



# Green human resource management and economic, social and environmental performance: Evidence from the Spanish wine industry

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## ABSTRACT

The purpose of this research is to assess the impact of Green Human Resource Management (GHRM) on the economic, social, and environmental performance of Spanish wineries. Additionally, age, size, and Protected Designation of Origin (PDO) membership are introduced as control variables in order to increase the accuracy of the cause-effect associations examined. To reach this objective, a conceptual model has been constructed and assessed through Structural Equation Modeling (PLS-SEM) using data gathered from a survey conducted between September 2022 and January 2023, involving 196 Spanish wineries. The results demonstrate the occurrence of a positive and meaningful relationship between GHRM activities and the three yield typologies assessed in the Spanish wine context. This study is novel in the academic literature on environmental and human resource management, since, to the best of our knowledge, no previous research has looked into the effect of GHRM on the sustainable performance of Spanish wineries. Thus, it is useful for both academics and wine industry professionals who are examining potential variables that can catalyze winery performance.

## 1. Introduction

The preservation of natural resources has become a priority for senior management in manufacturing companies [1]. In this sense, the increasing focus on environmental protection and the necessity of having practices that are sustainable has spurred a demand for companies to adopt measures that are ecologically, fiscally, and socially responsible [2].

Pollution from industrial activities has been increasing rapidly, and natural resources have been progressively diminishing [3]. This context has motivated governments, environmental agencies, employees, governmental entities and society in general to demand that companies implement more sustainable practices that will ultimately lead to financial benefits, improved environmental performance and competitive advantage [4]. These demands are even more important in the wine industry, which is the context of the present research, given that this sector has to face several environmental problems, such as global warming and water scarcity, which threaten its survival [5].

To achieve a sustainable approach, organizations are striving to establish and implement a structured system of environmental

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control [6]. Since the 1990s, this system has been acknowledged as a paramount factor in attaining sustainable progress, and its tenets have been utilized in many areas, including human resources [7]. It is known that human resources management is one of the company's most important assets, as it is capable of integrating all activities to achieve positive performance [8]. Therefore, many researchers have focused on the importance of the relationship between human resources and environmental management in order to facilitate sustainable development within organizations and increase the ecological knowledge of employees, thus enhancing the organization's environmental conservation capabilities [9–11]. In this sense, Green Human Resources Management (GHRM) seeks to bridge the gap between human resources management and environmental management, encouraging companies to inspire their employees to become more environmentally conscious and thus drive environmental performance [12].

GHRM refers to an approach that focuses on optimizing human resources in an organization to improve its environmental performance [13]. This includes the use of sustainable human resource practices such as hiring environmentally committed employees, establishing environmentally friendly work policies, leveraging human resources to reduce energy use and waste reduction, and may also involve the promotion of a green corporate culture and commitment to sustainable development [14]. The intellectual origins of the GHRM construct date back to the seminal works of Beer et al. [15] and Fombrun et al. [16], giving birth to a promising field of research within the discipline of strategic management.

GHRM can improve economic, social and environmental performance by implementing practices that contribute to sustainable development [17]. These practices include training employees on topics such as sustainability, saving energy and using renewable resources, using clean technology, and reducing waste [18]. At this point it should be noted that sustainability refers to the balance between meeting the current needs of society, the economy and the environment, without compromising the ability of future generations to meet their own needs, i.e., it implies making decisions and carrying out actions so that we do not exhaust natural resources and do not damage the ecosystems on which our lives are based, while promoting social and economic wellbeing [19]. GHRM also provides for the establishment of incentive programs for the development of green skills and the promotion of diversity among employees, which can improve the company's competitiveness, as well as contribute to the reduction of its carbon emissions and its impact on the environment [20].

In particular, there are different mechanisms through which GHRM can improve the sustainable performance of companies. First, GHRM can improve operational efficiency through measures such as reducing resource consumption in internal processes, implementing teleworking policies to reduce carbon footprint and adopting more efficient technologies [21]. Second, GHRM can stimulate organizational innovation, as employees committed to sustainability can propose ideas for more environmentally friendly products and services, which can open up new market opportunities [22]. Third, employees, especially younger generations, tend to seek out companies that are socially and environmentally responsible, so GHRM can help attract and retain talent by demonstrating a genuine commitment to sustainability [23]. Fourth, GHRM can improve the company's public image and reputation among its stakeholders, resulting in the generation of trust and loyalty among customers and business partners [24]. Fifth, GHRM can influence the environmental practices of suppliers and business partners, promoting the greening of the supply chain [25]. Thus, GHRM can generate long-term economic, social and environmental benefits for companies, creating a virtuous circle in which business success and sustainability are mutually reinforcing [26]. The study seeks to explore the benefits derived from such practices in organizations, aiming to answer the following research question: does GHRM have a positive effect on the economic, social and environmental profitability of companies? To this end, a theoretical model is proposed, which is subsequently contrasted through the use of structural equation modeling, collecting primary data through a survey conducted between September 2022 and January 2023.

The Spanish wine industry serves as the setting for this research, since the study of the catalytic variables of sustainable performance is essential to ensure the long-term viability of the sector. In particular, sustainable performance refers to the ability of an organization to carry out its activities, operations and processes in such a way as to achieve positive results in terms of long-term sustainability, which implies achieving a balance between the economic, social and environmental aspects of the actions undertaken [27]. The wine industry faces several challenges related to climate change, water scarcity, biodiversity preservation and pollution [28–30]. In fact, these challenges are even more intensified in warm wine-growing territories, as is the case in the Spanish wine context [31]. Therefore, if no action is taken to address these problems, the sector will face an uncertain future [32]. It is important that wine producers and consumers, therefore, become aware of the sustainability issues of the wine industry and take measures to reduce environmental impact, preserve ecosystems and promote sustainable wine production. In this context, the research contributes to elucidate the effect of a variable that can catalyze the economic, social and environmental performance of Spanish wineries: the GHRM.

The originality and relevance of the research is explained by several factors. First, previous research on the effect of GHRM practices in the wine sector is lacking, so this study provides a unique opportunity to explore and build upon existing knowledge in the areas of environmental management and human resources. Second, there are only a few empirical studies that have explored this construct, so this research aims to expand the accumulation of relevant knowledge about the topic. Third, the study reflects on the catalyzing factors for the sustainable performance of Spanish wineries, which is especially useful and relevant, since the survival of the sector depends on the adoption of a sustainable approach. Fourth, this research provides winery managers with valuable insight into how they can enhance their facilities' economic, social and environmental performance by implementing various strategies.

Following the introduction, the next section investigates the theoretical foundations, formulating research hypotheses. In the third section, the research methodology is outlined, while the fourth section reveals the outcomes of the model built with structural equation modeling. Finally, the fifth section summarizes the results, potential shortcomings and further research opportunities.

## 2. Literature review

### 2.1. Theoretical underpinning

The present research takes the Resource-Based View (RBV) as its main theoretical underpinning. This approach examines how the ability of firms to leverage their valuable, scarce and hard-to-imitate strategic resources can affect their competitive advantage [33]. In the context of this research, improved economic, social and environmental performance is understood as gaining a competitive advantage for companies, given that, in an increasingly sustainability-conscious business environment, companies that demonstrate a strong commitment to improving their triple bottom line (economic, social and environmental) can differentiate themselves from the competition, attract and retain employees committed to social and environmental values, enhance their corporate reputation, as well as access new markets and customer segments that value sustainability principles [34]. Therefore, improved economic, social and environmental performance can be a strong and valuable competitive advantage in today's marketplace, as it not only helps companies become more resilient and sustainable in the long term, but also enables them to position themselves as leaders in their industry, attract talent and build strong relationships with their stakeholders [35].

Strategic resources provide superior long-term performance and continued competitive advantage to the organization if they are difficult for competitors to duplicate or extremely costly to imitate [36]. In this sense, GHRM can be conceived as a highly strategic capability by proactively identifying, developing, motivating and extending green employee behavior, thus achieving market distinctiveness that results in competitive advantage [37].

Human capital, when properly integrated into the complex social system of a company, often satisfies the criteria of RBV, as it can contribute to the achievement of superior performance [38]. Human resources can be used to gain maximum advantage from the strategies developed and implemented by management to achieve sustainability through ecological objectives [39]. Therefore, the appreciation of human resources can be linked to not only improved business results, but also to an increased consideration for the general public and the environment in which the company functions [40].

Several researches conclude, taking the RBV as a reference, that the success of the sustainability of organizations depends on the degree to which companies develop and stimulate their GHRM [41]. In fact, the lack of GHRM practices can lead to the demotivation of employees, which hinders the achievement of business objectives and, therefore, can even harm organizational performance [42]. This study seeks to explore the impact of GHRM on the economic, social, and environmental outcomes of Spanish wineries through an examination using the RBV, given that the study underlies the idea that human capital is the key element for acquiring and applying the principles of sustainability, as well as for improving business performance in its triple dimension.

### 2.2. Hypothesis development

GHRM is essential in assisting organizations to develop and maintain a sustainability-oriented business strategy [43]. This is largely due to the catalytic role played by such management in the formation and effective dissemination of a collaborative green culture, since the development of environmental practices by the organization is determined by teamwork, tolerance of failures, environmental training of employees and the assessment and evaluation of environmental objectives [44].

On the one hand, from the company's perspective, the main benefits of GHRM include improved employee productivity, increased operational efficiency, reduced costs, improved competitiveness and sustainability, as well as enhanced brand image and increased attractiveness to potential investors [45]. On the other hand, employees can also benefit from GHRM through the improvement of the working environment, leading to improved job satisfaction and productivity, as well as increased employee motivation and commitment to the company [46].

Therefore, implementing GHRM not only reflects an ethical commitment to sustainability, but can also offer long-term strategic and economic benefits by enhancing brand image, attracting and retaining talent, fostering innovation, and generating operational cost savings [47]. First, companies are increasingly aware of their impact on the environment and are looking for ways to operate more sustainably [48], so GHRM can come to reflect a commitment to environmental responsibility, as well as demonstrate to employees, customers and communities that the company cares about reducing its environmental footprint [49]. Second, environmental and labor regulations are constantly evolving and becoming more stringent, so implementing GHRM can help the company stay in compliance with these regulations and avoid potential fines and penalties [50]. Third, by aligning human resource practices with sustainability, companies can access new markets and business opportunities related to environmentally friendly products and services [51].

GHRM contributes to the design, implementation and maintenance of an environmental management system in companies, thus helping them to achieve better economic, social and environmental performance [52]. This cause-effect relationship is explained, among other things, by the increased environmental awareness of employees, by the company's greater ability to attract and retain talent, as well as by its improved reputation [53].

Green recruitment and selection are one of the main practices within GHRM with the aim of the organization developing environmentally friendly practices that ultimately support business performance [54]. Hiring and retaining talented employees is a major challenge facing human resources managers today [55]. In this respect, organizations can use the promotion of environmental protection as a mechanism to attract highly skilled and environmentally conscious human capital [56]. Thus, in the process of analyzing, describing and specifying jobs, companies should include and emphasize environmental aspects, as well as clearly explain what is expected of the selected candidate in terms of meeting green objectives [57].

Hiring staff who share the company's values of sustainability and environmental responsibility ensures that there is a natural alignment with the organizational culture, which promotes consistency and commitment to the company's sustainable goals [58]. In

fact, hiring employees with experience and/or expertise in sustainability and environmental practices can strengthen the company's ability to lead sustainability initiatives, as well as adopt greener approaches in all areas of operation [59]. Moreover, company employees who have a solid understanding of environmental and social issues can influence their peers and promote greater awareness of sustainability throughout the organization, which in turn can lead to improved sustainable performance [60].

Green training is an essential component of successful green management in organizations, as it helps to ensure that employees are properly equipped to handle sustainability initiatives [61]. These aim to stimulate employees' attention and knowledge of environmental concerns, create a positive attitude, adopt a proactive approach to green initiatives, and encourage the development of skills to reduce waste and save energy [62]. Along these lines, Saturnino-Neto et al. [63] empirically demonstrated that to achieve corporate sustainability, investment in environmental training of workers was a decisive element. Likewise, incentive systems can value workers who participate in the development and implementation of green practices by setting green goals for both workers and managers who motivate their subordinates to achieve such goals [64]. In this regard, a wealth of scientific research shows that rewards can be an effective tool to promote better economic, social, and environmental outcomes for businesses [65].

The competence and involvement of employees in environmental protection is linked to better economic performance, since attracting and retaining a workforce interested in environmental development often leads to the recruitment of talented workers and, therefore, to organizational performance [66]. Similarly, strengthening employees' involvement and commitment to environmental actions and providing environmental training can improve their knowledge and skills, thereby boosting companies' economic performance [67].

GHRM can improve the economic performance of companies by integrating sustainable practices in all areas of the organization, since, by implementing them as a result of the green knowledge achieved by workers, such as reducing energy and water consumption, optimizing processes and eliminating waste, companies can save on operating costs in the long term [68]. Similarly, as Carballo-Penela et al. [69] point out, the search for environmentally friendly solutions can stimulate innovation within the company, which can lead to new products, services and ways of operating, generating new revenue opportunities. Furthermore, O'Donohue and Torugsa [70] highlight that by integrating sustainable approaches to human resource management, companies can reduce risks associated with legal issues, employee grievances and environmental problems, which in turn protects their assets and improves their bottom line [71]. However, the contribution of GHRM is not only in economic terms, but also through the improvement of such practices in social and environmental performance [72]. Following the thinking of El-Kassar and Singh [73] the alignment of GHRM practices with sustainability concepts allows building the capacity of companies to achieve not only their short-term financial goals, but also their goals aimed at improving society and the environment.

In particular, the recruitment of top talent, as a result of GHRM, is considered a key aspect to support the social performance of companies by increasing the level of employee satisfaction, as well as improving stakeholder relations [74]. Similarly, GHRM can improve the environmental performance of companies by helping them implement environmental management practices, such as monitoring natural resources and developing goals to reduce environmental impact [75]. It can also assist in educating employees on how they can improve environmental behavior in the workplace by encouraging recycling of materials and adoption of energy-efficient practices [76], as well as help companies develop motivational plans to encourage environmentally responsible behavior, enabling them to reduce energy consumption, minimize waste and reduce greenhouse gas emissions [77].

Therefore, in terms of social performance, GHRM can improve a company's social outcomes by implementing mechanisms that promote sustainable and responsible practices in its approach to society in general and employees in particular [78]. By implementing GHRM, companies create an organizational culture that values social responsibility, which extends to employees and is reflected in their actions and behaviors, contributing to a positive and socially responsible image of the company. Similarly, as Arnaud and Wasieleski [79] point out, GHRM can positively influence the local community by promoting socially responsible practices, thus strengthening the ties between the company and the community in which it operates. In addition, GHRM is not only limited to internal operations, but also extends to the supply chain, so ensuring that suppliers follow ethical and sustainable practices can contribute to the generation of a more positive social impact and thus avoid the development of harmful practices [80]. Furthermore, Zhang et al. [81] concludes that GHRM can be aligned with global objectives, such as the United Nations Sustainable Development Goals, thus demonstrating the company's commitment to the society in which it operates.

From an environmental performance standpoint, GHRM can encourage the conservation of resources such as energy, water and materials, allowing companies to reduce their environmental footprint and save operating costs [82]. GHRM practices can lead to the adoption of approaches that reduce waste generation and waste, which can result in the promotion of recycling, reuse and reduction of unnecessary packaging [83]. Similarly, GHRM can drive the adoption of sustainable transportation policies, such as the use of electric vehicles, carpooling options, and the promotion of bicycle use and public transportation, thereby reducing greenhouse gas emissions among workers. In addition, as pointed out by Zhao and Huang [84], GHRM involves the establishment of indicators to measure the environmental impact of operations and human resources practices, which allows constant monitoring of the environmental practices developed, as well as the identification of areas in need of improvement.

Given the notoriety of the GHRM construct, in recent years more and more scholars have begun to analyze the effect of GHRM on different organizational variables, such as business performance [85]. Previous studies have explored how GHRM can have an effect on performance in terms of economics, social and environmental outcomes, which have been linked to an increase in the environmental awareness of employees [86]. In this regard, Rawashdeh [87] found evidence of a positive correlation between GHRM and the long-term success of hospital companies in Jordan. Mousa and Othman [88], in turn, demonstrated such a causal-effect relationship in the Palestinian healthcare context. More recently, a study conducted by Awwad et al. [89] determined that the implementation of GHRM systems in small and medium-sized enterprises in Saudi Arabia had a positive, measurable impact on their economic, social, and environmental performance.

However, despite the existence of academic precedents in the analysis of the GHRM linkage, its study is very scarce and needs to be matured and reflected upon in other economic sectors that have not been previously explored. In this sense, to our knowledge, no prior research has explored the impact of GHRM on wineries' economic, social, and environmental performance, presenting an unprecedented opportunity to gain a better understanding of the topic. This is even more relevant considering the potential role that GHRM can play in the success of the wine industry, since it can not only improve its biodiversity, but also improve working conditions and winemaking practices, thus contributing to the formation of a sustainable wine industry in the long term. As the objective of overcoming such existing gaps in scientific knowledge, the following three hypotheses are put forward below (see Fig. 1).

- H1. GHRM has a positive effect on the economic performance of wineries.
- H2. GHRM has a positive effect on the social performance of wineries.
- H3. GHRM a positive effect on the environmental performance of wineries.
- H1 = a1: Green Human Resource Management → Economic Performance.
- H2 = a2: Green Human Resource Management → Social Performance
- H3 = a3: Green Human Resource Management → Environmental Performance

### 3. Methodology

The methodological structure of this research is developed in four sections: (1) research context, (2) population and sample, (3) variables, and (4) analysis technique. These sections are designed to provide a clear understanding of the research. A detailed description of each section is presented below.

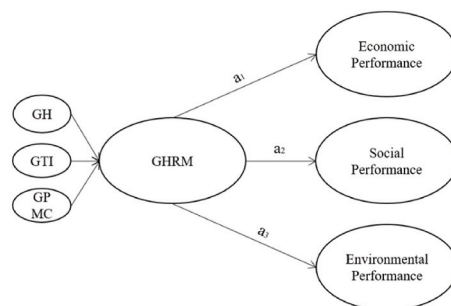
#### 3.1. Research context

The selection of the Spanish wine sector to contextualize this research is based on four considerations. First, the Spanish wine industry is estimated to drive substantial economic growth in 2022, with forecasts showing it will contribute €23.7 billion to the country's Gross Value Added and account for 2.2 % of the nation's total [90]. Additionally, the sector is seen to have great social, environmental and heritage value. Second, GHRM approaches can help the wine industry satisfy both the contemporary societal and ecological expectations of their customers, as well as adhere to the rigorous ecological standards they are held to, making it an essential matter to investigate in the current era. Third, gaining a thorough understanding of environmental issues has been identified as critical for businesses to remain competitive in the global market [91]. Fourth, this study offers an unprecedented investigation into the complex dynamics between environmental management and sustainability in the wine industry, presenting a first-of-its-kind theoretical model to explore these relationships.

#### 3.2. Population and sample

The population comprised all winemaking companies categorized according to the Spanish National Code of Economic Activities (CNAE, for its acronym in Spanish) code 1102. The Iberian System of Balance Sheet Analysis (SABI, for its acronym in Spanish) database revealed that this code corresponded to a total of 4373 businesses. This study employed a questionnaire created from a thorough literature review and pre-tested for accuracy and validity with environmental and quality managers of the wineries and winemakers in order to ensure the clarity and appropriateness of the items used to measure each construct.

The survey was distributed online through the Qualtrics application from September 2022 to January 2023, and a total of 196 valid



Note: GHRM: Green Human Resource Management; GH: Green Hiring; GTI: Green Training and Involvement; GPMC: Green Performance Management and Compensation  
 H1 = a1: Green Human Resource Management → Economic Performance  
 H2 = a2: Green Human Resource Management → Social Performance  
 H3 = a3: Green Human Resource Management → Environmental Performance

**Fig. 1.** Theoretical model proposed

Note: GHRM: Green Human Resource Management; GH: Green Hiring; GTI: Green Training and Involvement; GPMC: Green Performance Management and Compensation.

Source: own elaboration

responses were collected from the CEOs of the wine companies after a strict screening process. This is because senior management members are more knowledgeable and experienced in the overall and strategic functioning of the company, and can provide more insightful responses to the questions posed in the questionnaire. Thus, the sample consisted of 196 responses from 202 different winery CEOs. The CEOs had to answer items related to certain constructs, and a descriptive analysis of the sample is presented in Table 1.

An intricate assessment of Common Method Variance (CMV) was undertaken to discern potential discrepancies stemming from the deployment of a singular measurement method for evaluating correlative components. For this evaluative endeavor, the study adopted Harman’s one-factor test, harnessing the methodology of factor analysis as delineated by Zhao et al. [92]. Podsakoff and Organ [93] postulated that should the aggregate variance of an individual construct not surpass fifty percent, the dataset remains unaffected by CMV. Within the ambit of this scholarly examination, the pinnacle of aggregate variance observed for an individual construct was recorded at 31.90 %, thereby corroborating that the outcomes remained undominated by any singular factor, in resonance with the findings of Zhao et al. [92].

### 3.3. Final del formulario

Likewise, an intricate analysis of possible collinearity problems was performed, underscored by the criticality of ensuring the absence of multicollinearity amongst the antecedent variables aligned to each endogenous construct. As posited by Hair et al. [94], a Variance Inflation Factor (VIF) surpassing 5 signals the manifestation of collinearity. The presented VIF values, as delineated in Table 2, emanate from the evaluation of multicollinearity of every endogenous variable vis-à-vis others. It is, therefore, these values exclusively pertain to the associations between dependent variables and their preceding antecedents. Within the purview of this research, no VIF value was observed to cross the stipulated threshold, thus negating the possibility of collinearity challenges. Additionally, the collinearity scrutiny further facilitated the omission of common method bias, in line with Kock’s [95] assertion that VIF values beneath 3.3 warrant such exclusion.

Pertaining to the sample’s representativeness, it is imperative to underscore that among the Spanish autonomous communities, the preponderance of representation is attributed to Castilla and Leon (14.29 %), Catalonia (13.78 %), Castilla La-Mancha (10.20 %), and La Rioja (9.69 %). Notably, these communities also exhibit the most substantial population density, as illustrated in Fig. 2. Furthermore, all seventeen autonomous communities constituting Spain find representation within this study’s sample. In a comparative analysis of the sample and the broader population, the size of the wineries manifests a certain resemblance (see Fig. 3). Over 60 % of both the sample and the overall population are characterized as micro-enterprises, signifying establishments with a workforce of fewer than 10 individuals. Within the sample, 30.20 % qualify as small enterprises, employing between 10 and 49 individuals. Concurrently, 3.55 % are identified as medium-sized entities, encompassing a workforce ranging from 50 to 199 workers, and a scant 1.88 % categorize as large enterprises, boasting a workforce exceeding 200 individuals.

### 3.4. Variables

Previously validated scales were utilized to ensure the consistency, reliability and validity of the variables used. First, the GHRM variable was measured by the scale developed by Mousa and Othman [57], which is composed of three first-order variables: green hiring (6 items), green training and involvement (8 items), and green performance management and compensation (8 items). Second, Wang and Wang’s [96] 4-item scale was employed to measure economic performance, Paulraj’s [97] 5-item and Paillé et al. [98] 5-item scales were utilized to measure social and environmental performance, respectively. Third, age, size and membership in a Protected Designation of Origin (PDO) by wineries were introduced as control variables to observe the influence of these individual characteristics on economic, social and environmental performance. These variables were chosen due to their suitability for use in this research, as indicated by previous studies in the wine sector [99,100]. The size of each organization was evaluated according to the criteria of the Organization for Economic Co-operation and Development [101], the age was determined by the total duration of years from the organization’s inception until the time of the research (year 2022) and PDO was categorized as a binary value, 1 representing at least one PDO and 0 signifying no PDO assignment. All scales were rated using a 7-point Likert-type measurement and four variables were regarded as self-reflective principles, and the self-reflective-self-reflective principles classified as higher-level concepts.

**Table 1**  
Mean, Minimum, Maximum and Standard Deviation of the analyzed variables.

	Mean	Min	Max	Standard deviation
GHRM	5.125	1	7	1.112
EP	4.674	1	7	1.492
SP	4.762	1	7	1.271
ENP	5.251	1	7	1.624
SIZE	10.242	1	262	0.969
AGE	16.765	1	217	0.854
PDO	0.657	0	1	0.994

Note: GHRM = Green Human Resource Management; EP = Economic Performance; SP = Social Performance; ENP = Environmental Performance; PDO = Protected Designation of Origin.

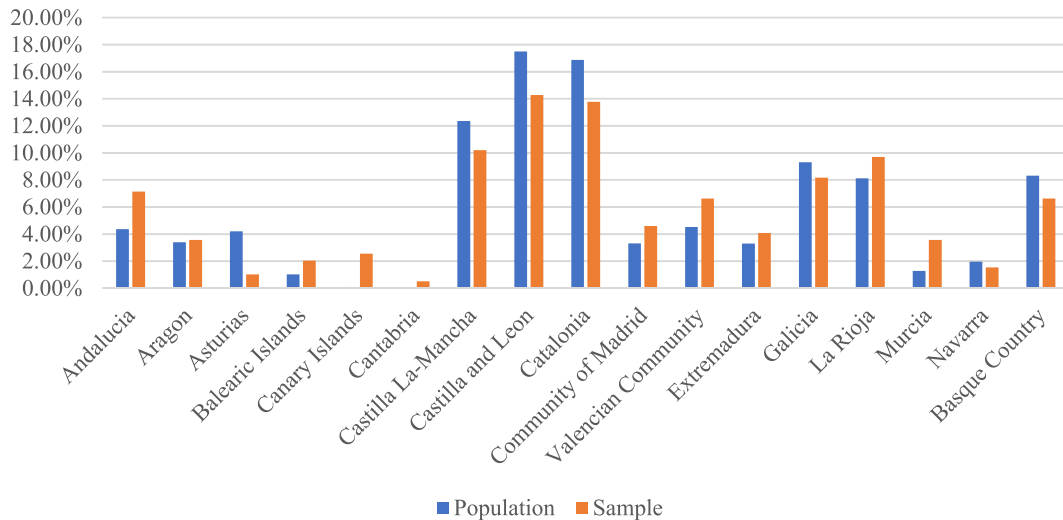
Source: compiled by authors

**Table 2**  
Analysis of collinearity in the model through VIF values.

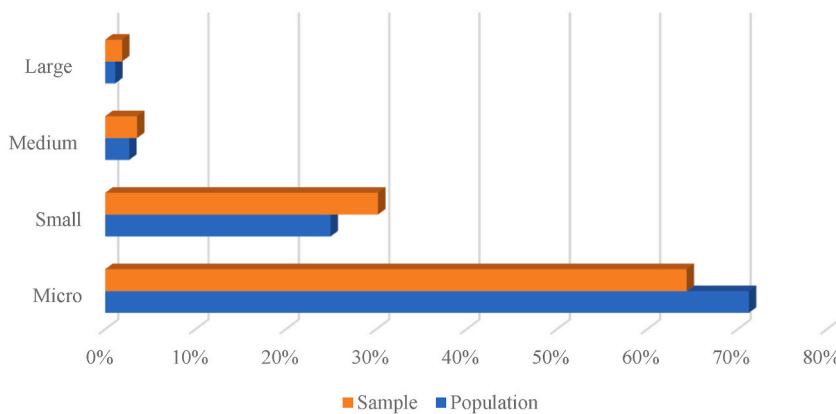
	GHRM	EP	SP	ENP	AGE	PDO	SIZE
<b>GHRM</b>		1.031	1.024	1.188			
<b>EP</b>							
<b>SP</b>							
<b>ENP</b>							
<b>AGE</b>		1.481	1.611	1.149			
<b>PDO</b>		1.014	1.573	1.110			
<b>SIZE</b>		1.942	1.230	1.780			

Note: GHRM = Green Human Resource Management; EP = Economic Performance; SP = Social Performance; ENP = Environmental Performance; PDO = Protected Designation of Origin.

Source: compiled by authors



**Fig. 2.** Geographical representation of companies in population and sample  
Source: own elaboration.



**Fig. 3.** Percentage of companies in the population and in the sample according to their size  
Source: own elaboration.

3.5. Analysis technique

This study utilized partial least squares structural equation modeling (PLS-SEM) and the SmartPLS v. 3.3.9 software to analyze the data, which enables the exploration of a large number of theoretical relationships between variables, including those that are latent. This technique is especially helpful in the Management discipline, since many of the concepts investigated are not directly observable

[102]. Three primary reasons motivated the choice of PLS-SEM were: (1) GHRM is an advanced construct, and PLS-SEM is an efficient technique for analyzing multivariate data [103]; (2) there are direct links between variables, and PLS-SEM is a suitable choice due to its capacity to handle both direct and indirect connections within the same model [104]; (3) the study sample size (n = 196) surpasses the minimum of 100 observations recommended by Reinartz et al. [105] for the use of this technique. As a summary, Table 3 shows a compilation of the technical specifications of the study.

#### 4. Results

To critically evaluate the efficacy of the proposed model, a two-stage approach methodology premised on the values of the latent variables was employed, recognizing the multi-dimensional nature of the GHRM construct. In the first phase, the cumulative values of these latent variables were scrutinized, which were subsequently refined to serve as indicators for the secondary-level variables. The results are systematically presented in a tripartite structure, following the guidelines delineated by Hair et al. [106]: (1) a comprehensive appraisal of the model; (2) an examination of the measurement model; and (3) a structural analysis of the model.

First, the overall evaluation of the proposed model indicates a Standardized Root Mean Square Residual (SRMSR) residual of 0.069, signifying an adequate overall fit, in accordance with the standard benchmark of 0.08 [107]. Consequently, it is possible to maintain carrying out the analysis of the structural model and the evaluation of the measurement model. Similarly, as can be seen in Table 4, the indicators relating to the unweighted least squares discrepancy (d\_ULS) and the geodesic discrepancy (d\_G) are below the values of HI95 and HI99 and are therefore within the confidence interval after bootstrapping.

Second, it is essential to underscore the adherence to the steps put forward by Hair et al. [106] when examining the performance of the measurement model. These steps involve the analysis of the indicators' reliability through their respective loadings ( $\lambda$ ), confirmation of composite reliability with Cronbach's alpha and composite reliability, appraisal of the convergent validity through the Average Variance Extracted (AVE), and determination of the discriminant validity utilizing the Heterotrait-Monotrait criterion (HTMT).

Evaluation of the measurement model is discussed in Table 5 which reveals that the values of the indicators of the respective models are more than 0.707, which complies with the individual reliability criteria [108]. This attests to the satisfactory levels of individual reliability of the indicators, thereby reinforcing their compatibility to assess each construct. Moreover, the attained results upheld the criterion of internal consistency reliability seeing as both Cronbach's alpha and composite reliability (pc) indicators exceed the minimum established value of 0.8. It should be noted that since a two-stage approach was followed for the calculation of the second-order variables, the scores of the first-order variables became indicators of the second-order variables, which is why the results for the GHRM construct are composed of three indicators. Likewise, all the constructs have an AVE higher than 0.5; indicating that they stand by the criteria of convergent validity as stated by Kline [109]. This implies that each construct is capable of describing more than half of the variance of its respective indicators. Furthermore, Table 6 confirms that all constructs conform to the criterion of discriminant validity, due to the fact that the HTMT is below 0.85 [110]. This means that every construct differs from one another, thus capturing distinct realities.

Similarly, before testing the significance of the trajectories, the study checked for an endogeneity problem in the model. When estimating models, studies can use the Gaussian Copula (GC) technique to detect and correct endogeneity problems [111]. In this sense, Table 7 shows that all the trajectories subjected to the GC test are not statistically significant, so the proposed relationships are free of the endogeneity problem.

Once the reliability and validity of the constructs had been ascertained, the subsequent step was to assess the structural model. This assessment revolved around determining the predictive capacity and the interaction between the studied constructs. Hair et al. [106] supplied the guidance to carry out this task, which was done by considering the path coefficients and the R-squared level. Fig. 4 below depicts an outcome from the bootstrap test of 5000 subsamples. As it is shown, the direct effects are quite positive and statistically relevant (see Table 8). This implies that GMRM positively and significantly affects economic (H1.  $\beta = 0.319$ ;  $p < 0.000$ , social (H2.  $\beta = 0.481$ ;  $p < 0.000$ ) and environmental (H3.  $\beta = 0.463$ ;  $p < 0.000$ ) performance. Therefore, the three hypotheses formulated are

**Table 3**  
Technical specifications of the study.

Methodological characteristics	Study information
Research context	Spanish wine industry
Population	4373 wineries
Sample	196
Survey target person	CEO
Variables analyzed	GHRM, EP, SP, ENP
Control variables	PDO, SIZE, AGE
Scale type	Previously validated scales
Analysis technique	PLS-SEM
Software	SmartPLS v. 3.3.9

Note: GHRM = Green Human Resource Management; EP = Economic Performance; SP = Social Performance; ENP = Environmental Performance; PDO = Protected Designation of Origin.

Source: own elaboration



**Table 4**  
Overall model fit.

	Value	HI95	HI99
SRMSR	0.069	0.074	0.081
d_uls	0.214	0.361	0.418
d_G	0.346	0.392	0.407

Source: compiled by the authors

**Table 5**  
Indicator analysis and convergent validity.

Construct/Items	Outer Loadings	Rho (Pa)	Cronbach's Alpha	AVE
<b>Green Human Resource Management (GHRM)</b>		0.877	0.867	0.789
GHRM 1	0.908			
GHRM 2	0.852			
GHRM 3	0.905			
<b>Economic Performance (EP)</b>		0.966	0.960	0.893
EP 1	0.915			
EP 2	0.962			
EP 3	0.951			
EP 4	0.951			
<b>Social Performance (SP)</b>		0.902	0.898	0.712
SP 1	0.777			
SP 2	0.881			
SP 3	0.845			
SP 4	0.878			
SP 5	0.834			
<b>Environmental Performance (ENP)</b>		0.932	0.930	0.781
ENP 1	0.895			
ENP 2	0.925			
ENP 3	0.823			
ENP 4	0.874			
ENP 5	0.899			

Note: The indicators for the second-order variables are: GHRM 1 = Green Hiring; GHRM 2 = Green Training and Involvement; GHRM 3 = Green Performance Management and Compensation.

Source: compiled by authors

**Table 6**  
Analysis of discriminant validity.

	AGE	DOP	ENP	EP	GHRM	SIZE	SP
AGE							
DOP	0.084						
ENP	0.077	0.021					
EP	0.032	0.170	0.462				
GHRM	0.145	0.047	0.537	0.375			
SIZE	0.105	0.093	0.221	0.160	0.217		
SP	0.130	0.048	0.817	0.655	0.587	0.236	

Note: PDO = Protected Designation of Origin; ENP = Environmental Performance; EP = Economic Performance; GHRM = Green Human Resource Management; SP = Social Performance.

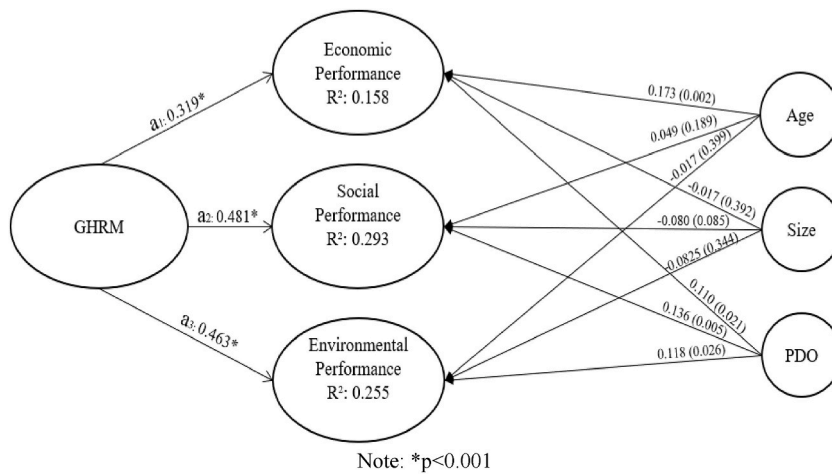
Source: compiled by authors

**Table 7**  
Gaussian copula (GC) test.

Path Endogeneity (GC) test	Original sample (O)	Sample mean (M)	T statistics ( O/STDEV )	P values
GHRM → EP	0.426	0.124	0.426	0.589
GHRM → SP	0.514	0.482	1.284	0.172
GHRM → ENP	0.571	0.512	0.517	0.267

Note: GHRM = Green Human Resource Management; EP = Economic Performance; SP = Social Performance; ENP = Environmental Performance.

Source: own elaboration



**Fig. 4.** Results of the proposed theoretical model  
 Note: \* $p < 0.001$ .  
 Source: own elaboration

**Table 8**  
 Evaluation of the structural model.

Direct Effects	Path Coefficient	t-Value	P Value	95% BCCI	Hypothesis supported
GHRM - > EP	0.319	3.520	0.000*	[0.170; 0.459]	H1 supported
GHRM - > SP	0.481	7.100	0.000*	[0.379; 0.593]	H2 supported
GHRM - > ENP	0.463	7.213	0.000*	[0.366; 0.570]	H3 supported

Note: \* $p < 0.001$ .  
 Source: compiled by authors

accepted and, in addition, it is clear that, of the three dimensions that make up sustainable performance, GHRM contributes most to social outcomes. As for the control variables, membership in a PDO shows a positive and significant effect on economic, social and environmental performance, while size shows a negative but non-significant relationship on the three types of performance and, finally, the age of the winery has a positive and significant effect on economic performance, a positive and non-significant effect on social performance, and a negative and non-significant effect on environmental performance.

Finally, it was determined that the quality of the model was satisfactory according to the Gesisser test ( $Q^2$ ). The  $Q^2$  scores had to be above 0 in order to demonstrate satisfactory levels of productive relevance [112]. According to Table 9, the  $Q^2$  values more than 0.25, thereby indicating that the model could be regarded as successful.

**5. Discussion and conclusions**

The results of the present investigation are in line with previous research on the subject, such as that of Rawashdeh [87], who found evidence of a positive correlation between GHRM and the long-term success of hospital enterprises in Jordan, that of Mousa and Othman [88] who demonstrated such a causal-effective relationship in the Palestinian healthcare context, or that of Awwad et al. [89], who concluded that the implementation of GHRM systems in small and medium-sized enterprises in Saudi Arabia had a positive and measurable impact on their economic, social and environmental performance. However, despite the existence of academic precedents in the analysis of the link between GHRM and sustainable performance, on the one hand, its study is very scarce and, on the other hand,

**Table 9**  
 Theoretical model with R-squared, path coefficients ( $\beta$ ) and significance.

	SSO	SSE	$Q^2 (=1-SSE/SSO)$
AGE	196.000	196.000	
DOP	196.000	196.000	
ENP	980.000	799.845	0.284
EP	784.000	680.069	0.253
GHRM	588.000	588.000	
SIZE	196.000	196.000	
SP	980.000	783.632	0.300

Source: compiled by authors

it needs to be matured and reflected upon in other economic sectors that have not been previously explored, as in the case of the wine sector.

This study demonstrates the impact that GHRM can have by enabling wineries to maximize their economic, social and environmental performance through consistent improvement of the three components that compose GHRM: green hiring, training and involvement, as well as green performance management and recompense.

By green hiring, wineries can reduce the risks associated with pollution, improve productivity and cost savings, and boost their image with customers and business partners. Not only does green hiring result in lower operating costs, but it also has positive implications for social performance. It can employ and develop people specialized in environmental and technological management, while promoting the use of more environmentally friendly technologies. Additionally, improved air and water quality contribute to better community health. Ultimately, wineries that invest in green hiring demonstrate a commitment to the environment and gain consumer confidence, which can ultimately result in more financial success.

Green training and engagement are vital for improving wineries' economic, social and environmental performance. Through specific training, employees can be educated on sustainable and responsible practices that will reduce the organization's environmental footprint. Employee involvement in green groups is another way to advocate for eco-friendly practices and motivate the implementation of innovative environmental projects. This type of collaboration also allows all stakeholders, including customers, suppliers, and government agencies, to recognize and support the winery's green agenda. Not only does implementing eco-friendly practices benefit the environment, but it can also reduce operating costs, promote customer loyalty, and bolster the winery's social reputation. In addition, a 'green' work culture encourages purpose and commitment among employees.

Green performance management and green offsetting can improve the economic, social, and environmental performance of wineries through providing financial incentives to those that take steps to reduce their environmental impact. Using these two tools can help wineries identify areas of improvement and measure their environmental performance. By being rewarded for their efforts to minimize their negative effects on the environment, wineries increase their commitment to environmental protection, as well as their bottom line. This ecological management and compensation should also result in significant cost savings for businesses in terms of fuel, energy, and other resources. Furthermore, it helps ensure and improve the health and biodiversity of specific ecosystems, thus contributing to a healthier planet and reducing the impacts of climate change.

The research therefore has several theoretical implications and practices. First, the study advances in the understanding of the effects of GHRM on organizational performance, given that, to the best of our knowledge, there are no previous studies that have analyzed the relationships raised in the Spanish wine context. Secondly, the study contributes to expanding the body of knowledge related to environmental and human resource management in the wine industry. Fourth, this research provides empirical evidence that GHRM can have a positive impact on the economic, social and environmental performance of wineries, making it a valuable aid for wine managers in their efforts to improve winery operations. Fifth, wine managers, based on the results of the research, can come to see the combination of environmental management and human resource management as a strategic element through which to gain a competitive advantage. Sixth, wine managers can use this research to attract financial resources through state aid to improve their GHRM.

Despite the valuable contributions of the research, there are certain limitations that should be noted. In order to gain a better understanding of how GHRM contributes to economic, social and environmental performance, it is important to extend the geographical scope of the study to encompass New World wine producing countries, such as South Africa. Additionally, future projects should investigate in greater depth the best practices that wineries can implement to improve their GHRM, such as through qualitative research using the benchmarking technique. By doing so, it would be possible to not only compare the model presented in this current study to those employed in the South African wine context, but also gain insight into what measures can be taken to maximize GHRM efficiency and effectiveness. Likewise, given the positive and significant effect of age on economic performance, as well as the positive and significant influence of belonging to a PDO on economic, social and environmental results, as a future line of research we propose to introduce the control variables of the present study (age, size and PDO) as moderating variables in the three main relationships raised in order to determine whether they affect their intensity.

#### Data availability statement

Data will be made available on request.

#### CRedit authorship contribution statement

**Johnny Vicente Montalvo-Falcón:** Funding acquisition, Formal analysis, Data curation, Conceptualization. **Eduardo Sánchez-García:** Project administration, Methodology, Investigation. **Bartolomé Marco-Lajara:** Supervision, Software, Resources. **Javier Martínez-Falcó:** Writing – review & editing, Writing – original draft, Visualization, Validation.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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