>GP 3</b>	0.846				
<b>GP 4</b>	0.865				
<b>GP 5</b>	0.831				

Source: compiled by authors

Table 3. Discriminant validity assessment on the basis of the Heterotrait-Monotrait criterion

	GKS	PDO	SIZE	AGE	GP	WT
<b>GKS</b>						
<b>PDO</b>	0.014					
<b>SIZE</b>	0.061	0.032				
<b>AGE</b>	0.048	0.019	0.129			
<b>GP</b>	0.418	0.022	0.072	0.104		
<b>WT</b>	0.011	0.098	0.091	0.269	0.238	

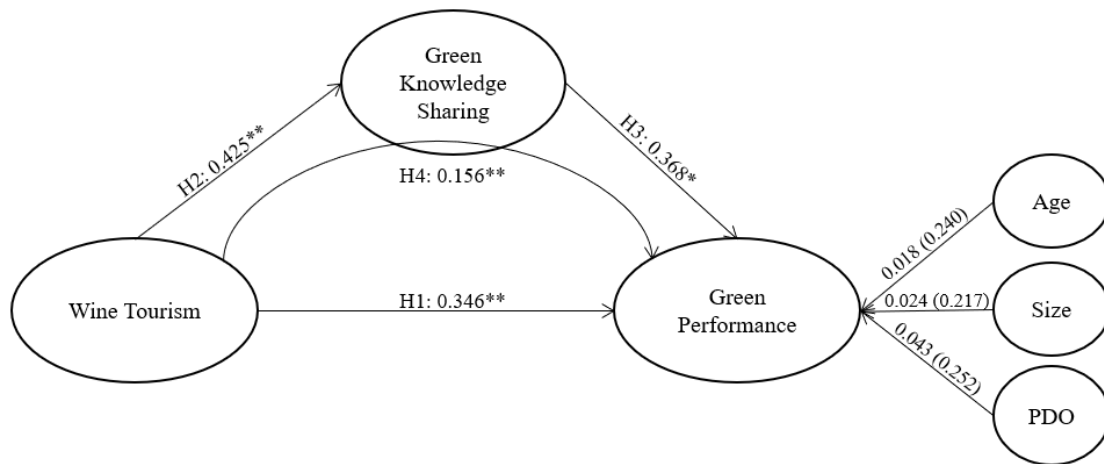
Source: compiled by authors

Upon the validation of construct reliability and authenticity, attention was directed towards an in-depth appraisal of the structural model. Illustrated in Figure 2 are the path coefficients juxtaposed with their corresponding R-squared values, all derived through a bootstrap examination consisting of 5,000 subsamples. Insights gleaned from these outcomes underscore the presence of robust and statistically appreciable effects within the scrutinized relationships. From this, it can be stated that WT holds sway over wineries' GP, with GKS functioning as an intermediary, albeit partial, agent in this dynamic. Bolstering this assertion is the manifestation of a decidedly positive and statistically meaningful direct influence (0.346), complemented by a similar nature of indirect consequence (0.156).

The empirical evidence garnered from the model's scrutiny lends credence to the ratification of all four hypothesized premises. A notable and constructive liaison became apparent between WT advancement and GP (H1:  $\beta=0.346$ ;  $p<0.000$ ), underscoring the direct repercussions WT imparts on GP. Concurrently, a favorable impact of WT on GKS was discerned (H2:  $\beta=0.425$ ;  $p<0.000$ ), alluding to WT's unswerving influence on GKS. Furthermore, a positive and significant nexus has been established between GKS and GP (H3:  $\beta=0.368$ ;  $p<0.018$ ), hinting that GKS is instrumental in actualizing GP within the confines of the establishments. Lastly, it was discerned that GKS (H7:  $\beta=0.071$ ;  $p<0.071$ ) partially mediates the interaction between WT and GP, a finding drawn from the positive and statistically consequential effect (refer to Table 4).

Regarding control variables, it is illuminated that membership in PDO, the longevity, and size of the wineries bear a positive, albeit statistically nebulous, influence. This shows an inability to generalize this correlation to a broader demographic. The model's integrity was assayed via the Geisser test ( $Q^2$ ), mandating forecasted values to surpass the nadir ( $Q^2 > 0$ ). In a contemporary directive by Hair *et al.* (2019), it is propounded that  $Q^2$  indices above 0, 0.25, and 0.50 are emblematic of low, moderate, and high predictive pertinence, in that order. Table 5, delineating the cross-validated redundancy, serves as a testament to the model's predictive gravitas through the exhibition of  $Q^2$  outcomes. Evidenced by  $Q^2$  indices that breach the 0.250 mark, the model is adjudged to possess a median degree of predictive relevance, as per the benchmarks set forth by Hair *et al.* (2019).

Figure 2. Theoretical model with R-squared, path coefficients ( $\beta$ ) and significance



Notes: \*\*p<0.001 \*p<0.05  
Source: compiled by authors

Table 4. Results of the structural model for the mediation model

Direct Effects	Path Coefficient	t-Value	P Values	95 % BCCI	Hypothesis supported
WT → GP	0.346	5.812	0.000**	[0.212; 0.499]	H1 supported
WT → GKS	0.425	5.128	0.000**	[0.216; 0.547]	H2 supported
GKS → SP	0.368	2.027	0.018*	[0.060; 0.468]	H3 supported
Indirect Effects	Path Coefficient	t-Value	P Values	95 % BCCI	Hypothesis supported
WT → GKS → GP	0.156	2.614	0.000**	[0.055; 0.347]	H4 supported

Notes: BCCI = Bias Corrected Confidence Intervals; \*\*p<0.001 \*p<0.05

Source: compiled by authors

Table 5. Construct cross validated redundancy

	SSO	SSE	Q <sup>2</sup> (=1-SSE/SSO)
GKS	392.000	321.055	0.322
PDO	196.000	196.000	
SIZE	196.000	196.000	
AGE	196.000	196.000	
GP	588.000	439.200	0.285
WT	1,568.000	1,568.000	

Source: compiled by authors

### Discussion and conclusions

This research is of paramount importance, as it empirically evidences the positive relationship between the WT development and the GP achieved by Spanish wineries. Furthermore, it sheds light on the transformative impact of this form of tourism in stimulating the GKS and how this, in turn, can lead to the improvement of GP.

The results of the research yield several theoretical, practices and policy implications. From a theoretical point of view, this study contributes to the academic literature by providing empirical evidence within the Spanish WT industry. In particular, the research establishes the positive and significant impact of WT development on GP, while highlighting the mediating effect of GKS on this relationship. These results align with recent research by Marco-Lajara *et al.* (2023a), Martínez-Falcó *et al.* (2023b) and Martínez-Falcó *et al.* (2023c), who demonstrate that the development of WT fosters competitiveness, green innovations and circular economy practices in Spanish wineries. However, to the authors' knowledge, no previous research had examined the mediating effect of GKS on the primary relationship investigated. Thus, this study serves as an initial exploration to understand how the development of WT can increase the stock and transfer

of environmental knowledge, which in turn can lead to increased GP of wineries, such a linkage may have been established through the joint understanding of NRBV and KNV theories. Consequently, it is essential to emphasize the need for further progress in exploring these relationships, as the existing academic literature addressing them remains limited. The theoretical implications of this study therefore successfully address the three RQs raised, providing evidence for (RQ1) a significant and positive effect between WT and GP development, as well as (RQ2) the mediating role of GKS in the WT-GP relationship. Moreover, the fact that the study focuses on the Spanish wine context brings a new perspective that enriches the academic discourse by shedding light on a wine region relatively unexplored in previous literature compared to the study of WT in New World wine-producing countries. In addition, the research also highlights the tangible benefits that wineries can realize through the strategic development of WT, suggesting avenues through which they can leverage their tangible and intangible assets to improve business performance. Therefore, the present research extends the body of knowledge of previous academic literature, offering a holistic understanding of the interaction between WT, GKS, and GP in the Spanish wine landscape.

Regarding the practical implications of the research, the study reveals that the influence of WT on GP transcends the superficiality of tourism activities, revealing itself as a bridge that conveys values, expectations and, substantially, knowledge. This reveals an unexplored opportunity: to use the WT platform for a bidirectional environmental education. Visitors become imbued with the winery's sustainable efforts, transforming them into conscious consumers, while wineries can absorb emerging ecological trends and preferences from tourists, refining their offerings and practices, but the lever that catalyzes this synergy is undoubtedly the transfer of ecological knowledge. Herein lies the essence of the transformation: staff training should not be limited to traditional operations, but should boldly expand into green education, creating sustainability ambassadors within the organization itself. At the same time, strategic alliances with universities and research centers become imperative, as they open channels for the circulation of updated knowledge and promote innovation. Investment in ecological knowledge thus represents an enrichment of the winery's human and structural capital, placing sustainability as the gravitational axis of the company. In the same way, the internalization of these practices demands a recalibration of the organizational structures, since it implies the insertion of sustainability criteria in the strategic core, the convergence of commercial and environmental objectives and the establishment of a GP monitoring and evaluation system. The latter is vital for making efforts tangible, translating into concrete indicators that serve not only as an internal management tool but also as translucent corporate responsibility reports.

In terms of policy implications, the findings of this study call for a profound reflection on current agricultural and tourism policies, revealing the need for an integrated agenda that does not treat both fields in a watertight manner. The WT interface, with its capacity to catalyze ecological practices, deserves recognition in public policies as an instrument of sustainable development, implying the incorporation of specific measures that encourage the symbiosis between tourism and viticulture based on sustainability, through incentives for wineries that actively participate in this tourism modality with a green approach. On the other hand, the mediating role of GKS underlines the political responsibility of promoting a culture of sustainability in the industry. This task transcends the mere enactment of regulations and enters the realm of education, training and dissemination. It thus reveals the imperative of policies that support continuous training and knowledge sharing in sustainable practices through the creation of centers of excellence in sustainable viticulture or by facilitating strategic alliances between wineries and academies or research institutes. In addition, the research results have implications for environmental governance, as they suggest the need for a regulatory framework that not only imposes sustainability standards, but also encourages green innovation. This could take the form of ecological certification schemes, subsidies for clean technologies, or preferential access to

markets for products derived from sustainable practices. Similarly, at the level of strategic planning, the findings point to the desirability of local and national authorities incorporating sustainable WT into their regional development strategies. Recognizing the particularities of each territory, these strategies could focus on the preservation of the landscape, the promotion of biodiversity, and the protection of the cultural heritage associated with viticulture, thus strengthening the territorial identity and the ecological and socioeconomic resilience of winegrowing regions.

While the research provides significant findings, it is essential to recognize its limitations. The relevance of the study would be enhanced by expanding the geographic scope to other nations renowned for their viticulture, which would facilitate comparative analysis between viticulture in Old and New World regions. In addition, further exploration of the impact of factors such as winery size, longevity, and PD affiliation is warranted, given their role as mere control variables in this analysis. Such an approach would require a multi-group examination to discern possible discrepancies within the suggested framework based on these elements. Furthermore, the present research focuses predominantly on the mediating role of GKS within the WT-GP nexus, underscoring the need for future studies to investigate alternative mediating constructs potentially critical to this correlation.

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