

The influence of institutions on the climate change adaptive capacity of winegrowers in Utiel-Requena

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1. INTRODUCTION

The global wine industry is being threatened by climate change. Wine production highly depends on the climate and is therefore very vulnerable to changes in temperature and precipitation. Several climate change factors influence the wine quality. Changes in growing season due to temperature rise is the most important one as this determines the ripening of the grapes and thereby the acidity, amount of sugars and other typical flavors of the wines (Jones *et al.*, 2005). Higher temperatures will shift the growing season to an earlier moment of the year and during the flowering and growing phase it can cause accumulation of sugars and grape mortality and can destroy the flavors. However, in the maturation phase, higher temperatures

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could be beneficial for the development of tannins in the wine (Mira de Orduña, 2010). A decrease in precipitation can result in higher stress levels, leading to a lower concentration of flavors and decrease the quality of the wine (Avery, 2008). Schultz and Lebon (2005, p.71) concluded that there is a “*substantial risk in terms of more frequent and more severe droughts with possible adverse effects on yield and quality*”.

Even though exact impacts of climate change are uncertain, it is expected that the productivity of the crop cultivation, and thus also wine production, will decrease in the Mediterranean region (Iglesias *et al.*, 2011). Due to the geographical sensitivity of wine production, climate change can be considered as a real threat for the high-quality production of wine and it is very likely that regional wine qualities and varieties will change in the future (Jones *et al.*, 2005). For many wine producing regions, this will create severe consequences for the economic situation (Hannah *et al.*, 2013), especially in the wine regions in Spain where the wine sector is very important for the economy as it stimulates local economies by activities as grape cultivation, wine production, trade and wine tourism (Jones *et al.*, 2005). The increasing temperature in the summer season will affect the grape varieties cultivated in Spain and thereby threaten many rural livelihoods dependent on wine production (Schultz, 2000; Duarte Alonso and O’Neill, 2011). Wood (2008) mentions that Spain already experiences problems in the wine production because of climate change, and Wilson (2007) even expects Spain to be worlds’ first wine region that becomes unviable for wine production.

Decreasing the impacts of climate change requires a high adaptive capacity from winegrowers. Institutions play an important role in developing a high adaptive capacity (Gupta *et al.*, 2010). In this research, institutions are defined as ‘*systems of rules, decision-making procedures, and programs that give rise to social practices, assign roles of the participants in these practices and guide interactions among the occupants’ relevant roles*’ (IDGEC, 1999, p.14). As Gupta *et al.* (2010) described, an institution is shaped by society and an institution shapes a society. For collective action, such as climate change adaptation, institutions play an important role (Mubaya and Mafongoya, 2017). This does not necessarily mean that institutions have a positive influence on the adaptive capacity, an institution might

also negatively influence the adaptive capacity. This makes it difficult to indicate the strengths and weaknesses of an institution on the adaptive capacity, to enhance this adaptive capacity and to prepare society for current and future climate change impacts. Especially since climate change impacts are uncertain and it is difficult to predict what climate change adaptations need to be made in the future, it is important that the institutions positively influence the adaptive capacity of society. Therefore, this research focuses on decreasing this knowledge gap by using a case study about the Utiel-Requena wine region in Spain.

This wine region is located west of Valencia and covers an area of 33.658 ha and represents 5,8% of the total Spanish Denominación de Origen Protegida (DOP) wine surface. It has two bigger villages, Utiel and Requena, and several smaller villages as San Antonio, Las Casas, Los Corrales and Las Cuevas. The dry continental climate makes the area a perfect location for the cultivation of Bobal, Tempranillo and Cava grapes, among others varieties. The area produced around 220.000 hl of wine in 2015/2016, with a total trade value of almost 53,6 million euro, making viticulture the most important economic activity (MAGRAMA, 2016). However, an important share of wine produced is sold in bulk, and its average price is relatively low. To ensure the sustainability and viability of the production, Utiel-Requena's wine sector needs to be prepared and able to adapt to climate change, which requires a high adaptive capacity from its 5.600 winegrowers.

For the case study, two meso-institutions were selected and analyzed, the Denominación de Origen Protegida (DOP) and the irrigation communities. The wine sector contains many other wine institutions (Meloni and Swinnen, 2013) that can all influence winegrowers' adaptive capacity. After interviews with scientist familiar with the area, these two institutions were considered of major importance in the wine sector due to their close relation to the winegrowers and to their high dependence of local conditions. Moreover, both institutions have great influence on the wine production of this area. Water availability as well as wine quality will be threatened by climate change. So, even though climate change adaptation is not their responsibility, it is expected that both institutions will still benefit from a high adaptive capacity.

The DOP is a tool regulated by the European Union to protect the quality of agricultural products and food products of certain DOP areas (MAPAMA, 2017). The Spanish DOPs are controlled by a governing council in which the regional government participates. Utiel-Requena is one of the 94 DOP regions of Spain (MAGRAMA, 2016). The main objective of a DOP is to protect the wine origin and characteristics. The quality and characteristics of the wines are essentially or exclusively owned to their geographic origin, inherent to the human and cultural factors (MAPAMA, 2017). To maintain this quality, the DOP sets rules for different aspects of the wine production like the grape variety and the intensity of production. The grapes used for the DOP Utiel-Requena wines are exclusively produced in the Utiel-Requena zone and the production of wine also has to take place in this area (MAPAMA, 2017).

The main objective of irrigation communities is to manage the irrigation water and maintain irrigation systems within a certain area. The water quality and quantity requirements are set by the ‘Confederación Hidrográfica’, besides these requirements the irrigation communities are independent institutions with their own operating standards and regime (Carles *et al.*, 2008). Utiel-Requena has four relatively young irrigation communities as until recently most vineyards were rain-fed (Salón *et al.*, 2005).

This explorative research aims to cover a broad set of aspects on how these two institutions contribute to the adaptive capacity of winegrowers. The objective of this analysis is to provide an overview of the current situation and to identify the strengths and the weaknesses of the institutions’ influence on the adaptive capacity of winegrowers. The results can be used as a guidance to improve the role of institutions in climate change adaptation in the area. Thereby the analysis can contribute to a higher objective of this research, which is increasing the adaptive capacity of winegrowers and preparing the sector for future climate change impacts.

2. CONCEPTUAL FRAMEWORK

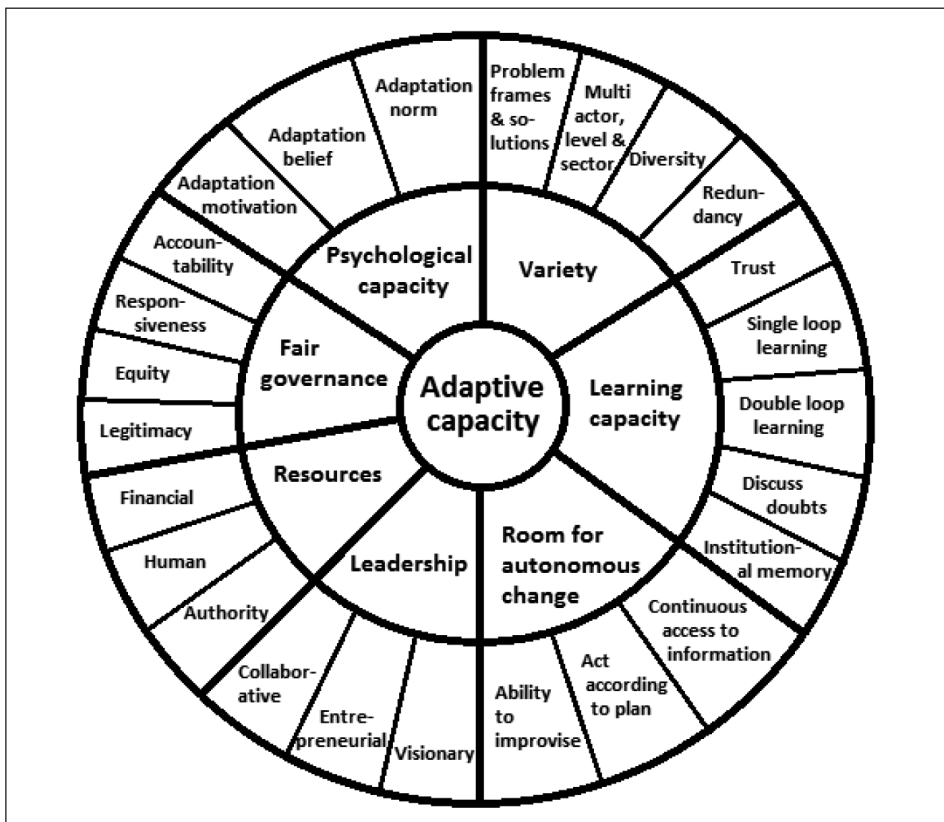
Adaptation is a great challenge for the agrifood sector (Fan *et al.*, 2017). Adaptation is costly and complex and farmers, in particular small and medium producers, need technical assistance and financial resources

(Howden *et al.*, 2007). This requires a new political and institutional approach to help them (Antle, 2010).

It is not easy to assess the functioning and quality of institutions in promoting human actions for complex situations as climate change. Institutions are hard to measure and to assess (Voigt, 2013). To analyze the influence of institutions on the adaptive capacity an extended version of the Adaptive Capacity Wheel framework was used (Gupta *et al.*, 2010, Grothmann *et al.*, 2013). The framework contains 25 criteria and was selected based on its elaborate choice of criteria and its suitability in addressing the influence of institutions on the adaptive capacity.

Figure 1.

ADAPTIVE CAPACITY WHEEL FRAMEWORK. SOURCE: GUPTA ET AL. (2010) AND GROTHMANN ET AL. (2013)



The first four criteria focus on the variety of an institution. Many researchers emphasize that there is no ideal pathway or strategy for climate change adaptation. Since climate change will affect a society on multiple levels and in multiple ways, an institution should be prepared to adapt to a wide variety of problems and collaborate with a wide variety of stakeholders on different levels. Additionally, this requires a wide range of adaptation measures and thereby it should beware for redundancy to make the adaptation measures efficient and cost-effective without inconvenient overlap.

The framework continues with criteria about the learning capacity of an institution. An institution with a positive influence on the adaptive capacity creates trust and encourages society to learn and question the institution's routines, norms and basic assumptions. When more information is available about a certain subject, it will improve the skill of actors to understand each other's situations which increases mutual understanding, trust and respect; key aspects for developing a pleasant learning environment. An institution should be open to discuss the doubts and uncertainties that are inseparable from climate change adaptation and learn from its experiences by monitoring and evaluating them (Gupta *et al.*, 2010).

Next, the framework analyses the institution by looking at its room for autonomous change. According to Gupta *et al.* 2010 (p.463), who developed the initial version of the framework, room for autonomous change "*is the ability of an institution to permit social actors to autonomously adjust their behavior in response to environmental change*". This includes creating a clear plan and acting according to this plan, providing continuous access to information so that, when implementation of plans fails due to unexpected circumstances, stakeholders are able to improvise.

Improving the adaptive capacity of a society asks for correct leadership. "*Leadership is a driver for change, showing a direction and motivating others to follow*" (Gupta *et al.*, 2010, p.463). A good leader needs to have a long-term vision and needs to be able to reform society (Van den Brink *et al.*, 2011). Another aspect is that a leader should stimulate society to

change and take actions against (future) climate change impacts. To do so, communication and collaboration between different levels of society is required.

In times when natural resources become scarcer, institutions should encourage the mobilization and availability of authority, human and financial resources. Authority resources consist of institutional rules and constitutional laws, human resources are knowledge and expertise, and financial resources are needed to implement the authority resources and create room to develop human resources. Institutions will positively influence the adaptive capacity of society when they generate sufficient resources to create climate change adaptation measures, to implement and maintain them and to ensure their viability (Gupta *et al.*, 2010).

To improve the adaptive capacity of a society, institutions should also be supported by society, should not discriminate in the mobilization and availability of resources, and should promote legitimate policy processes by using constitutional laws (Gupta *et al.*, 2010). Moreover, institutions with fair governance should also respond to society's needs and make society feel heard by the institution (Van den Brink *et al.*, 2011). A clear and logic board structure with clearly divided tasks helps to improve the transparency of the institution and positively contributes to create a fair governance.

The last criteria of the Adaptive Capacity Wheel framework focus on the psychological capacity towards climate change adaptation of an institution. To enhance the adaptive capacity, it is important that an institution is motivated and believes in its capabilities to play a role in this. Moreover, an institution should also see the importance of enhancing the adaptive capacity and of climate change adaptation in general. Therefore, these criteria focus on the 'we can', 'we want' and 'we should' of enhancing the adaptive capacity (Grothmann *et al.*, 2013).

3. METHODOLOGY

The data used for this research was derived from in-depth interviews conducted over 2 months with 21 stakeholders of the wine sector of Utiel-

Requena in 2016. Different stakeholders were interviewed to get the most complete interdisciplinary overview (table 1). A first selection of the interviewees was made based on the involved stakeholders in the wine production by using connections and knowledge from the expert interviews. A second selection was formed by using a snow-ball technique out of the first selection.

Table 1

OVERVIEW AND DESCRIPTION OF THE INTERVIEWEES PER INSTITUTION. NOTE, SOME INTERVIEWEES HAD MULTIPLE FUNCTIONS

Function	Number of interviewees	Description
Winegrowers	12	Cultivators of grapes.
DOP Utiel-Requena	2	Two persons within this institution were interviewed.
Irrigation communities	3	Two of the six irrigation communities were interviewed.
Scientists	3	Scientists specialized in water management, wine production, climate change and economics. All are familiar with the study area.
Oenologists and other wine experts	3	Oenologists and an (international) wine exporter from Utiel-Requena were interviewed.
Cooperation	2	Utiel-Requena has 32 wine cooperations, the interviewed cooperation functions as an umbrella cooperation.
Government	1	Employee of the Spanish Ministry of Agriculture, Fishing and Water Supply.
Agricultural expert	1	A supplier of agricultural products with knowledge on the area and its wine production.

The data obtained during the interviews were used to assign a code to each criterion of the Adaptive Capacity Wheel. All coding was performed by one researcher who also conducted and analyzed the interviews. Each criterion was coded with a positive influence, a slightly positive influence, a neutral or no influence, a slightly negative influence, or a negative in-

fluence. An assessment rubric was developed to code the criteria and to increase the objectivity and continuity of coding throughout the research. As an example, Table 2 shows the assessment rubric for the criterion visionary. The full assessment rubric contains descriptions for each criterion.

Table 2

PART OF THE ASSESSMENT RUBRIC FOR THE CRITERIA ‘VISIONARY’ FROM THE DIMENSION ‘LEADERSHIP’

Negative influence	Slightly negative influence	Neutral or no influence	Slightly positive influence	Positive influence
--	-	0	+	++
The institution only focuses on the present and lacks future plans	The institution focuses on the present and the future, but lacks future plans	The institution focuses on the present and the futures, but fails to develop long-term future plans	The institution focuses on the present and the future, but long-term future plans lack a clearly formulated approach	The institution focuses on the present and the future and has long-term future plans with a clearly formulated approach

The positive coded criteria are considered the main strengths and the negative coded criteria are the main weaknesses of an institution’s influence on climate change adaptive capacity.

4. RESULTS

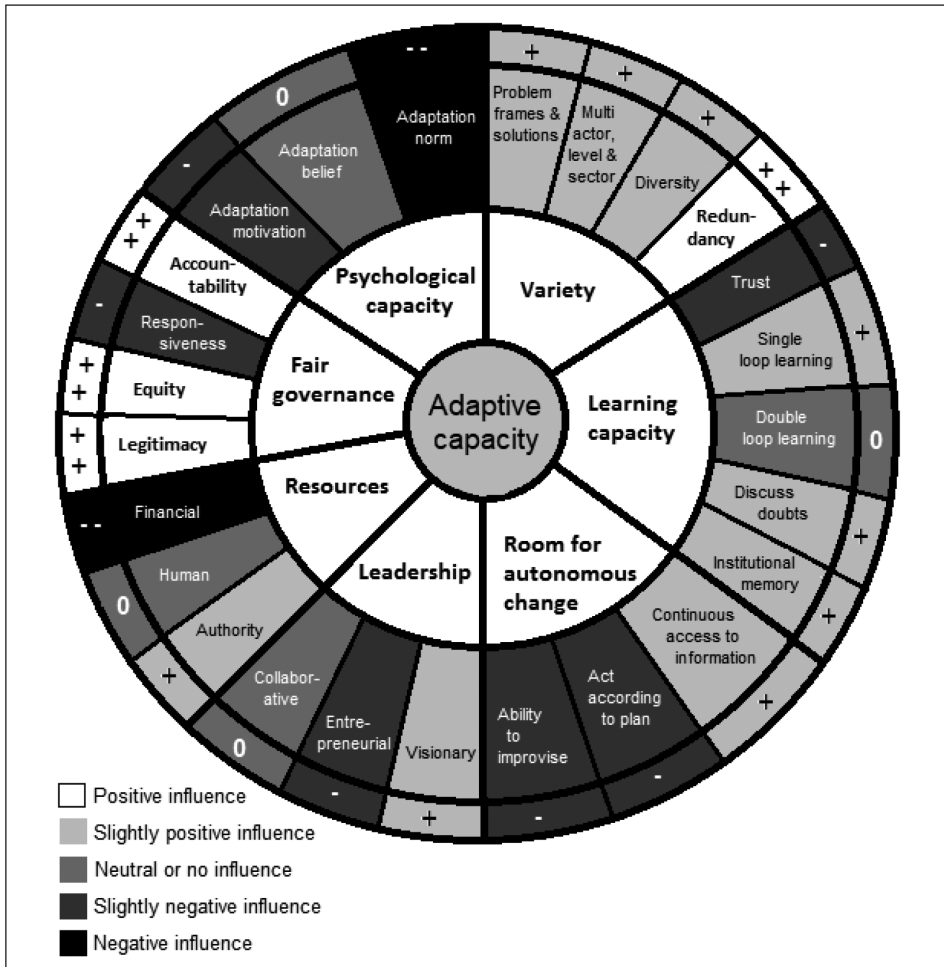
This section first describes how the Denominación de Origen Protegida (DOP) and the irrigation communities contribute to the adaptive capacity of winegrowers. Thereafter it reflects on the adaptive capacity of the wine sector as a whole.

4.1. DENOMINACIÓN DE ORIGEN PROTEGIDA (DOP)

Figure 2 shows the results of the DOP projected in the Adaptive Capacity Wheel framework.

Figure 2

ADAPTIVE CAPACITY WHEEL OF THE DOP UTIEL-REQUENA. SOURCE: OWN ELABORATION



One of the DOP's main strengths is its 'fair governance'. The existence and work of the DOP is supported by most the interviewees, the DOP treats every member equally without any discrimination, and the tasks, position and associated responsibilities are considered clear and logic. Another strength of the DOP is the redundancy of its solutions. The measures of the DOP do not overlap inconveniently and complement each other, which implies that the approach is cost-effective.

Another strength of the DOP is that it focuses on multiple problem frames and solutions and collaborates with many different actors in the sector. Also, the evaluations and meetings are done with different stakeholders. However, this collaboration is not optimal as winegrowers are often excluded from these meetings and represented by cooperatives. This results in distance between the winegrowers and the DOP and interviewed winegrowers indicated that they did not feel heard by the institution. Moreover, by excluding the winegrowers from decision-making processes or the development of plans, the DOP decreases the capacity of individuals to self-organize and innovate.

A major weakness of the DOP is that the institution does not acknowledge the importance of climate change adaptation. Most interviewees linked this low adaptation norm of the DOP on the highly resilient Bobal grape in the area, at least in the short term. Interviewees described the DOP as reluctant to climate change adaptation which resulted in a low score on the ‘psychological capacity’ dimension. This weakness is linked to a more fundamental problem. The acknowledgement of climate change and its impacts is a first step to create awareness in the institution. Awareness about climate change impacts will eventually also increase the acknowledgement of the importance of climate change adaptation; the adaptation norm. Improving the climate change awareness might be a challenge for a sector that is characterized as conservative and “*reluctant to question and therefore to propose improvements*”.

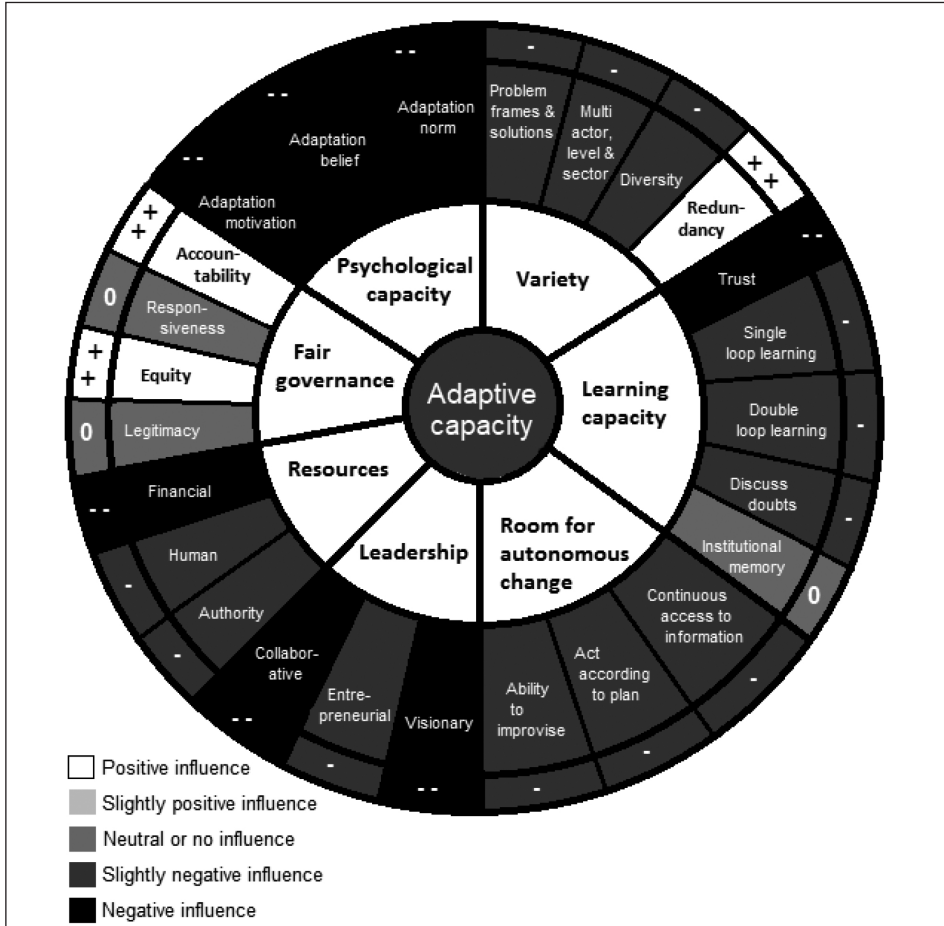
4.2. Irrigation communities

The Adaptive Capacity Wheel of the irrigation communities shows that there is a lot of room for improvement as the majority of the criteria is coded as having a ‘negative effect’ or ‘slightly negative effect’.

Strengths of the irrigation communities are its equity and accountability. The irrigation communities treat every member the same and none of the interviewees experienced any form of discrimination. The institution also has a clear board structure with logic and clearly divided position and tasks makes everyone aware of the associated responsibilities per function.

Figure 3

ADAPTIVE CAPACITY WHEEL OF THE UTIEL-REQUENA IRRIGATION COMMUNITIES. SOURCE: OWN ELABORATION



The analysis shows many weaknesses in the influence of the irrigation communities on the adaptive capacity. The institution's demotivation, disbelief in its ability and necessity to play a role in climate change adaptation can be considered as the main weakness of the irrigation communities. In terms of climate change adaptation, the irrigation communities do not see it as their role to implement adaptation measures. According to them, they only have to divide the irrigation water and when less water is available, they will provide less. Measures to prevent irrigation water shortage

in the future are not included in their plans nor in their objectives. This lack of psychological capacity and future oriented vision might also be attributed to the low climate change awareness. Irrigation communities do not see the need for future planning when their plans are based on the constantly changing weather. This will impede the creation of future and long-term climate change adaptation plans.

Another weakness is the trust between the irrigation communities and the winegrowers. Even though all interviewed winegrowers mentioned that the institution does not discriminate between winegrowers, they still do not fully trust the institution for having the best intentions. This might be linked to the fact that the irrigation communities do not include winegrowers much in their decision-making and planning activities and thereby do not show much effort to improve this trust. This weakness goes hand in hand with another weakness of the institution, the lack of collaboration. The institution does not work together with stakeholders. Winegrowers are often excluded from daily practices and planning, which limits their business contacts and opportunities that can enhance their adaptive capacity. Moreover, the institution does not provide any financial support or mediating support between the bank and the winegrowers. This limits the adaptive capacity of winegrowers because it gets harder for them to realize adaptation measures that require financial input.

4.3. The sector as a whole

Combining the results of the two analyzed institutions with the information gathered during the interviews, makes it possible to look at the situation from a broader perspective. Three main conclusions are: (1) nobody seems to take responsibility for climate change adaptation, (2) adaptation is driven by short-term economic reasons more than future sustainability reasons, and (3) there seems to be a lack of engagement in terms of wine quality, technical support and communication.

Taking responsibilities

Perhaps the most important conclusion for the area as a whole is that it remains unclear who takes responsibility to push the wine sector towards

a more sustainable level with a high adaptive capacity. The ‘not my responsibility’-attitude can be linked to a lack of climate change awareness. Institutions that do not believe in climate change and do not acknowledge climate change impacts, will not lead or make plans for climate change adaptation. As one winegrower mentioned in an interview: *“at the moment there is still not enough awareness about climate change at such a level that action is taken. So, the DOP doesn’t consider climate change adaptation as one of their responsibilities”*. Even though many interviewees acknowledged the existence of climate change and understood the impacts of climate change on agriculture, they did not see the urgency of the problems. *“At the moment climate change is a very popular subject, but they don’t talk about it in the community. There is a drought or there is not... we look at it year per year”*. Another common response on the lack of climate change adaptation was that the Bobal grape is very resilient and it will take a while before climate change negatively affects the wine sector in Utiel-Requena. Even though the cultivation of the Bobal grape is decreasing and the more water intensive Cava grape is gaining popularity among the winegrowers. *“Irrigation communities and many others in the agricultural sector will probably wait with taking action against climate change until the point that there is no other choice than to take action. So, it will probably all be last-minute climate change adaptation, but this is a mentality that is very common in Spain”*.

Drivers of adaptation

A result of the ‘not my responsibility’-attitude is that many interviewees do not seem to believe in the institutions’ ability to play a role in climate change adaptation. Looking at the results of this research, the contribution of the DOP and the irrigation communities to the adaptive capacity of the winegrowers in Utiel-Requena is not optimal. This does not necessarily mean that society is not able to adapt to change. Several transitions in the agriculture of Utiel-Requena were observed. The economic crisis stimulated the society in Utiel to shift from grapes to almonds. A shift from grape cultivation to almond cultivation and a shift from Bobal grapes to Cava grapes. The poor economic performance of agriculture in the area was the driver for both transitions that generates higher profits, especially after the economic crisis in 2008. Similarly, in the 2000s, winegrowers no-

ticed that a higher yield and profit could be achieved by changing from surface irrigation to drip irrigation. This shift to drip irrigation was not driven by potential water saving, but rather that with drip irrigation more land could be cultivated.

These changes in crops and irrigation techniques are signs that the area has genuine adaptive capacity and is capable of responding to incentives. Yet, institutions nor society seems to be driven by climate change impacts and climate change adaptation might benefit from focusing more on economic drivers than on climate change drivers.

Engagement

The finding that both institutions lack planning, exclude stakeholders from planning and decision making, and do not stimulate stakeholders to take their own actions, was by one interviewee summarized as “*falta profesionalidad*”, which can be interpreted as a limited degree of capacity and engagement. This is not only visible at an institutional level, but also at the sectoral level. Some interviewees mentioned that there is no ‘wine culture’ and passion in the wine sector of Utiel-Requena. This started in the beginning of the 20th century when foreign investments made it possible for Utiel-Requena to produce wine very easily and at low costs. Looking for big productions to overcome losses due to filoxera, winegrowers produced high volumes that could only be sold for low prices. The big bodegas establishing in Utiel-Requena mainly before the second world war, created a low quality, marketing poor wine model.

The suitable climate characteristics for wine production of the area and the ‘easy’ Bobal grape did not stimulate winegrowers to improve their wine quality: “*Historically it has been a mediocre grape and an easy life in the vineyards*”. The high volumes and low-quality characteristics of the wine sector of Utiel-Requena are still visible. A cooperative in Las Cuevas said: “*we sell almost everything in bulk (97%). Our main buyers are the big markets, bottles do not sell well*”.

Things have started to change in the XXI century, due to projects improving the quality and promotion of the wines. Still, the average prices of wines of Utiel-Requena are among the lowest prices in Europe, even

though the quality is increasing. Some blame the low prices on the promotion and marketing of the DOP, others blame it on the lack of foreign investments.

The limited degree of engagement is also projected in the amount of technical support. In whole Utiel-Requena, only two cooperatives provide technicians. One of the tasks of the technicians is to select the best parcel per grape variety and quality, to support the cultivation processes and to give advice. These tasks hardly get done, due to the small number of available technicians in the area. Cooperatives blame the public sector that there are insufficient resources available to support the wine sector. However, according to an employee of the regional Ministry of Agriculture, *“money has not been spent well in the sector and when cooperatives only provide two technicians for the whole area, this shows that there is no willingness to improve or change the sector”*.

In addition to the lack of technical support, the wine sector also lacks communication and collective action. Few meetings are organized between institutions and other stakeholders, resulting in low collaboration. Irrigation communities admit that they do not have much contact with other irrigation communities; *“Everybody goes its own way”*. The limited contact between institutions has as a positive result that little friction exists between institutions in the area. However, when complex problems as climate change need to be solved, collaboration and communication between involved institutions is crucial. Especially for the irrigation communities it would be important to discuss the distribution of irrigation water when droughts become more frequent.

5. DISCUSSION AND CONCLUSIONS

This study analyzed the influence of the DOP and the irrigation communities on the adaptive capacity of winegrowers in Utiel-Requena. The objective was not to rate, qualify or judge the DOP or irrigation community, but rather to analyze their consciousness about the future challenges caused by climate change and their ability to face these challenges. The results show that, as strengths, both institutions treat all winegrowers equally and have well-organized boards. Weaknesses are failure to ac-

knowledge their role in enhancing adaptive capacity and not giving it priority, the exclusion of winegrowers in decision making, the lack of clear plans and the present oriented vision.

The in-depth and open approach of interviewing made it possible to not only analyze the two institutions individually, but also to put the results in a broader perspective to create an overview of the current situation in the sector as a whole. This yielded three conclusions. First, the area seems reluctant to climate change adaptation. Climate change awareness is low with some actors not acknowledging the existence of climate change and its potential impacts. Second, adaptation and transitions in the past seems to be driven dominantly by economic reasons, not environmental ones. This refers to the balance between the short-term market-driven economic aspects and the long-term sustainable vision. On the other hand, it shows that the area is capable of making quick transitions, which will be an asset when it comes to adaptation. Third, the area has a lack of engagement in wine quality, technical support and communication between stakeholders.

The analysis of this paper characterizes the DOP and the irrigation communities as conservative institutions that are currently underprepared to deal with the impacts of climate change. Without changes in the functioning of the institutions, they might add to climate change problems instead of addressing them. In the case of the DOP, the board (Consejo Regulador) could promote climate change adaptation measures focusing on communication and advising different grape varieties and crop management measures that are better adapted to the new environmental conditions. For the irrigation communities, improving the water management with a focus on the increasing water scarcity is a very necessary measure in dealing with climate change impacts. Even though the results of this analysis are case-specific, they might raise questions related to the influence of institutions on climate change adaptive capacity in other wine-regions as well.

Methodologically, this study shows the difficulties of assessing institutions and more particular in assessing how institutions support the society in adapting to new environmental conditions. The Adaptive Capacity Wheel framework used in this research was developed by Gupta *et al* (2010) and

extended with a psychological dimension by Grothmann *et al.* (2013). Even though the Adaptive Capacity Wheel and its elaborated selection of indicators proved to be a useful method for this research, we would like to draw attention to two limitations of the framework.

First of all, two criteria were felt missing: communication and enforcement of rules. The poor communication in the wine sector turned out to be one of the causes of the limited degree of engagement. The criterion enforcement felt missing as many interviewees mentioned that rules and laws existed, but were ineffectiveness as enforcement was lacking.

Second, Gupta *et al.* (2010) used the average of the criteria to calculate the score of the dimension belonging to these criteria. The core of the wheel was coded by calculating the average of the dimensions. The number of criteria per dimension differs, meaning that the approach of Gupta *et al.* (2010) gives different value and importance to criteria. However, the value per criterion is very case-specific and without any further research it is impossible to assign different weights to the criteria. Therefore, this research assigned equal weights to the criteria and coded the core of the wheel by taking the average of all criteria instead of all dimensions.

This research and framework focus on the role of two meso-institutions in enhancing the adaptive capacity of winegrowers. However, it should be taken into account that these two institutions are not the only ones that can influence the adaptive capacity and behavior of winegrowers. The findings of this research show that the functioning of the DOP and irrigation communities is also related to the functioning of other institutions, other European policies (DOP rules and Water Directive), and the whole wine sector. Improving only the institutions influence might not be enough to bring the adaptive capacity of winegrowers to a level required for the expected climate change impacts. For further research it is recommended to analyze the climate change awareness, the influence, and the power of other institutions in the wine sector, because the question still remains: in a sector reluctant to deal with climate change, who will stand up and lead the wine sector of Utiel-Requena to adapt to the impacts of climate change?

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ABSTRACT

The influence of institutions on the climate change adaptive capacity of winegrowers in Utiel-Requena

Climate change requires a high adaptive capacity from Utiel-Requena's winegrowers, in which institutions play an important role. This research analyzes the influence of two specific institutions, the 'Denominación de Origen Protegida' and the irrigation communities, on the adaptive capacity of winegrowers in Utiel-Requena. Interviews were conducted and analyzed by using the Adaptive Capacity Framework consisting of 25 indicators. Results show that both institutions scored high on equity and clear board structures. Weaknesses are the low response to winegrowers' needs, limited knowledge transfer, and lack of clear plans for extreme situations. Both institutions did not seem to acknowledge the importance of climate change adaptation and their role in enhancing it. Overall, the sector seems to lack engagement in terms of wine quality, technical support and stakeholder communication. The results imply that the area has little climate change awareness.

KEY WORDS: adaptive capacity, Utiel-Requena, institutions, wine sector, climate change.

JEL CODES: Q10, Q54.

RESUMEN

La influencia de instituciones en la capacidad adaptativa de los vitivinicultores de Utiel-Requena

El cambio climático requiere una alta capacidad adaptativa por parte de los productores de uva y vino de Utiel-Requena, en la cual las instituciones desempeñan un papel importante. Esta investigación analiza la influencia de dos instituciones, la "Denominación de Origen Protegida" y las Comunidades de Regantes de la zona en la capacidad adaptativa de los mencionados productores. Para ello se han realizado entrevistas personales cuyos resultados son analizados con un modelo de valoración de la capacidad adaptativa institucional que contiene 25 indicadores. Los resultados muestran que ambas instituciones están bien en materia de equidad y órganos de gobierno. Por el contrario, muestran debilidades en capacidad de respuesta a las necesidades de los productores, transferencia de conocimiento y falta de planificación ante situaciones extremas. Ambas tienen también en común una falta de reconocimiento de las necesidades de adaptación de los productores y de su papel para mejorarla. En conjunto, el sector parece necesitado de un mayor compromiso en materia de calidad del vino, asistencia técnica y comunicación entre los actores. De los resultados se deriva que la concienciación sobre los riesgos del cambio climático en el área es escasa.

PALABRAS CLAVE: capacidad adaptativa, Utiel-Requena, instituciones, sector vitivinícola, cambio climático.

CÓDIGOS JEL: Q10, Q54.