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# Sustainability and growth: Evidence from Spanish wine industry

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## Abstract

*Aim of study:* To analyze the compatibility of sustainability with the business growth of wineries in Spain.

*Area of study:* The data used come from a survey conducted in the years 202 and 2021, which was addressed to the all wineries located in Spain.

*Material and methods:* The economic growth of wineries is conditioned by different factors; in this work we have analyzed the orientation towards sustainability, business resources and capabilities (marketing, innovation, marketing, human resources, network resources, management resources and financial resources), profitability and exports. The empirical analysis was carried out by studying the responses received after a first mail sent to all independent wineries, with a subsequent telephone call. The number of responses, 411, represents 14% of the population. Using the regression model, estimated by OLS with Robust Errors proposed by Eiker-White, the factors determining the economic growth of the wineries were analyzed. The analysis done was exploratory.

*Main results:* The results show that the factors that most favor the growth of Spanish wine companies are management capabilities, sustainability orientation and financial resources.

*Research highlights:* Two relevant factors for growth are management capabilities and sustainability orientation. This reaffirms the compatibility of opting for sustainability and business growth in the case of Spanish wineries. And it allows to give arguments to the positive discourse between growth and sustainability of economic activities.

**Additional key words:** business growth; Spanish wineries; resources and capabilities.

**Abbreviation used:** FR (Financial Resources); HR (Human Resources); INR (Innovation Resources); MKR (Marketing Resources); MR (Management Resources); NR (Network Resources); OLS (Ordinary Least Square); ROA (Return on Assets); SABI (Balance Sheets Analysis System); VIF (Variance Inflation Factor).

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# Introduction

Companies from all sectors need to grow and to maintain the income from their investment (Penrose & Penrose, 1959; Jeewandarage, 2021). Those companies that cannot grow in an environment in which the rest of the companies are growing at the same or higher rate as the sector average will lose market share and most probably disappear (Penrose & Penrose, 1959; Porter, 1985; Barney, 1991; Grant, 2010). Growth is undoubtedly the most cited factor of business success (Martín-García & Morán, 2021), although there is no unanimity with respect to defining the variable or variables that should be used to measure it (Jeewandarage, 2021; Martin-García & Morán, 2021), and in many cases there is no correlation between the different measures used (van Witteloostuijn & Kolkman, 2019; Jeewandarage, 2021).

However, at the end of the last century a new paradigm emerged which questioned the capacity of human activity to continue growing indefinitely: sustainability (Choi & Gray, 2008). ''Sustainable development'' was initially defined as ''development that meets the needs of the present without compromising the ability of the future generation to meet their needs" (World Commission on Environment and Development, 1987). Climate change, the exhaustion of resources, pressure on fundamental elements for human life, such as air or water, droughts, floods, the greenhouse effect or famines seem to call into question our capacity to continue stretching the resources provided by planet earth (Theis & Tomkin, 2015). Business growth largely depends on the same economic activities that generate a loss of biodiversity, climate change, the degradation of the soil, the pollution of water and unsustainable geochemical flows (Theis & Tomkin, 2015). However, without economic growth economies go into recession which leads to unemployment and poverty. Therefore, the global economy is headed towards a conflict between sustainability and economic growth.

Most of the literature explains business growth by business productivity (Melitz, 2003; Helpman et al., 2004; Bernard et al., 2012; and Fariñas et al., 2021, for Spain). However, there is an emerging strand of literature that recommends a more in-depth study of new management models, as an alternative to explaining company growth (Huerta & Salas, 2012). This new literature suggests that improvement in business management constitutes an additional source of growth: increasing human capital, professionalising business management and implementing good management practices.

The contribution of our work is inserted in this new literature. The strategic decision to guide the company towards sustainability does not hinder its growth, but, in fact, is an element that boosts it. Therefore, when companies take this line of action, they do not face a dilemma between growth and sustainability but can adopt practices oriented towards the latter not only without threatening their growth, but also favouring it. There are hardly any studies that analyse this relationship between sustainability and growth in companies (Moore & Manring, 2009; Gupta et al., 2013).

This article seeks to cover this gap in the knowledge and to do this it will focus on the Spanish wine industry. Spain is the country with the largest area of vineyards in the world with 964 thousand of hectares in 2021, although in terms of production, it holds third place with 35.3 MhL after Italy (50.2 MhL) and France (37.6 MhL) representing 47% of world wine production in 2021 (OIV, 2022). In Spain, the winemaking activity generates 23.7 billion euros per year, equivalent to 2.2% of gross domestic product. In terms of employment, the sector provides 427,700 jobs, representing 2.4% of employment in Spain; 215,300 people are employed directly and the employment of the remaining 212,400 is indirect or induced (Interprofesional del Vino en España, 2020). In January 2023, a total of 4,130 wineries were registered, which employed an average number of 10 workers and were, on the whole, small companies (SABI, 2023).

The wine sector in Spain is continually growing. Therefore, average production has increased, despite the reduction in the area of vineyards due to an increase in yield of 18% from an average of 38 hL/ha to 45 hL/ha between 2008 and 2018 (OEMV, 2019). During the period between 2010 and 2021, exports increased by 36% in terms of volume (1.520 billion litres in 2010 as opposed to 2.077 billion in 2021) and 59% in terms of value (€1.448 billion in 2010 and €2.304 billion in 2021) (OEMV, 2022). The turnover of companies has grown by 26.6% over the last five years (SABI, 2023).

The wine industry has a series of specific characteristics that connect it to sustainability, as it is developed on the soil, which is subject to the vagaries of the weather and climate change, floods, cold snaps and droughts, which directly affect its production (Barbosa et al., 2018; Ferrer et al., 2020).

Therefore, this study analysed whether the growth of Spanish wineries is favoured by an orientation towards sustainability and the possible existence of other factors that also drive the growth of wineries, such as innovation, management resources and structural factors, such as size and age. The results enable us to contribute to the open debate on whether it is possible to make sustainability compatible with growth and, therefore, to show the sector's ability to meet the challenges imposed by society, stakeholders and the global economy on climate change.

The study of the growth of firms dates back more than one hundred years (van Witteloostuijn & Kolkman, 2019), with the book by Penrose & Penrose (1959) being a fundamental element in its theoretical development (Pitelis, 2009). There are two ways in which a company can grow: organically or through acquisition. A firm can grow organically by using unused productive services and a new combination of resources within the firm; alternatively, a

firm can grow through acquisition, by buying another firm (Jeewandarage, 2021).

Companies are bundles of resources, under internal direction, for producing goods and services, sold in markets for a profit. Their boundaries are defined by the area of coordination and "authoritative communication" (Penrose & Penrose, 1959). Their growth is conditioned by the availability of superior human and management resources that foster innovation and determine the direction of the growth (Davidsson, 1991). Companies can obtain economies of growth and economies of size. Therefore, there is a limit to growth, but not to size. The limit to growth is determined by the capacity to absorb new resources which the management of the company can interiorise.

The factors that drive growth can be internal or external (O´Gorman, 2001). The internal factors have a strong emphasis on internal development (Achtenhagen et al., 2010), where, like a natural biological process, an increase in firm size is a consequence of interactive internal changes (Jeewandarage, 2021). Companies grow by increasing their productivity. Business heterogeneity can enable an increase in productivity through new management models, incentive systems or organisational structures that foster greater interaction between managers and workers (Huerta & Salas, 2012). In short, with elements that define the business management and the capital of the organisation (Eisfeldt & Papanikolaou, 2013).

The resource-based view of growth was proposed by Penrose & Penrose (1959) and has become one of the most relevant lines of the conceptualisation of the growth of firms (Gupta et al., 2013). The resources that have been linked to growth are technology and innovation, which enable faster growth, but also marketing skills, which allow the firm to respond to the changes in the market and construct new distribution channels (O´Gorman, 2001).

External factors, outside of the company, have a large influence on the firm's growth. The most relevant are the characteristics of the sector in which the company develops its activity. However, the company has a very low capacity for action with respect to the external factors.

Another problem that emerges when studying growth is the determination of its form of measurement as there is no consensus in this respect (Achtenhagen et al., 2010).

The most commonly used variables for measuring the growth of companies are: employment growth, sales growth, profit, return on equity (ROE), return on assets (ROA) and entrepreneurs' perceived growth relative to their competitors in terms of increase in company value. However, there is a very weak correlation between growth measures used by entrepreneurship researchers and the respondents' perceived increase in company value relative to their competitors (Achtenhagen et al., 2010). This lack of correlation between the variables used to measure growth may be due to the existence of two different meanings of the term growth. On the one hand, it is sometimes used to explain a mere increase in quantity, for example, when we refer to the "growth" of production, exports or sales. On the other hand, its primary meaning is also used, which implies an increase in the size or improvement in quality as a result of a development process, more related to the measurement of the intentions/aspirations for growth or the will to grow (Penrose & Penrose, 1959; Achtenhagen et al., 2010). This bipolarity highlights how the nature of growth is a multidimensional and complex process (Delmar, 2019). Some authors even show how in the study of growth there is no coherence in the perception of which "variables" are dependent, independent or mediators (Delmar, 2019).

Small and medium-sized companies are considered to constitute the backbone of the economy (Gupta et al., 2013). They are also highly important for sustainable environmental development (Moore & Marning, 2009; Andersén et al., 2020). Smaller and newly created companies are considered as "drivers" of sustainable development (Klapper et al., 2021). However, small companies are usually less concerned about the environment than the large ones due to a lack of resources and because they are subject to less external pressure (Touboulic et al., 2014; Andersén et al., 2020).

The managers play a fundamental role in directing the company towards sustainable growth, for example, through greater awareness when purchasing supplies (Anderson & Eshima, 2013; Andersén et al., 2020), by acknowledging that business growth must be linked to ecological and societal issues, as well as higher quality products (Choi & Gray, 2008; Genus, 2021; Klapper et al., 2021). The sustainable entrepreneur should attempt to combine growth and sustainability (Muñoz & Cohen, 2018; Genus, 2021).

The concern of companies for the environment may take the form of incorporating the three pillars of sustainability (social, environmental and economic) in their business model and also achieving growth (Moore & Marning, 2009; Klapper et al., 2021). The adoption of sustainability stimulates, through innovation, the development of virtuous cycles, creating opportunities and reconciling different objectives (Genus, 2021). This gives rise to a dynamic capacity (Aragón-Correa & Sharma, 2003) that facilitates growth paths (Gupta et al., 2013). Following green and sustainable policies improves the differentiation strategy of the company, bestowing it a competitive advantage (Choi & Gray, 2008; Andersén, 2021).

There is a significant lack of studies that relate the wine industry with growth and sustainability (Gilinsky et al., 2016; Castillo, 2022). The study by Gilinsky et al (2016) is based on a qualitative analysis of interviews with the managers of four wineries of California, New Zealand and Spain. And the research conducted by Castillo (2022) addresses the need to connect exports, sustainability and growth. There are studies that relate the consumer's propensity to pay for sustainable or ecological wines, although they produce contradictory results (e.g., Moscovici & Reed, 2018; Ouvrard et al., 2020). Other studies have

**Table 1.** Significance of the sample size.

| Region | Sample | | Population | | Significance of sample | |
|---|---|---|---|---|---|---|
| | No. of wineries (a) | % of the total of the sample (b) | No. of wineries (c) | % of the total of the population (d) | Difference in absolute value /(b-c)/ (e) | Margin of error (f) |
| Andalusia | 33 | 8.03% | 314 | 7.58% | 0.45 | 0.164 |
| Aragon | 27 | 6.57% | 150 | 3.62% | 2.95 | 0.171 |
| Asturias | 2 | 0.49% | 12 | 0.29% | 0.20 | 0.661 |
| Canary Islands | 16 | 3.89% | 86 | 2.08% | 1.81 | 0.222 |
| Cantabria | 0 | 0% | 9 | 0.22% | 0.22 | - |
| Castilla y León | 61 | 14.84% | 699 | 16.88% | 2.04 | 0.12 |
| Castilla-La Mancha | 38 | 9.25% | 428 | 10.33% | 1.08 | 0.154 |
| Cataluña | 60 | 14.60% | 636 | 15.35% | 0.75 | 0.12 |
| Comunidad Valenciana | 20 | 4.87% | 219 | 5.29% | 0.42 | 0.209 |
| Extremadura | 9 | 2.19% | 102 | 2.46% | 0.27 | 0.313 |
| Galicia | 45 | 10.95% | 385 | 9.30% | 1.65 | 0.137 |
| Balearic Islands | 9 | 2.19% | 82 | 1.98% | 0.21 | 0.31 |
| La Rioja | 22 | 5.35% | 339 | 8.18% | 2.83 | 0.2 |
| Madrid | 20 | 4.87% | 211 | 5.09% | 0.22 | 0.21 |
| Melilla | 0 | 0% | 1 | 0.02% | 0.02 | - |
| Murcia | 6 | 1.46% | 91 | 2.20% | 0.74 | 0.39 |
| Navarra | 17 | 4.14% | 105 | 2.54% | 1.60 | 0.22 |
| Basque Country | 26 | 6.33% | 273 | 6.59% | 0.26 | 0.18 |
| Total | 411 | 100.00% | 4,142 | 100.00% | 0.001111 | 0.046 |

| Variables of the BALANCE SHEET and PROFIT AND LOSS ACCOUNT | | |
|---|---|---|
| | Sample average | Population average |
| Operating income (thousands of EUR) | 2,454.68 | 2,504.58 |
| Number of employees | 11.86 | 10.32 |
| Total Assets (thousands of EUR) | 5,499.38 | 5,084.87 |
| Yearly result (thousands of EUR) | 74.13 | 86.16 |

Source. Own elaboration based on SABI data.

also addressed the relationship between sustainable policies and performance in the wine industry in Spain, also with contradictory findings. The results were positive between performance and sustainability, in its three dimensions, social, environmental and economic (García-Cortijo et al., 2021), and negative in the case of the analysis of Corporate Social Responsibility (Muñoz & Cohen, 2018). Others have analysed how the changes in the preferences of the market towards sustainable products are related to a positive propensity of consumers to purchase the products of the company, which can lead to an increase in sales (Moscovici & Reed, 2018). Another study examines how the stakeholder engagement and the sensitivity of the entrepreneur can lead the company to adopt sustainable strategies, which, in turn, can give rise to the innovation of products, the prevention of pollution and a better management of natural resources (Santini et al., 2013; De Steur, et al., 2020). The improvement in the adoption of innovations aimed at sustainability can have a secondary effect on the winery as it constitutes a strategy for differentiating its products. This can give rise to a competitive advantage (De Steur et al., 2020; Ferrer et al., 2022) and growth opportunity (Gilinsky et al., 2016; Castillo, 2022).

Within this theoretical context, those wineries that are able to include sustainability in their objectives will be more prepared to take advantage of the opportunities and respond to the threats of the environment and will be better equipped to grow. Accordingly, we propose the verification of the following hypotheses:

*Hypothesis 1: Wineries can make growth compatible with sustainability in such a way that an orientation towards the latter can drive growth.*

On the other hand, the availability of differential management resources more oriented towards the changes in the environment favours the dynamism of the company.

**Table 2.** Wineries in Spain, according to the number of employees and to the income in $10^6$ euros (Dec 2019) and their percentages, compared to the wineries in the sample.

| | Source and type of company | | | |
|---|---|---|---|---|
| | SABI | | Survey | |
| | N | % of total | N | % of total |
| **Number of employees** | | | | |
| Micro <10 | 2224 | 78.9 | 246 | 71.5 |
| Small 10-49 | 517 | 18.3 | 84 | 24.4 |
| Medium 50-249 | 71 | 2.5 | 14 | 4.0 |
| Larger than 250 | 4 | 0.2 | 0 | 0.0 |
| Larger than 50 | 75 | 2.7 | 14 | 4.0 |
| No data available | 0 | 0 | 7 | 0.02 |
| Total | 2816 | 100 | 351 | 100 |
| **Income of sales in $10^6$ euros** | | | | |
| Micro <2 | 2005 | 79.9 | 183 | 77.5 |
| Small 2-10 | 379 | 15.1 | 37 | 15.7 |
| Medium 10-50 | 108 | 4.3 | 15 | 6.3 |
| Larger than 50 | 18 | 0.7 | 1 | 0.4 |
| No data available | 306 | | 115 | |
| Total | 2816 | | 351 | |

This availability of management resources determines the incentives, the obstacles and the directions of development of a company (Arias, 2022,) and contributes to the differentiation between companies and their development (Schwab, 2019). Therefore, a second hypothesis is formulated based on the role played by management resources in the growth of the company:

*Hypothesis 2: The wineries with better management resources than their competitors will also achieve higher growth.*

# Material and methods

## Sample and variables

The database used is made up of companies that operate in Spain and whose economic activity is wine-making (code 1102 of Spain's National Registry of Economic Activities, 2009). The data were obtained through surveys carried out in 2020 and 2021 with a total of 411 responses. All wineries acting as independent companies, according to the Iberian Balance Sheets Analysis System (SABI) and Appellation of Origin databases and operating at the time of the survey were selected; a total of 2,977 wineries. The manager of each of the companies was contacted via email (Spanos & Lioukas, 2001). The wineries were given one month to respond and if during that time no response was provided, a telephone reminder was made. The final sample consisted of 411 valid responses, which meant a response rate of 14%, similar to the amount reported by Baruch & Holtom (2008). This number has no problems of significance for the results because the error represents 0.1%, according to the variable of net amount of total turnover for the year 2020. In this year, the sales of the 411 companies were 764 million euros compared to the 7.3 billion euros of the rest of the sector, according to SABI.

The sample obtained has the same properties as the population and is representative of the distribution across the national territory (Table 1). In addition, the companies of the sample and those of the population share similar results in their balance sheet and profit and loss account, with similarities in the items referring to operating income, the number of employees, assets and the yearly results (Table 1).

The survey data present a similar distribution in terms of size characterization according to number of employees and turnover (see Table 2). The questionnaire is presented in Table 3. Column 1 shows the questions posed to the managers and Column 2 shows the variables derived, which are explained later in Tables 4 and 5.

*Dependent variable*

Following the recommendations regarding the dimensions for analysing growth of Delmar (2019), this study

**Table 3.** Questionnaire.

| Questionnaire | Variables generated in the model |
|---|---|
| **Question 1:** your company's investment in vineyards is carried out by:<br>(a) adjusting costs (b) without major changes (c) growing by investing. | Growth in vineyard,<br>$Y_{GROWTH\ IN\ VINEYARD}$ |
| **Question 2:** your company's investment in the winery is achieved by means of:<br>(a) adjusting costs (b) without major changes (c) growing by investing. | Growth in winery,<br>$Y_{GROWTH\ IN\ WINERY}$ |
| **Question 3:** your company's investment in management is made through:<br>(a) adjusting costs (b) without major changes (c) growing by investing. | Growth in management.<br>$Y_{GROWTH\ IN\ MANAGEMENT}$ |
| **Question 4:** Indicate your interest in Organic Wine as an environmental measure, on a scale of 1 to 5, where 1 is a low level of interest and 5 a very high level of interest. | Organic wine (OW) |
| **Question 5:** Indicate your interest in the calculation of the carbon footprint as an environmental measure, on a scale of 1 to 5, where 1 is a low level of interest and 5 a very high level of interest | Carbon footprint (CF) |
| **Question 6:** Indicate your interest in Corporate Social Responsibility as an Environmental measure, on a scale of 1 to 5, where 1 is a low level of interest and 5 a very high level of interest | Corporate responsibility (CSR) |
| **Question 7:** In relation to the competition in resources for innovation, the position of your company with respect to the competition is:<br>a) much worse b) worse c) same d) better e) much better | Innovation resources (INR) |
| **Question 8:** In relation to marketing resources, the position of your company with respect to the competition is:<br>a) much worse b) worse c) same d) better e) much better | Marketing resources (MKR) |
| **Question 9:** In relation to human resources, the position of your company with respect to the competition is:<br>a) much worse b) worse c) same d) better e) much better | Human resources (HR) |
| **Question 10:** In relation to network resources, the position of your company with respect to the competition is:<br>a) much worse b) worse c) same d) better e) much better | Network resources (NR) |
| **Question 11:** In relation to management resources, the position of your company with respect to the competition is:<br>a) much worse b) worse c) same d) better e) much better | Management resources (MR) |
| **Question 12:** In relation to financial resources, the position of your company with respect to the competition is:<br>a) much worse b) worse c) same d) better e) much better | Financial resources (FR) |
| **Question 13:** How old is the company? | Age (AGE) |
| **Question 14:** In what range is your turnover?<br>a) less than 50 thousand euros b) between 50 thousand and 200 thousand euros<br>c) between 200 thousand and one million euros d) between 1 and 5 million euros<br>e) between 5 and 10 million euros f) between 10 and 20 million euros<br>g) over 20 million euros | Size (SIZE) |
| **Question 15:** What is the company's ROA range?<br>a) less than 5% b) between 5% and 15% c) between 15% and 25%<br>d) between 25% and 35% e) between 35% and 45% f) more than 45% | Profitability (ROA) |
| **Question 16:** Does your company export? | Exports (X) |

ROA: return on assets.

used a growth indicator based on the assets of the company (O'Gorman, 2001). To do this, we used the aggregate of the future investment decisions of the company in three of the most important links of its value chain: the vineyard, the winery and the management systems (Interprofesional del Vino en España, 2020), through the question to the company managers about their will to grow (Andersén, 2021).

A growth index was formed $Y_{GROWTH,\ i}$ which was a result of adding together the three measures of the company's will to grow in three aspects: 1) will to grow in the vineyard ($Y_{GROWTH\ IN\ VINEYARD}$), 2) will to grow in the winery ($Y_{GROWTH\ IN\ WINERY}$), 3) will to grow in management, marketing and sales ($Y_{GROWTH\ IN\ MANANGEMENT}$). Whereby:

$$Y_{GROWTH} = Y_{GROWTH\ IN\ VINEYARD} + Y_{GROWTH\ IN\ WINERY} + Y_{GROWTH\ IN\ MANAGEMENT}$$

Each item evaluates the will of the company in terms of how it intends to approach the following three years, using a Likert scale where the three possible responses are: *1 cost adjustment, 2 no major changes and 3 growth through investing* (see Table 4).

The descriptive statistics of the endogenous variable are those that appear in Table 5.

*Independent variables*

In accordance with the theory, the independent variables (described in Table 5) have been classified into three blocks: 1) Sustainability (SI), which is calculated by adding the three variables that capture the interest that the company has in organic wine, the carbon footprint and corporate responsibility (García-Cortijo et al., 2021; Ferrer et al., 2022).

2) Resources determine the company's capacity to grow (Penrose & Penrose, 1959) and its orientation towards sustainability (Knight et al., 2018). In this case, the following are studied: innovation resources (INR), marketing resources (MKR), human resources (HR), network resources (NR), management resources (MR), and financial resources (FR).

3) Structural factors analyse age (AGE), size (SIZE), economic performance (ROA) and exports (X).

The statistics of each variable are presented in Table 6.

## Functional form

A regression model was proposed in order to develop the study. Its analytical expression is as follows:

$$Y_{GROWTH,i} = \sum_{k=0}^{11} \beta_k X_{ki} + u_i$$

substituting $X_{ki}$ with the set of exogenous variables, we obtain:

$$Y_{GROWTH,i} = \beta_0 + \beta_1 SI_i + \beta_2 INR_i + \beta_3 MKR_i + \beta_4 HR_i + \beta_5 NR_i + \beta_6 MR_i + \beta_7 FR_i + \beta_8 AGE_i + \beta_9 SIZE_i + \beta_{10} ROA_i + \beta_{11} X_i + u_i$$

with i= 1, 2…411 wineries

where the random error $u_i$ follows a normal distribution with a mean of zero, $E(u_i)=0$ and the error variance is not constant, $Var(u_i) = \sigma_i^2$, that is, $u_i \sim N(0,\sigma_i^2)$,

In this model, the fifth Gauss–Markov assumption of homoskedasticity of the random error $Var(u_i) = Var(u_j) = \sigma^2$, $\forall i \neq j$, is not fulfilled. Therefore, the construction of confidence intervals and the testing of the hypothesis based on the usual expression of the standard error of the coefficients estimated

$$\hat{\beta}_k\ \sigma^2_{\hat{\beta}k} = \frac{\sigma^2}{E(\sum_i x_i^2)}$$

with $x_i = X_i - \bar{X}$, are not valid. One solution to solve the problem of heteroskedasticity consists in using the Robust Errors or Standard Errors of Eicker-White (Croux et al., 2003; Bianco et al., 2005; Baltagi, 2008), as in the studies

**Table 4.** Description and statistics of the endogenous variable.

| | Description | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Growth in vineyard ($Y_{GROWTH\ IN\ VINEYARD}$) | Value 1: cost adjustment<br>Value 2: no major changes<br>Value 3: growth through investment | 1.83 | 0.69 | 1 | 3 |
| Growth in winery ($Y_{GROWTH\ IN\ WINERY}$) | Value 1: cost adjustment<br>Value 2: no major changes<br>Value 3: growth through investment | 1.74 | 0.73 | 1 | 3 |
| Growth in management ($Y_{GROWTH\ IN\ MANAGEMENT}$) | Value 1: cost adjustment<br>Value 2: no major changes<br>Value 3: growth through investment | 2.12 | 0.78 | 1 | 3 |
| $Y_{GROWTH}$ | $Y_{INVESTMENT\ VINEYARD} + Y_{INVESTMENT\ WINERY} + Y_{INVESTMENT\ MANAGEMENT}$ | 4.30 | 1.99 | 1 | 9 |

**Table 5.** Description of the independent variables.

| | Variables | Description |
|---|---|---|
| SUSTAINABILITY | Sustainability index (SI) | This is the sum of the three items (explained in the lines below)<br>SI = OW+ CF+CSR |
| | Organic wine (OW) | The wineries scored their interest in Organic Wine as an environmental measure on a scale of 1 to 5 where 1 was a low level of interest and 5 a very high level of interest. |
| | Carbon footprint (CF) | The wineries scored their interest in the calculation of the carbon footprint on a scale of 1 to 5 where 1 was a low level of interest and 5 a very high level of interest. |
| | Corporate responsibility (CSR) | The wineries scored their interest in adopting this measure on a scale of 1 to 5 where 1 was a low level of interest and 5 a very high level of interest. |
| RESOURCES | Innovation resources (INR) | Value of 1 if the company had a position that was much worse than the competition<br>Value of 2 if the company had a position that was worse than the competition<br>Value of 3 if the company had a position that was the same as the competition<br>Value of 4 if the company had a position that was better than the competition<br>Value of 5 if the company had a position that was much better than the competition |
| | Marketing resources (MKR) | Value of 1 if the company had a position that was much worse than the competition<br>Value of 2 if the company had a position that was worse than the competition<br>Value of 3 if the company had a position that was the same as the competition<br>Value of 4 if the company had a position that was better than the competition<br>Value of 5 if the company had a position that was much better than the competition |
| | Human resources (HR) | Value of 1 if the company had a position that was much worse than the competition<br>Value of 2 if the company had a position that was worse than the competition<br>Value of 3 if the company had a position that was the same as the competition<br>Value of 4 if the company had a position that was better than the competition<br>Value of 5 if the company had a position that was much better than the competition |
| | Network resources (NR) | Value of 1 if the company had a position that was much worse than the competition<br>Value of 2 if the company had a position that was worse than the competition<br>Value of 3 if the company had a position that was the same as the competition<br>Value of 4 if the company had a position that was better than the competition<br>Value of 5 if the company had a position that was much better than the competition |
| | Management resources (MR) | Value of 1 if the company had a position that was much worse than the competition<br>Value of 2 if the company had a position that was worse than the competition<br>Value of 3 if the company had a position that was the same as the competition<br>Value of 4 if the company had a position that was better than the competition |
| | Financial resources (FR) | Value of 1 if the company had a position that was much worse than the competition<br>Value of 2 if the company had a position that was worse than the competition<br>Value of 3 if the company had a position that was the same as the competition<br>Value of 4 if the company had a position that was better than the competition<br>Value of 5 if the company had a position that was much better than the competition |
| STRUCTURAL FACTORS | Age (AGE) | Years from the creation of the company until 2021 (date of the study) |
| | Size (SIZE) | Measured by the turnover amount:<br>Value of 1: Less than 50 thousand euros<br>Value of 2: Between 50 thousand and 200 thousand euros<br>Value of 3: Between 200 thousand and one million euros<br>Value of 4: Between 1 and 5 million euros<br>Value of 5: Between 5 and 10 million euros<br>Value of 6: Between 10 and 20 million euros<br>Value of 7: Over 20 million euros |
| | Profitability ROA | Value of 1 if ROA is less than 5%<br>Value of 2 if ROA is between 5% and 15%<br>Value of 3 if ROA is between 15% and 25%<br>Value of 4 if ROA is between 25% and 35%<br>Value of 5 if ROA is between 35% and 45%<br>Value of 6 if ROA is more than 45% |
| | Exports (X) | Takes the value of 1 if the wineries export and 0 otherwise |

**Table 6.** Description and statistics of the variables. Total sample of wineries.

| Variables | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|
| Sustainability index | 10.83073 | 2.952185 | 3 | 15 |
| Innovation resources | 2.989924 | 0.9427551 | 1 | 5 |
| Marketing resources | 2.679293 | 0.9785939 | 1 | 5 |
| Human resources | 3.017722 | 0.8651105 | 1 | 5 |
| Network resources | 2.903308 | 0.848657 | 1 | 5 |
| Management resources | 2.972081 | 0.8481275 | 1 | 5 |
| Financial resources | 2.936709 | 0.9199119 | 1 | 5 |
| Age | 39.43564 | 104.0772 | 1 | 300 |
| Size | 2.746702 | 1.284506 | 1 | 7 |
| Profitability | 2.091185 | 1.001926 | 1 | 5 |

of Martinez-Ferrero & Frias-Aceituno (2015), Oczkowsk (2015), Knight et al. (2018), Meng et al. (2018), Qureshi et al. (2020). Thus, to resolve the non-compliance with the fifth Gauss-Markov assumption and to be able to construct the confidence intervals and test the hypotheses, the Eiker-White error estimation method has been used, where

$$\sigma^2_{\hat{\beta}k} = E\left[\frac{\sum_i x_i^2 \sigma_i^2}{\left(\sum_i x_i^2\right)^2}\right]$$

The advantage of this technique is that it can be applied without the need to know the specific pattern followed by the heteroskedasticity in each case. It can be used to carry out statistical inference immune to heteroskedasticity (King & Roberts, 2015).

# Results

According to Pulido & López (1999), the first task in estimating an econometric model begins with the analysis of the endogenous variable, $Y_{GROWTH,i}$, isolating it from the rest of the variables. $Y_{GROWTH,i}$, is a continuous, transversal variable with no sudden or irregular variations that follows a normal distribution according to the Shapiro-Francia test, with a W= 0.99 and an associated p-value of 0.87, higher than 0.05. Therefore, the null hypothesis that $Y_{GROWTH,i}$ follows a normal distribution is accepted.

To summarise the output produced by STATA, the following conventions have been used. First, statistical significance for all tests has been a set at a p-value not exceeding 0.10. Breusch-Pagan/Cook-Weisberg test for heteroskedasticity determined the non-fulfilment of the

**Table 7.** Estimate of the growth model of wineries.

| $Y_{GROWTH}$ | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Sustainability index | 0.07918 | 0.04118 | 1.92 | 0.056 | -0.00194 | 0.16029 |
| Innovation resources | -0.10240 | 0.14188 | -0.72 | 0.471 | -0.38185 | 0.17705 |
| Marketing resources | 0.13531 | 0.13484 | 1.00 | 0.317 | -0.13026 | 0.40089 |
| Human resources | 0.01030 | 0.15950 | 0.06 | 0.949 | -0.30385 | 0.32445 |
| Network resources | -0.15088 | 0.18221 | -0.83 | 0.408 | -0.50976 | 0.20800 |
| Management resources | 0.31547 | 0.16310 | 1.93 | 0.054 | -0.00577 | 0.63670 |
| Financial resources | 0.28643 | 0.15199 | 1.88 | 0.061 | -0.01293 | 0.58578 |
| Age | 0.00071 | 0.00050 | 1.42 | 0.108 | -0.00028 | 0.00170 |
| Size | 0.19041 | 0.10312 | 1.85 | 0.066 | -0.01269 | 0.39351 |
| Profitability | 0.00691 | 0.12694 | 0.05 | 0.957 | -0.24311 | 0.25692 |
| Exports | -0.00087 | 0.41151 | 0.00 | 0.998 | -0.81137 | 0.80964 |
| _cons | 1.52751 | 0.65108 | 2.35 | 0.020 | 0.24514 | 2.80987 |

**Table 8.** Detection of multicollinearity, variance inflation factor (VIF).

| Variables | VIF |
|---|---|
| Sustainability index | 1.10 |
| Innovation resources | 1.38 |
| Marketing resources | 1.68 |
| Human resources | 1.71 |
| Network resources | 1.67 |
| Management resources | 1.66 |
| Financial resources | 1.48 |
| Age | 1.03 |
| Size | 1.27 |
| Profitability | 1.09 |
| Exports | 1.14 |
| VIF Mean | 1.38 |

hypothesis of Constant variance, with chi2(1) = 3.78, Prob > chi2 = 0.0519. Therefore, Ordinary Least Square (OLS) with Robust or Eiker Errors was applied. The results of this estimate, shown in Table 7, enable us to extract conclusions regarding the growth of the wineries in Spain and the results of their significance.

The linear functional form is correct according to the Ramsey RESET test using powers of the fitted values of $Y_{GROWTH}$, Ho is fulfilled: model has no omitted variables with a F(3.244) = 0.90 and a Prob > F = 0.4397. On the other hand, the specification link test for single-equation models also shows the correct specification of the model as the β coefficient associated with the variable $\hat{y}^2$ of the model that it estimates and on $\hat{y}$ and $\hat{y}^2$, it is not significant Coef. = -0.1954027, P > |t| =0.353. The model does not have problems of multicollinearity as the Variance Inflation Factor (VIF) is lower than 10 for each of the exogenous variables, with a VIF mean of 1.38 (see Table 8). Finally, a Snedecor's F distribution of 3.08 and a Prob > F = 0.0007 indicates the overall significance of the model.

The results show that the elements related to growth are, first, management resources, an orientation towards sustainability, financial resources and the size of the winery. Therefore, hypothesis 1 and hypothesis 2 are validated. However, the rest of the resources (innovation, marketing, human and network) and profitability are not related to growth. Age (p = 0.108) borders significance.

# Discussion

A series of conclusions may be extracted from the analysis of the results. Wineries with a higher sensitivity to sustainability (SI) decide to make more investments, as indicated by Gilinsky et al. (2016), who contemplate growth as a secondary objective to sustainability. In other words, it is adopted when it is necessary for survival or related to realistic long-term profitability objectives. Similarly, Castillo (2022) indicates that sustainability is the pillar of the growth of some wineries. Within the resources block, FR and MR also contribute to a higher growth. In a globalised and increasingly competitive world, FR are not only fundamental for furthering growth and expansion, but also for implementing the medium and long-term investment projects of the companies (Elston, 2002; IPYME, 2011; Archel et al., 2015). With respect to management resources, different authors (Penrose & Penrose, 1959; Petrakis, 1997; Feindt et al., 2002; Blázquez et al., 2006) identified them as promoters of the growth of the firm: professionalisation of the team, the experience and knowledge of the environment of owners and directors, new business practices which establish closer contacts with the client, the acquisition of a greater commitment to quality and a management team keen to maintain good relations with the employees to meet the established objectives (O'Gorman, 2001; Achtenhagen et al., 2010; Gupta et al., 2013; Eshima & Anderson, 2017).

With respect to size (SIZE), the larger wineries have more opportunities for growth and investment. These results are different to those obtained by Correa (1999) and Becchetti & Trovato (2002), who found a negative relationship between growth and the size of the firm. Blázquez et al. (2006) revealed that the smaller companies are those that have a clear inclination towards growth. Dunne & Hughes (1994,) found that the sign of the size-growth relationship changes over time. Meanwhile, García-García (2004) concluded that the large companies continue to invest to maintain their rate of expansion when their market share has stabilised. It is important to indicate how these different conclusions can be attributable to the different variables associated with growth and usually a low correlation (Achtenhagen et al., 2010; Delmar, 2019). Globalisation, competition and the new environmental imperative have altered the growth pattern of wineries, modifying their traditional objectives. This work shows that the economic growth of a company is not incompatible with sustainable development, but rather that both elements reinforce each other acting as a sort of virtuous cycle. This study aimed to be a theoretical and practical contribution that demonstrates how the capacity of wineries to adapt to the environmental requirements of society can constitute a line for the development of their competitiveness. Therefore, our study produces an important result for the management of wineries: an orientation towards sustainability does not hinder the growth of the company, but, in fact, is an element that boosts it. Wineries therefore do not face a dilemma between growth and sustainability but can adopt practices oriented towards the latter, not only without threatening their growth, but also favouring it.

The growth of the company is what enables it to maintain investment income and be seen by society as a busi-

ness that deserves the trust of its stakeholders. Economies that accumulate more growing firms have a higher level of employment, a return for their investors and they can ensure the competitiveness of the country in the global market. However, the growth paradigm in itself, in a world of scarce resources and subject to climate change, is no longer valid in the twenty-first century. The United Nations, governments and all kinds of institutions do not contemplate growth that is not connected to sustainability. The definition of sustainability includes three factors, to ensure social, environmental and economic development. However, many studies question whether sustainability and growth can exist and this element undoubtedly constitutes a major challenge of the twenty-first century. This study addresses whether growth and sustainability are possible in a very specific environment, namely the wine industry in Spain. Due to its proximity to the soil and dependence on the climate, the wine industry is possibly one of the sectors most threatened by climate change and, therefore, concerned about both elements: growth to maintain income and sustainability to maintain the business.

The results of the study corroborate how, through investment policies, sustainability and the will to grow are compatible in the wine industry. This conclusion is extremely relevant because it supports those who defend sustainability policies. Another conclusion of this study, which has also been drawn in previous research, is how management skills are fundamental for growth and sustainability. Policies for training the people who manage the companies of the agro-food sector, therefore, constitute an essential activity to be carried out by institutions. This is because it does not seem as though sustainability can be driven solely through the consumer and the redirection towards sustainable products must be based on growing companies, which, at the same time, are sustainable. The study also highlights that in order to grow in the wine-making sector, financial resources, the size and the age of the company are relevant.

One of the main limitations of the study is the lack of agreement when establishing indicators of the growth of the firms and, therefore, the difficulty in making comparisons with other studies. Future research will continue to study the factors that explain the growth of wineries and the compatibility with being sustainable, distinguishing between territoriality and the type of wineries (private companies and cooperatives), as these are aspects that condition the strategic decision making of firms.

# Authors' contributions

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