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Opportunities and threats for agrifood firms. The case of wineries applying Rasch analysis

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Abstract. This article identifies the opportunities and threats perceived by winery managers in the new general environment after to Covid-19. The sample comprised 66 wineries located in the Canary Islands (Spain), whose managers answered a questionnaire. This region has a long wine tradition and it has been re-developed and reborn via quality since the 1990s. Rasch analysis and its Differential Item Functioning (DIF) were used to process the information as novel competitive analysis tools. The main opportunities found are the islands' climate, in addition to the social values and lifestyle. The main threats are the unemployment rate and, with less much negative influence, all the restrictions and regulations derived from Covid-19. The only difference considering age and size of wineries is the influence of the climate: wineries that have been active for more than 30 years perceive it even as a greater opportunity, than the youngest ones. The results are useful both for existing wineries and for potential entrepreneurs who want to open a business in this sector to effectively focus their efforts on the existing opportunities.

Keywords: opportunity, threat, environment, Rasch, wineries.

1. INTRODUCTION

To grow and survive, organisations must inevitably interact with their environment [1]. So the first step in order to understand the firms' actions is to know their surrounding environment and the pressures and limitations derived from such circumstances [2]. That link between firms and their environment has been studied with various approaches and methodologies (for instance, the classics [2-5], to name a few). The environment and its analysis become a central aspect in the studies on the behaviour, decision-making and strategies of firms [6,7].

The fact that the strategies of firms are conditioned by their environment [8] has a special relevance after the most recent unpredictable and sudden disaster: the Covid-19[1] [9]. Although Covid-19 changed 'the rules of the

[1] The World Health Organization (WHO) declared a health emergency of international concern for Covid-19 on 30 January 2020. In Spain, the government declared a state of alarm on 14

game' for all industries and in all countries, normality has gradually been recovered for people and businesses. The first step in this return to normality for firms must be the analysis of the new circumstances of their environment to decide their new strategies from now. Social, cultural, economic, legal, technological or health-related changes have taken place because of Covid-19[2]. The different circumstances of the environment require different management responses [12]. Hence the importance of the analysis of this new environment, which is the primary objective of this paper.

Although all activity sectors and all kinds of firms have suffered the consequences of Covid-19, this work focuses on firms which are of special relevance for Spain and for the Canary Islands (where this work takes place), such as agrifood firms, and particularly wineries. The 50% drop of turnover in the hospitality sector in 2020 [11] and the closure of restaurants, bars and cafes [9], puts them in a particularly vulnerable situation and in need of a strategic vision to react.

Starting from the fact that the purpose of the analysis of the environment is to identify the external changes that will influence the activities of a firm [13], with a new environment around firms after Covid-19 and their need to strategically react, the aim of this paper is to make an environmental analysis to know the characteristics of that new environment that winery managers have in their mind when making decisions, whether being positive or negative. In particular, the paper identifies, on the one hand, the main positive environmental variables for wineries from which they could benefit, that is, their opportunities. On the other hand, the paper also highlights the main negative environmental variables for wineries whose consequences should be minimised in order to be competitive and even to survive, that is, their threats.

Thus, this paper makes important contributions. On the one hand, after an exceptional event such as Covid-19, firms have to return to normality knowing beforehand which characteristics of this new environment they can benefit from (opportunities) and which they should avoid (threats). This article identifies the main opportunities and threats perceived by the managers of wineries in this new world order. In small firms, which are the major ones in the wine sector, their strategies are more conditioned by the perceptions of the decision-maker than by objective and formal analyses and diagnoses of the company's environment [14]. Therefore, the results provided by this work will be very useful both for existing wineries and for potential entrepreneurs who want to open a business in this sector to effectively focus their efforts as it considers the information that they really have in mind while deciding.

For institutions and organisations in the wine sector, this work is a guide for designing new policies to help the sector and to promote wine activity, especially in regions like the Canary Islands (Spain). It is a region where the wine sector has been considered one of the few dynamic sectors of traditional agriculture [15] and it is deeply rooted in the culture. Finally, for researchers, apart from its own conclusions about wineries, this article proposes the application of a novel competitive analysis tool, the Rasch [16] modelling technique with a great potential of use.

2. THEORETICAL FRAMEWORK

2.1. The business environment and the environmental scanning

The importance of the business environment for firms has been demonstrated when conditioning a number of their organisational aspects. For example, their adaptive response [37], the formulation of their strategy [14], product innovation [17], alliance use [18], personal networking activities [19], organisational ambidexterity [12] or turnovers of SMEs [20], among many other aspects.

The business environment is defined as the relevant physical and social factors located outside the boundaries of the organisation that are directly taken into account when making decisions [3][3]. These elements that constitute the business environment are traditionally classified into two levels (e.g. [21-23]: task environment and general environment (Table 1). The task environment is usually defined based on the competitive forces of Porter [24]: the firms' customers and their current competitors are particularly considered for its study (e.g. [21,25]. Suppliers are sometimes added (e.g. [3,23]. On the other hand, the general environment comprises the charac-

March, limiting the free movement of people, which led to the confinement of the population until June, after which a gradual return to normality began.

[2] There are a number of studies on the impact of Covid19 focused on different aspects of society. Hidalgo-Pérez [10] and Blanco et al. [11] thoroughly made an analysis of the effects of Covid19 on the economy and Spanish firms and their causes. For example, the authors show that Spain was one of the most affected advanced economies by the pandemic with a drop of the GDP in 2020 of 10.8% [11].

[3] The importance of the environment for organisations has generated a wide variety of definitions, approaches and even contradictory results, leading to a fragmentation of their field of study [6]. Meinhardt et al. [6] and Robinson et al. [7] made a detailed review on the business environment literature, its dimensions, measures, background, turnovers and moderating effects.

Table 1. Environmental scanning of firms.

		Type of information being analysed (e.g. [30,38])	
		Objective (e.g. [31,32])	Perceived (e.g. [3,21,23,33])
Type of environment (e.g. [21, 22, 23])	General environment (socio-cultural, technological, political-legal and economic factors)	– Independent of the decision-maker. – All companies have to manage the same degree of uncertainty in the environment (general or specific).	– Based on deciders mental schemas and their bounded rationality. – Each company perceives a different degree of uncertainty in the environment (general or specific) that it has to manage.
	Task environment (customers, suppliers and competitors)	– Based on historical accounting data (e.g. stability of sales, value added)	– It is the information that is actually taken into account when making decisions: expected to be more strongly linked to the business strategy

Source: own elaboration.

teristics of the country or region where the company is located that may affect all its firms regardless their sector. It is defined based on different characteristics that varies slightly among authors depending on the context of their study. The most common factors are those included by Daft et al. [21], Elenkov [26], May et al. [27]: the socio-cultural, technological, regulatory and economic factors of the region. On the other hand, in a comparative study between firms in the United States and India, Stewart et al. [23] add the political-legal factors that entrepreneurs of both countries perceive similarly. These characteristics are also analysed in the works of Sawyerr [28] on the environment of firms in Nigeria, Elenkov [26] in Bulgaria, or May et al [27] in Russia. Sopha et al. [20] consider natural disasters as a relevant variable of the environment in a sample of SMEs in Indonesia.

Environmental analysis is the process of seeking and collecting information on events, trends and changes external to the firm that will guide its future course of action [29]. It is relevant then the type of information being analysed. The literature has traditionally suggested two approaches[4] (Table 1). The first one considers the environment as an objective reality independent of the decision-maker (for example, [31,32]). It would imply, for instance, that all firms in a sector would have to address the same degree and type of uncertainty [14]. The second perspective, which we follow in this work, defines the environment as a reality perceived by managers. Due to their limited rationality [33], the environment is characterised by managerial perceptions (for example, [3,19,21-23,34]). Under this perspective, strategic decisions and the behaviour of firms are conditioned by managerial perceptions and their interpretation of the environment [8,14,17,35-37]. Lueg and Borisov [30] conclude that both measures are not perfect substitutes and that perceptual measures are more suitable and complete for assessing the environment.

The events that have taken place in recent years, such as the Covid-19 pandemic, belong to the general environment of firms, affect to all of them, and have been particularly complex, of a special relevance and it spread rapidly worldwide. Thus, the general environment has become one of the greatest sources of uncertainty in recent years and a source of opportunities and threats that should be identified by firms. Thus, perceptions of the general environment in the mind of managers is the objective of this study.

2.2. Organisational environment and wineries

Like any other sector, the wine business environment also needs to be analysed to identify which variables determine or can determine the behaviour and development of its firms. However, no studies have been carried out that consider it as the main objective of their analysis, but it has been included as conditioning elements when explaining other concepts related to firms.

[4] Lueg and Borisov [30] analyse extensively the conceptual and methodological differences of characterising the environment through the two approaches suggested by the literature: in an objective way by means of archival environmental uncertainty and by means of perceived uncertainty.

When analysing wineries' strategies, there are works that consider some external factors as conditioning items. An example of this is Jordan et al. [39]. With the objective to identify the drivers of Australian winery success compared to French ones, they conclude that the emergence and success of the Australian wine industry is partially due to their environment: a simpler and more permissive wine legislation and a more innovative environment, among other factors.

Some of the environmental characteristics more frequently considered in the winery industry are those related to the natural environment and environmental sustainability. In this framework, Fernández-Olmos et al. [40] mention the high dependence of viticulture on external conditions derived from the natural framework of the environment, such as natural disasters, insect infestations, disease or drought. In relation to sustainability, Ouvard et al. [41] conclude that sustainability shapes the business model in the wine industry. Ferrer-Lorenzo et al. [42] also analyse the link between the winery's business model and sustainability, derived from the greater interest in ecological aspects shown by wine consumers.

Another important feature of the environment that has been analysed, although with a more marketing-focused approach, is consumer behaviour and habits (e.g., [43-47]), which is a socio-cultural characteristic of their environment. Related to that, Rossi et al. [48] in a study with Campania (Italy) wine firms conclude that the most important characteristics of successful wine enterprises is their ability to understand the environmental features related to consumer behaviour, that is, market trends and consumer behaviour patterns.

In recent times, the Covid19 pandemic has been considered as one of the key elements of the winery environment. Some articles focus on how consumer behaviour and buying decisions were affected by Covid-19 (for example, [49-51] and how the sector was affected (for example, [9]). For example, Alonso et al. [52], considering Italian and Spanish wine consumers, observed marginal changes in wine consumption during the crisis but important changes in consumer behavior: consumers showed more interest in wine events and wine routes and also their knowledge about the wine region and wine in general increased. Niklas et al. [53] analysed perceptions and reactions to Covid-19 in the wine industry, differentiating between firms from 9 countries from the Old World (France, Italy and Spain) and New World (South Africa, USA, Chile, Argentina, Australia and New Zealand) countries. They found significant differences in both the perception of impact and the response in terms of investment. In particular, New World countries perceive a greater impact than the other group. Macedo et al [54] specifically analyse the impact of governments' policy responses to Covid-19. They found that they had varying impacts on wine trade depending on whether it is an importing or exporting country.

These articles just highlight some of the factors that changed the competitive context of wineries. However, none of them make a complete analysis of their environment putting all relevant items together to know their relative importance negative influence or positive influence.

3. RESEARCH METHODOLOGY

3.1. The sample and data collection

This study takes place in the Canary Islands (Spain), one of the Spanish regions 'with the oldest traditions in vine cultivation and wine production' [47, p. 70][5].

The Canary Islands is an archipelago made up of 8 volcanic islands and several islets in the Atlantic Ocean, off the Northwest coast of Africa. The islands' climate is subtropical with gentle temperatures all year round mainly due to the trade winds. This climate presents variations both between islands and even within one same island resulting in microclimates. This creates a wide and varied biodiversity and landscapes and natural spaces that range from laurel forests to lava flows and to large extensions of sand dunes. This natural value has turned tourism, mainly sun and beach mass tourism, into the region's main economic activity, alongside agriculture, traditionally focused on bananas.

Vine is the second most important crop in the Canaries depending on the area occupied [56]. There are 11 wine Designations of Origin out of a total of 101 in Spain [57]. In the report by the Instituto Canario de Calidad Agroalimentaria (2009-2010) [58] two factors of the islands' environment are mentioned as determinants of the characteristics of their wine: climate and soil.

Wineries are usually family farms, with a highly artisanal production, high production costs [59] and great difficulties in terms of generational renewal [60].

Its contribution to the region is not only economic but also fulfils a landscape function, in addition to environmental conservation and preservation of old varieties [15]. At the end of the last century, the sector modernised significantly and maintained a process of growth

[5] Alonso [55] presented the Canary Islands wine production as similar in history, tradition and heritage to that of the Croatia wine industry. Thus, this paper contributes not only to the knowledge of the wine sector in the Canary Islands but also to other wine regions.

due to the decisive support of the public administrations [61]. The creation of the Designations of Origin also meant a turning point for the sector by encouraging the search for quality [62] and contributing to its professionalisation and future competitiveness [63]. This way, in recent decades, the islands' wine has been revalued, has acquired a social prestige, making significant investments in infrastructure for cultivation and in the improvement of wineries [15].

As a way to find new and different wine consumers, wineries are slowly moving towards their diversification and are focusing their attention on tourists. However, the works of Alonso and colleagues [55,63-66] still observe a lack of wine tourism culture in the sector and suggest its development as a natural extension from the traditional product [55]. Thus, the initiatives that combine wine, culture, tradition and tourism will allow using the potential of tourism in the region and therefore increase sales [66] and contribute to the economic development of the region [67]. Alonso et al. [65] identify at the same time some threats from the environment for its development like the luggage restrictions on flights, the anti-drink-drive laws or the prepaid travel packages [55].

The information needed to make the environmental analysis of wineries was obtained from a sample of wineries located in the Canaries (Spain). During February and the beginning of March of 2022, managers were contacted by phone, in person or via email to request their participation in the study. The survey process ended on 19 March, 2022. The total number of wineries that answered the questionnaire was 66 from a total population of 86 wineries according to the SABI[6] (76.74% response rate), being all the questionnaires received valid. They constitute our sample (Table 2).

The wineries of the sample (Table 2) are characterised by being mostly micro enterprises (75.8%) and small enterprises (21.2%). Regarding their age, the most numerous group of wineries are over 30 years old (31.8%), followed by the ones that are between 21 and 30 years old (28.8%), and those that are up to 10 years old (27.3%). In relation to their markets, it is surprising that the largest group of wineries aspires to cover all markets (37.9%), which would include both regional and national and international markets. It is followed in importance by the group of wineries focused on a local and insular market (27.3%), perhaps linked to the wineries with lower capacity.

[6] SABI (Sistema de Análisis de Balances Ibéricos) by Bureau Van Dijk (a Moody-s Analytics Company) in one of the most comprehensive databases on Spanish and Portuguese companies. It provides contact details of the companies, their descriptive characteristics and their annual accounts that the authors need for their research project.

Table 2. The sample (N=66 wineries).

	Number	%
Age		
0-10 years	18	27.3%
11-20 years	8	12.1%
21-30 years	19	28.8%
More than 30 years	21	31.8%
Total	66	100%
Size		
Microenterprise	51	77.3%
Small winery	14	21.2%
Medium sized winery	1	1.5%
Total	66	100%
Markets		
Local and island market	18	27.3%
Regional market	11	16.7%
National market	10	15.2%
All markets	25	37.9%
Missing data	2	3%
Total	66	100%

Source: own elaboration.

In short, our wineries show the characteristics that have defined the wineries of the Canary Islands for centuries: they are mostly micro enterprises with a long tradition.

3.2. The questionnaire

The research team designed a questionnaire *ad hoc* with two parts. In the first section managers should indicate the descriptive characteristics of the wineries (name, location, date of establishment, number of employees and markets). In the second part managers should answer the question "Please rate the influence of the following environmental items on the management of your winery (1 being a very negative influence and 5 being a very positive influence)". Based on the literature, they had to assess a total of 12 items belonging to the following segments of their general environment (Table 3):

- Geographic segment: the geographical characteristics of the Canaries are determining factors of the region, its firms and its wines [58].
- Economic segment: given the commitment of the wineries for the quality and modernisation of their facilities in recent times, it is important to know if the development of the Canaries in terms of infrastructures, transport or communications could support their own development. In addition, given

Table 3. Environmental segments and items.

Please rate the influence of the following environmental ítems on the management of your winery (1 being a very negative influence and 5 being a very positive influence)	
Segment	Items to be assessed
Geographic segment	1. Location of the Canaries 2. Geography of the Canaries 3. Climate
Economic segment	4. Development in the Canaries 5. Purchasing power 6. Unemployment
Politic-legal segment	7. Political situation 8. Laws 9. Covid19 protocol
Socio-cultural segment	10. Social values and habits 11. Demographic factors 12. Education and training level

Source: own elaboration.

Table 4. Descriptive statistics of environmental items.

	Min	Max	Mean	St. dev.
1. Location of the Canaries	1	5	3.11	1.054
2. Geography of the Canaries	1	5	3.44	0.914
3. Climate	2	5	3.97	0.894
4. Development in the Canaries	1	5	3.11	0.897
5. Purchasing power	2	5	2.89	0.787
6. Unemployment	1	4	2.23	0.652
7. Political situation	1	5	3.03	0.701
8. Laws	1	4	3.02	0.813
9. Covid-19 protocol	1	5	2.67	1.043
10. Social values and habits	2	5	3.88	0.713
11. Demographic factors	1	5	3.33	0.829
12. Education and training level	2	5	3.14	0.654

Source: own elaboration.

that the price of wine is sometimes established as an important determinant of purchasing decisions [68], the purchasing power of the population and the unemployment rate, as one of the most remarkable characteristics of the region defines the main economic features of their environment.

– Politic-legal segment: includes general characteristics of the political situation as a reflection of the greater or lesser institutional support to the sector, which has been decisive for its development [61]; the laws that, as in the case of luggage restrictions on flights and the anti-drink-drive laws, have posed threats to the sector in other times [55], and the Covid19 protocols, as a reflection of the specific provisions derived from the Covid-19 situation.
– Socio-cultural segment: includes the determining characteristics of the society for the decisions of wine consumers such as the profile of the consumer (e.g. [47,69]).

The quality of the measurements was analysed by means of the statistics given by the Rasch model, which was applied in the study. The reliability shows satisfactory levels, both for wineries (reliability of 0.70) and for the items of the scale (reliability of 0.96). Validity and unidimensionality were also checked.

Table 4 provides a descriptive analysis of the answer to the items. It already shows the importance of the climate and social values and habits, which has the highest means and the most positive influence. In contrast, unemployment has the lowest mean of all the items and the most negative influence. This last item is the one with the lowest St. deviation.

3.3. Rasch analysis

Rasch analysis [16] was developed to improve the precision of the researchers in the construction and use of instruments for measurement [70]. It has been traditionally used on Medicine, Psychology and especially on Education. Its application in the business field is more recent [71-75]. As a result, it is defined as an "important methodological advance for management research" [76, p. 1).

One of its main advantages is related to the type of variables that, in general terms, are used in the field of management: the latent variables, those that are not directly measurable, like the influence of the environment, which is considered in this paper. Rasch analysis [16] is particularly suitable for the measurement of these variables. In fact, according to Wright and Stone [77, p. 34] "is the only method for constructing measures from observations", or, in other words, transforms the data into "objective" measures [73]

Regarding the approach of the analysis, while other data management techniques try to characterise the whole sample of the study, the Rasch analysis [16] focuses on the individualised analysis of each of the subjects of the study, whether patients, students or wineries, in our case. This way, there is no need to assume that the set of data follows a normal distribution [78] for its application. This approach allows a detailed analysis at an individual level of the behaviour of both each subject and each item [76].

In addition, it is defined as a conjoint measurement model and the estimated parameters of the sub-

jects as well as those of the items are expressed in the same units of measurement, *logits*. This allows developing the conjoint analysis, which is another advantage of this technique. This way, subjects and items are located simultaneously on the linear continuum that describes the variable analysed (the latent variable), so that each item can be evaluated with respect to each subject and each subject with respect to each item.

The Rasch Rating Scale Model, developed by Andrich [79,80] is the one applied in this work. It is particularly suitable for being applied with ordinal multiple category scales, such as the ones used in this work.

For the analysis of the latent variable *environmental influence,* this methodology starts from the scores of a group of wineries (subjects) about a set of items (items of the environment). With these scores, a model that explains such variable and the parameters is estimated, both for the subjects (wineries) and the items (items of the environment). Then, the parameters are located on a linear continuum that represents the latent variable.

The parameters of the wineries (subjects-βn) and the parameters of the environmental items (items-δi) are simultaneously located on the linear continuum (Figure 1). According to the scale used from 1 (high negative influence) to five (high positive influence), their location on the continuum gives the items a character that goes from more positive influence (items lower on the continuum and with the smaller measurements) to more negative influence (items located higher on the continuum and with the bigger measurements). Similarly, the wineries are also placed along the continuum. In this case, it is indicated whether the wineries perceive the influence of the environment as being negative or like a threat in general (wineries located at the top of the continuum with the bigger measurements) or like a positive aspect or like an opportunity (wineries located at the bottom of the continuum with the smaller measurements).

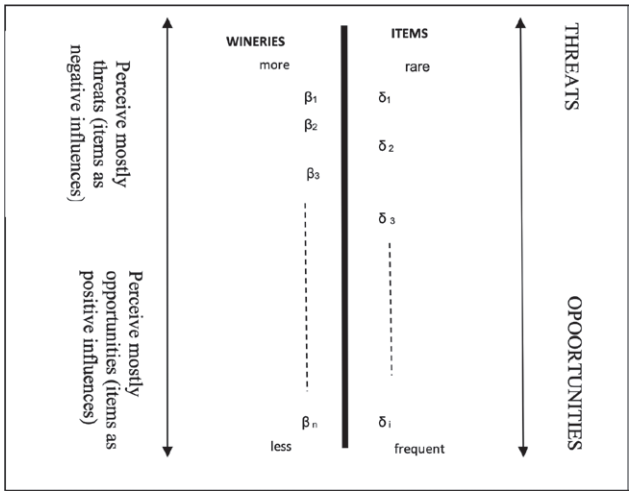

Figure 1. Lineal continuum.

From a mathematical point of view, it is expressed as follows (based on [72]):

P_{nij} is the probability of a subject *n* with skill $ß_n$ choosing category j on a common scoring scale applied to item *i* of difficulty d_i. Then, $P_{ni\,(j-1)}$ is the probability of selecting category (j-1). The Neperian logarithm of the defined ratio odds would be:

$$\ln \frac{P_{nij}}{1-P_{ni(j-1)}} = \beta_n - \delta_i - \tau_{ij} \quad (1)$$

where $ß_n$ and d_i represent the measurements in the dichotomous Rasch model [16], and t_j is the Rasch-Andrich threshold. It would be the point in the latent variable at which the probability of selecting category j is the same as that of selecting category (j-1), considering the difficulty of item i.

The expression of that probability would be:

$$P_{nij} = \frac{1}{\gamma} \exp\left[j(\beta_n - \delta_i) - \sum_{k=1}^{j} \tau_h \right] \quad (2)$$

where t_1 is 0 and g a normalised/standardised factor that reflects the sum of all the possible numerators.

The work is undertaken with two facets that interrelate in the Rasch Model (wineries and items of the environment), where:

$ß_n$ is the parameter of the skill of wineries n, and whose field of variation n ={1,…,N} (sample of wineries);

d_i is the parameter of the difficulty of item i, and whose field of variation is i = {1, L}(sample of items considered), which would be the influence of the item.

The parameters are estimated using a maximum likelihood method through the software *Winsteps 3.92.1* (Linacre, 2016), which considers the algorithms PROX and JMLE (*joint maximum likelihood estimation*)[7].

4. RESULTS

The results were obtained by applying the software *Winsteps 3.92.1* to the answers given by the managers of wineries about their perceptions of the environment. The program estimates the explanatory model of the latent variable "environmental influence" and the linear continuum (Figure 2) that represent it. Figure 2 shows

[7] To delve deeper into the fundamental and probabilistic mathematical developments of this methodology see, among others, Wright and Stone [77].

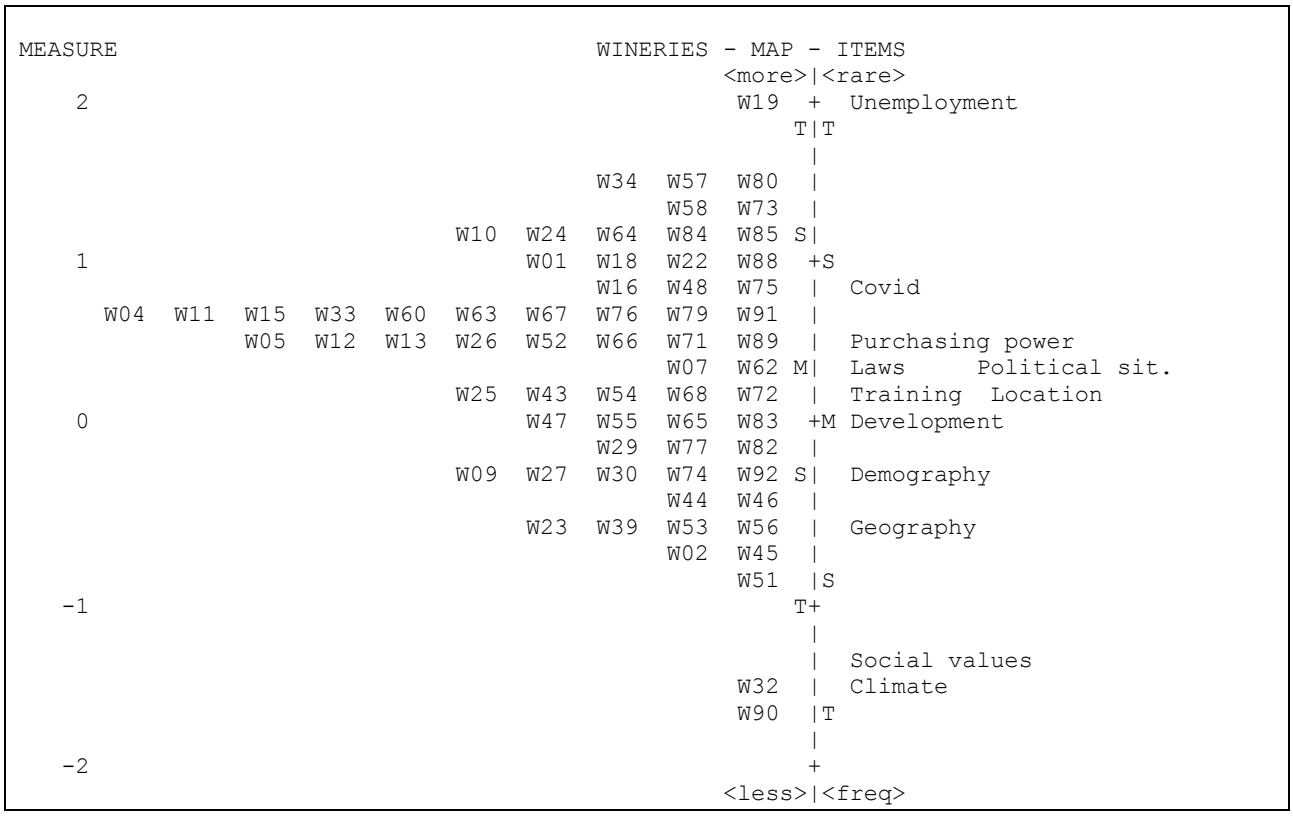

Figure 2. Opportunities and threats for wineries. Source: own elaboration.

the parameters of the environmental items on one side and the parameters of the wineries on the other side. The exact location of each parameter on the continuum is determined by the measurements estimated by the model (Table 5). From these measurements and their location in the continuum, the perception of the items as opportunities or threats of the environment is deduced: the items lower on the continuum and with the smaller measurements are the ones perceived as opportunities and items located higher on the continuum and with the bigger measurements are perceived as threats.

Two items stand out for being located particularly on the lower part of the linear continuum with the smallest measurements (Figure 2 and Table 5): climate (-1.56 logits) and social values and habits (-1.42 logits). According to the explanations in the methodological section, such smallest measurements make these influences to be perceived as the two main positive ones generated by the environment and thus constituting their main opportunities. Climate is particularly positive for wineries and continues to be a great opportunity for the sector as a key determinant of the characteristics of the islands' wine [58]. From the joint analysis of items and wineries, it can be seen that, however, there are two wineries W32 (-1.62 logits) and W90 (-1.81 logits) that perceive the climate as a threat since they are located below this variable on the continuum and their measurements are lower than that of the climate (-1.56 logits).

As for the social values and habits of society, they are also perceived as an opportunity that wineries can take advantage of since wine and wineries are rooted in the culture of local society [65]. Therefore, they are part of their habits and values due to the long winemaking tradition of the region [47].

Unemployment rate (1.87 logits) lies on the opposite side of the continuum, thus being the greatest negative influence and the main threat perceived by the managers of wineries, with a significant difference over the rest. The level of unemployment in the Canary Islands is one of the highest in Spain, standing at 25.2% at the end of 2020 compared to 16.1% of the country's total [82]. However, from the joint analysis of items and wineries, one exception can be observed: W19 winery (2.00 logits). This winery is the only one that considers unemployment as an opportunity since it is located slightly above this item on the continuum and its measurement is slightly higher than that of the latter. It is a small winery, more than 30 years old and selling its wines in the local market.

Table 5. Environmental item measures.

Items	Measure	Model S.E.	Infit	Outfit	PTMEA Corr.
			MNSQ	MNSQ	
Unemployment	1.87	0.18	0.88	0.94	0.18
Covid-19	0.82	0.17	1.62	1.61	0.42
Purchasing power	0.50	0.17	0.93	0.94	0.43
Laws	0.28	0.17	0.82	0.83	0.58
Political situation	0.25	0.17	0.71	0.72	0.48
Education/Training	0.15	0.17	0.58	0.57	0.44
Location	0.10	0.17	1.23	1.22	0.63
Development	0.04	0.17	0.89	0.89	0.61
Demographic factors	-0.40	0.17	1.03	1.04	0.34
Geography	-0.64	0.17	1.08	1.08	0.53
Social values and habits	-1.42	0.18	0.74	0.75	0.53
Climate	-1.56	0.18	1.41	1.41	0.39
MEAN	0.00	0.17	0.99	1.00	
P.SD.	0.90	0.00	0.29	0.28	

Source: own elaboration.

Contrary to what might be expected, Covid-19 and all the legislation and regulations in this regard (0.82 logits) are not the greatest threat to wineries but the second most negative influence, at a remarkable distance from unemployment. Once the great influence of Covid-19 has been overcome[8], most of the restrictions and regulations have been eliminated and the time and spaces lost are trying to be recovered.

The rest of the items are found on the central part of the continuum. If the mean influence of the set of items (0.00 logits) is taken as reference, there are two variables that make a more positive influence than the mean of variables, although lower than that generated by climate and social values and habits, which are considered the main opportunities. These two items that equally favour the sector are the geography of the Canaries (-0.64 logits) and demographics (-0.40 logits). The rest of items have higher measurements than the mean and therefore would generate a negative influence on wineries, although these threats would not be as serious as unemployment and Covid-19. The purchasing power of the population (0.50 logits), which is a determining factor in the purchasing decisions of consumers and particularly linked to unemployment, is one of them.

The items linked to legislation (0.28 logits) and the general political situation (0.25 logits), along with the level of training of the population (0.15 logits), the location of the Canary Islands (0.10 logits), and the level of development of the Canary Islands (0.04) are also located as negative influences, although with less intensity.

Table 6. Differential Item Functioning considering age and size of wineries*.

Winery class	DIF Measure	DIF S.E.	Winery class	DIF Measure	DIF S.E.	DIF Contrast	Prob.	Item
0-10 years	-1.41	0.33	More than 31 years	-2.58	0.36	1.17	0.0233	Climate

*This table shows only the significant differences found. The results for the other items, considering age and size have a probability higher than 0.05 and made them non significant.
Source: own elaboration.

To complement the results obtained, another tool provided by the Rasch analysis has been applied: the Differential Item Functioning (DIF)[9]. This indicator allows us to know if there are significant differences in how wineries perceive the influence of their environment depending on their age or size (Table 6). The results obtained show us that there is only one significant and relevant difference (prob. 0.0233 and Dif contrast 1.17) if we take into account the age of the wineries and only in relation to how they perceive the influence of the climate. This way, the group of wineries that have been active for more than 30 years perceive the influence of the climate even more positively than the group formed by the youngest wineries (0 to 10 years). The reason could be that younger wineries are often run by younger people. It is precisely these young people who are more environmentally and climate conscious and perceive climate less as an opportunity than older people who are supposed to run older wineries [10]. The rest of the aspects of the environment are not perceived as significantly different by the wineries according to their age after Covid-19. In the case of the size of the wineries, no significant differences have been found in how they perceive the influence of the environment.

[8] It should be noted that at the time of the management survey (February - March 2022), the most critical period of the Covid crisis and the period of home confinement (March - June 2020) had passed, although some of the social, technological and economic consequences were still present.

[9] The analysis of the residuals derived from the process of data adjustment to the model allows verifying the presence of a differential item functioning (DIF) between the groups of wineries. The estimation of this DIF is performed using a hypothesis contrast to determine whether the difference in the location measures of the items in each subsample is significant.

[10] Research founded by El Observatorio Social de la Fundación "La Caixa", carried out by Rodon and Guinjoan [83] on whether attitudes towards climate change in Spain vary with age, concludes that young people tend to be more concerned about climate change, even more so than the economy. Specifically, 42% of 16-25 year olds and 35% of 26-35 year olds consider climate change to be one of the three main current problems.

5. CONCLUSIONS, IMPLICATIONS AND FUTURE LINES OF RESEARCH

5.1. Conclusions

A first noteworthy contribution of this article is that it carries out an analysis of the new environment after Covid-19 of the wineries located in the Canary Islands (Spain), a region with a special winemaking tradition and unique and differentiated wines, which can serve as a reference for other areas and wineries as well as for new entrepreneurs in the sector.

After the application of an innovative methodology in this field, such as the Rasch's analysis [16], another of the noteworthy contributions of the article is that it identifies that the great opportunity offered by the environment to wineries is still the natural characteristic that has traditionally been considered one of the great drivers of the sector, regardless of the winery's size: the climate, determining factor of the characteristics of the wine of the Canary Islands along with the soil [58]. This item is particularly positively by wineries that have been active for more than 30 years. The perceived great variety of microclimates existing in the Canary Islands, together with the richness of vine varieties, allows us to predict the most appropriate grape for each microclimate so that it can develop its entire cycle in the best conditions [84].

In addition, the climate is one of the permanent elements that are fixed when planting, being in turn the regulator of the development processes of the vine cycle [85]. Hence, this favourable climate is considered one of the factors that determines with greater impetus the viticultural vocation of the islands [84].

On the other hand, the warm and mild climate all year round in the Canary Islands is the most important aspect when choosing the Canary Islands as a tourist destination [86]. The visitors, potential wine consumers, are increasingly looking for new and differentiated experiences apart from the sun and beach offer, such as guided tours, social events in wineries and wine tastings. These events are the natural extension from the traditional product of wineries [55], which should be exploited with greater determination by wineries within the framework of wine tourism.

Social values and habits are found as the second source of opportunities. Wine and wineries have been part of the culture of local society for centuries [64] and are part of its habits and values due to the region's long winemaking tradition [47]. Apart from that, after months of confinement, lockdowns, and social distances, society has returned to normality and it implies that family and friends gatherings (birthday celebrations, anniversaries, weddings, graduations, business lunches or Christmas), social events (inaugurations, exhibitions, cultural festivals, book presentations, among others) or popular festivals (carnivals, pilgrimages, or religious festivities) play an important role in people life after being missed for a long time. All these events are important for the wine sector as it is "part of a bundle consumed in social activities" [9, p. 843].

After the wine market very strong contraction in 2020 [53], the great threat to wineries is not Covid-19 and its protocols. The great threat to wineries has been one of the pandemic's consequences, the increase of the unemployment rate, with a substantial difference over the rest of the environmental variables. The unemployment rate has important consequences for the purchasing power of families after a difficult period, with lockdown periods, with the paralysis of the vast majority of economic activities and in which the savings of families served as a great help to solve the economic problems in many cases. Besides that, it is important to know that the main wine consumers of these wineries are the islands' residents, being more likely to consume wine if they are civil servants or employees [87]. Apart from that, price is one of the determinants of wine consumption [68].

In short, the general environment is perceived by managers as an important source of opportunities for the wine sector of the islands by presenting natural conditions, like climate, and social conditions that favour their development. However, it also provides threats, such as unemployment, which could affect the Canary Islands wine market, where the wineries do not precisely compete on price. Finally, after the negative shock of pandemic [53], the sector's perception of the general environment seems to be similar for wineries in the Canary Islands. With the exception of climate, wineries, regardless of their age and size, perceive the same opportunities and threats in their general environment.

5.2. Implications

A first implication of this study is the clear evidence that the wine sector in the Canary Islands is aware of having in its favour the natural conditions of the islands, such as climate, regardless of the size of the winery. Furthermore, the climate is one of the main tourist attractions of the islands and its visitors should be clearly seen as potential consumers of their wine. In addition to this, tourists who arrived on the islands in 2021 made their greatest expenditure, without considering accommodation, in restaurants and cafes and enjoy trying the local gastronomy [86]. This means that wineries have a clear market niche to address in tourists and must decisively

complement their offer with leisure activities (guided tours, cultural events or tastings). Activities not only aimed at tourists but also at residents, since a greater interest of consumers in the wine culture has been observed in general [69]. However, despite having the potential for this, there is a lack of a wine tourism culture in the sector [55,63-66]. This shows that, despite the favourable natural conditions, the recent improvements in the professionalisation of the sector and the quality controls exercised by the designations of origin, there is still much work to be done, especially in the search for synergies with other sectors such as tourism. Tourism sector, which in its new strategy after Covid-19, aims precisely to promote the integration of everything local and the complementarity with the rest of the sectors of the economy of the Canaries[11]. The wine sector must also take special advantage of the "proposition" made by the tourism sector for the diversification of its offer, further exploiting the obvious synergies that exist between both sectors.

With a clear commitment to wine tourism, wineries could also minimise the negative effects of the main current threat to the sector, unemployment, a traditional evil of the local economy that has worsened after Covid-19 and difficult to solve in the short and medium term.

From the point of view of public institutions, this paper has also important implications. It goes into managers' minds to know how they perceive their environment and what they have really present when making decisions. The first implication is the need to continue proposing policies to improve employment in the Canary Islands, mainly youth employment, since it is negatively conditioning their future. Secondly, the institutions must continue to carry out actions to improve the competitiveness of the sector, aimed at modernising facilities, improving their varieties, training winegrowers, positioning an institutional brand of 'Canarian wines' and diversifying its offer. A good example in this regard is the Aid for investments of the Wine Sector Intervention within the framework of the Strategic Plan of the Common Agricultural Policy (Royal Decree 905/2022 of October 25) in which the need for a change of orientation in the sector is highlighted, or the Rural Development Program of the Canary Islands, whose purpose is to contribute to the development of a more competitive agricultural sector and to the improvement of the viability of farms, especially important given that local wine is more expensive to produce [64]. It is also necessary for the designations of origin and municipalities to get involved by organising events such as the V Enogastronomic Fair of Santa Úrsula (January-March 2023), the Territory and Wine Festival in Tegueste (March 2023), which includes blind wine tasting, vineyard routes and visits to wineries, narration sessions, cinema, music, humour and stargazing accompanied by wine tasting, or the 10th Gran Canaria Me Gusta Fair (April 2023), to highlight local products, such as wine.

From the point of view of the methodology used, the Rasch's analysis [16] and its potential, a practical use of this study is also represented, both for the sector and for public institutions and other researchers. The individualised treatment of the items but particularly of the wineries is especially important, since it allows us to know what each winery considers as a threat and what it perceives as an opportunity, being decisive in view of the new competitive framework after Covid-19 and the need to return to normality while reorienting strategically the sector.

5.3. Future lines of research

This work also represents an important contribution to the literature since a whole line of research can be developed from these preliminary results.

One of the future lines should be aimed at solving one of the limitations of this study, that is, the size of the sample used. For example, wineries from other regions of Spain, such as those in the Balearic Islands, which share characteristics with the Canary Islands such as the fragmentation of the territory and the importance of the tourism sector, could be incorporated. Undoubtedly, the extension to the entire Spanish territory would be ideal or even incorporating wineries from other countries.

Those related to climate change could also be included as variables of the general environment to be considered and valued by the winemaker, as it is evident that global warming is affecting the sector and modifying its way of growing and selling wine and also its final product.

Once the general environment of the wineries has been analysed, a second step would be to make a diagnosis of their specific environment and the bargaining power exercised over the wineries by their suppliers, customers and, mainly, their competitors, whose rivalry in quality and price is evident when consulting the market shares of the major brands and Designations of Origin,

[11] The Government of the Canary Islands [88] has proposed a strategy to transform the tourism model of the Canaries after Covid-19. In one of their plans, they propose "the extension and cohesion of the value chain" increasing the presence of the "Canarian component" in all tourist services, as a way to differentiate the destination. Furthermore, they consider as one of their goals that 'the success of our tourism model is to make the rest of the economic activity of the Canary Islands benefit from the traction to offers'. Available in https://turismodeislascanarias.com/es/

that continue to reign in the Spanish tables, such as Rioja, Ribera del Duero or Rueda.

From the point of view of the technique applied, the Rasch methodology [16], it could delve into the tools it provides and further exploit its potential. For example, a differential analysis of groups of wineries and groups of items could be made in order to know if, in general terms, there is some segment of the environment that is in itself an opportunity or if there is some that is a threat as a whole. Or the differential item functioning, depending on the location of the winery, which would delve into the differentiated management by islands or areas.

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