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# **Conegliano Valdobbiadene Prosecco Docg: Managing Product and Landscape Core Sustainable Policies and Their Impacts on Winery Visits**

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Paper prepared for presentation at the 7<sup>th</sup> AIEEA Conference  
“Evidence-based policies to face new challenges for agri-food systems”

14-15 June 2018  
Conegliano (TV), Italy

## **Summary**

*Nowadays, the relationships among wine tourism and environmental and economic sustainability has gained an outstanding importance on the supply side because of changes in wine visits' demand and behaviour. This paper aims to better understand the model which explains the number of wine visits wherever product and landscape management are considered key factors for the wine tourism development of the Conegliano Valdobbiadene Prosecco PDO. In order to assess the research questions, we used the method of instrumental variables (IV), applied through the Two-Stages Least Squares (TSLS) procedure for evaluating wineries sustainability's policies towards winery visits. Results showed how in the case of the Conegliano Valdobbiadene Prosecco PDO's wineries, evidence-based strategies on product and landscape sustainability policies should be taken into account when managing more effective visits experiences.*

Keywords: coneigliano valdobbiadene docg, wine tourists, prosecco and sustainability, prosecco and landscape, two-stages least squares.

JEL Classification codes: Q1, Q18, Q56, D22, D81.

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# **Conegliano Valdobbiadene Prosecco Docg: Managing Product and Landscape Core Sustainable Policies and Their Impacts on Winery Visits**

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## **1. INTRODUCTION**

Over the last years the linking of tourism performance to environmental and economic sustainability has gained an outstanding importance on the supply side because of a more wine tourists' eco-sensitive demand and behaviour (Barber, Taylor, & Deale, 2010; Delmas & Grant, 2014; Forbes, Cohen, Cullen, Wratten, & Fountain, 2009).

This paper aims to better understand the model which explains the number of wine tourists in the Conegliano Valdobbiadene Prosecco DOCG's area, looking at various key factors concerning the wineries' environmental sustainability.

Despite the overwhelming bulk of literature, very little research has taken into consideration the potential influence of core products and landscape practices (i.e. implementation of firms' 'green' innovations) which provide a significant impact and thus could increase the number of winery visits (Montella, 2017; Santini, Cavicchi, & Casini, 2013).

A specific analysis considering the factors involved in wineries staging-experiences for wine tourists is presented, according to sustainability criteria (Carmichael, 2005; Getz & Brown, 2006; Pikkemaat, Peters, Boksberger, & Secco, 2009). Indeed, for wine companies the setting of practices for a positive stage experience that focuses both on product and landscape core sustainability is necessary, so that winery visits would then be repeated and subsequently amplified in person (ex. face-to-face, word-of-mouth, etc), with media communications (ex. social network, etc), etc (Williams & Kelly, 2001).

With reference to Conegliano Valdobbiadene sparkling wineries' tourism flows, the number of visitors have dramatically grown from over 151,000 in 2008 to over 375,000 in 2016, showing an increase of 148%. Incoming flow growth was accompanied by an increase in total expenditure, which reached an estimated value of 36 million euros, three times the 2008 total (Boatto, Galletto, Barisan, & Bianchin, 2013).

At present, the area cultivated with Glera and other minor varieties (Bianchetta, Perera and Verdiso) for the DOCG production encompasses more than 7,500 hectares, land which represents a territorial value.

As of now Conegliano Valdobbiadene Prosecco DOCG's production (over 90 million bottles) represents an 18% share of the total Prosecco PDO (Protected Denomination of Origin) supply; such relatively small share represents the top quality Prosecco, which is rooted in a specific tradition, *terroir* and landscape (Boatto, Barisan, & Pomarici, 2017a; Pomarici, Barisan, Boatto, & Galletto, 2016).

In 2016, 3,387 wine growers, 433 vintners and 181 sparkling wine companies were part of the Conegliano Valdobbiadene Prosecco' sparkling wine business.

In total, 2,526 people were employed in the Docg sparkling wine houses. Considering human capital's breakdown by working tasks: 13% wine growers, 40% cellar staff, 25% business and administration, 7% export manager, 3% CEO and 12% owners. Among them almost 900 young people were employed, equal to about

36% of the total employed. Of these female employment was equal to 38% (Boatto, Barisan, & Pomarici, 2017b).

From this viewpoint, companies' landscape management play a key role on many territorial elements: from the preservation of viticultural and cultural heritage to achieving authenticity of wines, to the relationship with local communities up to the development to wine tourism (Galletto & Barisan, 2018; Hall & Mitchell, 2002). Consideration of the landscape as a key factor in the area and sparkling wine's enhancement relates to 86% of the wineries, while 88% of them support the application to include the hilly area within the UNESCO World Heritage.

This paper deals with the arising importance of environmental sustainability where product and landscape management are considered key factors for the wine tourism development of Conegliano Valdobbiadene Prosecco PDO on the markets, given the joint roles of human capital and territorial values. In order to address this theme, the paper is organized as follows. The first part introduces theoretical approach, data collection and research methodology. The second part shows empirical results. The third part reports the paper's potential discussion and conclusions.

## 2. RESEARCH METHODOLOGY AND DESCRIPTION OF DATA

### 2.1 The theoretical approach

This paper encompasses the literature about wine tourism policy and environmental sustainability of a wine-tourist area (Gilinsky et al., 2015; Quadri-Felitti & Fiore, 2012). For this reason, an evidence-based strategy coming from the Conegliano Valdobbiadene's Wine Sparkling District, which is also a candidate as UNESCO World Heritage site, could give some useful insights so, in order to better understand the impact of different firms operational in wine-tourism venues, a theoretical conceptualization and empirical analysis was applied.

Beginning with Pine and Gilmore's experience economy model, we have identified two key principles of the wineries' sustainability practices where the wineries active participation is concerned (Gabzdylova, Raffensperger, & Castka, 2009; Pine & Gilmore, 1999; Williams & Kelly, 2001) (Table 1):

- Core Product Sustainability;
- Core Landscape Sustainability.

On the one side, the "vertical reading" of the research framework reflects the wineries participation in performing both a product and landscape stage experiences while, on the other side, "horizontal reading" reproduces concept of relevance for immersion in the destination of the experience during the visits.

In the first model (CPS), the equation to be estimated has the dependent variable  $Log(wv)$  which logs the number of visits. It is treated as an endogenous regressor wine's environmental certification ( $Wec$ ), that is a variable indicator. The choice of  $Wec$  as an endogenous variable is justified by the fact that is under the unit control and of growing importance for operators in the wine sector as, nowadays, tourism and sustainability literature have shown.

We consider others exogenous repressors. Among them the adoption of different Product Management's strategies in order to protect the grapes against biotic diseases: i.e. adoption of an Advanced Integrated Pest Management ( $Aipm$ ); Integrated Pest Management ( $Ipm$ ); Organic, Biodynamic & Sustainability certified protocols ( $OBScp$ ). In addition, Vineyard Management ( $VM$ ) is mainly designed to monitor the Glera protection in an effective and sustainable way by means of Support decision system ( $Sds$ ) and traps insects monitoring ( $Min$ ). Finally, in order to improve the Prosecco Superiore D.O.C.G.'s sustainability image for the wine tourists, the use of new generation sprayers ( $As$ ) and traditional ones were analyzed ( $nAs$ ).

In the second model (CLS), we return to the landscape sustainability variables on the same dependent variable  $\text{Log}(wv)$ . It has been treated as an endogenous repressor landscape's managing levels ( $Lsm$ ), that is an indicator variable with ascending ranking of sustainable involvement. The choice of  $Lsm$  as an endogenous variable is justified by the fact that it is under the wineries control and of relevance for the landscape's beauty scenery too.

Moreover, we have taken into account others exogenous repressors. Of these is the adoption of different firm management's policies in order to make more and more welcoming the landscape by<sup>1</sup>: favouring the maintenance of permanent grassing ( $Pgov$ ) and Wooden posts ( $Wpo$ ), reducing or removing chemical weeding ( $Cwee$ ) and implementing ecological weeding ( $Ewee$ ). To achieve these goals, around 20% of vine growers were involved in planting new hedgerows (hornbeam, dogwood, hazel, elderberry, etc.), aiming at improving the landscape protection levels without harming the useful fauna ( $Phf$  and  $Pnt$ ).

To conclude, in order to improve the Prosecco Superiore's sustainability image for the wine tourists, the adoption of certified protocols with impacts on landscape were analyzed ( $Sfc$ ).

Tab. 1 – Research framework implemented on the Conegliano Valdobbiadene Prosecco DOCG: wineries' sustainability variables and active participation impacting on wine tourism experience.

Core Product Sustainability (CPS)	Core Landscape Sustainability (CLS)
<b>Product Certifications (<math>Wec</math>):</b> <ul style="list-style-type: none"> <li>- Product Carbon Footprint</li> <li>- Product Water Footprint</li> <li>- Product Life Cycle Assessment</li> <li>- Environmental Product Declaration</li> <li>- Other product certifications</li> </ul>	<b>Landscape Management (<math>Lsm</math>):</b> <ul style="list-style-type: none"> <li>- Sustaining organization of agricultural water supplies respecting environment</li> <li>- Recovering local farming architectural heritage</li> <li>- Protecting local cultural and artistic heritage</li> </ul>
<b>Product Management (<math>PM</math>):</b> <ul style="list-style-type: none"> <li>- Advanced Integrated Pest Management or "Protocollo Viticolo" (<math>Aipm</math>)</li> <li>- Integrated Pest Management (<math>Ipm</math>)</li> <li>- Organic, Biodynamic &amp; Sustainability certified protocols (<math>OBScp</math>)</li> </ul>	<b>Firm Management (in-vineyard - <math>FMi</math>):</b> <ul style="list-style-type: none"> <li>- Permanent grassing over (<math>Pgov</math>)</li> <li>- Chemical weeding (<math>Cwee</math>)</li> <li>- Ecological weeding (<math>Ewee</math>)</li> <li>- Wooden posts (<math>Wpo</math>)</li> <li>- Pre-stressed concrete or metal posts (<math>Pscp</math>)</li> </ul>
<b>Vineyard Management (<math>VM1</math>):</b> <ul style="list-style-type: none"> <li>- Support Decision System (<math>Sds</math>)</li> <li>- Monitoring insects (<math>Min</math>)</li> </ul>	<b>Firm Management (out-of-vineyard - <math>FMo</math>):</b> <ul style="list-style-type: none"> <li>- Woods (<math>Woo</math>)</li> <li>- Planting of hedgerows and forestation (<math>Phf</math>)</li> <li>- Planting new trees' groups (<math>Pnt</math>)</li> </ul>
<b>Vineyard Management (<math>VM2</math>):</b> <ul style="list-style-type: none"> <li>- Sustainable atomizers used (<math>As</math>)</li> <li>- Non-sustainable atomizers used (<math>nAs</math>)</li> </ul>	<b>Sustainability &amp; Firm Certifications (<math>Sfc</math>):</b> <ul style="list-style-type: none"> <li>- Biodiversity Friend</li> <li>- EMAS</li> <li>- Other supply chain certifications</li> </ul>

## 2.2 Data collection and description

In order to develop a detailed picture of the Conegliano Valdobbiadene Prosecco DOCG in terms of wine tourism, we needed to collect, analyze and integrate data coming from the Research Centre for Viticulture and Oenology (C.I.R.V.E.) of the Prosecco Docg wine District and the Certification bodies in charge of Prosecco production's control (C.I.R.V.E., 2016; Valoritalia, 2017).

From a structural production viewpoint, data were gathered starting with small and medium-sized wineries to end with the big and very-large companies. The stratification in business clusters has been drawn on the basis of the total number of bottles sold annually (standard = 0.75 L). Therefore, the dataset was divided

<sup>1</sup> These includes in-vineyard and out-of-vineyard territorial policies.

into four business size: i) small units (less than 150,000 bottles sold), ii) medium-sized ones (150,000-500,000), iii) large companies (500.001-1.000.000), iv) very large companies (more than 1,000,000)<sup>2</sup>.

Data were used to draw an overview of the Prosecco Docg's vineyard sustainability policies' impact on wine tourism and experiences considering the year 2016 as a period of time. The analysis was carried out on a survey panel of 143 wine companies with a direct sale to the public, which represent approximately 79% of the bottled DOCG's sparkling wine companies (Table 2).

*Core Product Sustainability.* On average 14.7% of them have adopted one or more ecological certifications for products. These are product sustainable standards aiming at respecting environment over the territory, such as the Carbon Footprint assessment of products (ISO 14067), Water Footprint assessment of products (ISO 14046), EPD (Environmental Product Declaration), ISO 14001 (Product Life Cycle Assessment), and other product ecological certifications (i.e. Biodiversity friend, Energy Management System etc). 76.2% of wineries have adopted the Vineyard Protocol defined by Conegliano Valdobbiadene Prosecco DOCG's Tutelary Consortium, which has been implemented for promoting the Advanced Integrated Pest Management while a fairly smaller number follows the biodynamic organic production paradigms and sustainability protocols (3%); the rest of the wineries follow the references guidelines provided by the European Parliament and the Council of Member State through the National Action Plans (i.e. IPM or Integrated Pest Management) for the progress in the implementation of Directive 2009/128/EC on the sustainable use of pesticide in producing grapes. On average wine companies used 0.6 sustainable atomizers (i.e atomizers equipped with recovery drift, atomizers equipped with non-drift nozzles, etc). Considering the exogenous variable *Lim*, on a Likert scale ranging from 1 to 4, landscape is a distinguishing feature of the area, representing a strategic factor in Prosecco Superiore DOCG's marketing. Indeed, compared to other Italian and international wine-growing areas, hogbacks are culturally distinctive elements of CVP DOCG viticulture, which historically has shaped the Conegliano Valdobbiadene Prosecco DOCG hills, determining additional cultural, social and economic core values for the product.

**Table 2.** Descriptive statistics of the variables included in the models.

Variable	Observations	Mean	Standard. Deviation	Min	Max
Log of winery visits	143	6.626	1.328	3.912	10.043
<b>Core product sustainability:</b>					
Wines' Environmental Certifications	143	0.148	0.357	0	1
Advanced Integrated Pest Management	143	0.765	0.424	0	1
Sustainable Atomizers used	143	0.602	0.924	0	4
Landscape importance in product marketing	143	3.709	0.528	1	4
<b>Core landscape sustainability:</b>					
Landscape's Managing Levels	143	0.503	0.637	0	2
Chemical weeding	143	17.587	32.877	0	100
Ecological weeding	143	1.678	12.043	0	100

Source: own elaboration.

*Core Landscape Sustainability.* With reference to this, 35% of wineries have adopted sustaining organization of agricultural water supplies aiming at respecting environment (the first level considered in vineyard managing), where recovering local farming architectural heritage and protecting local cultural and artistic linked to vineyard heritage represents 7.7% of the total.

On average the DOCG's area under vines accounted for 10.4 hectares per wineries. The firm size spans the area cultivated to Glera from the 7.7 hectares of the small wineries to the 12 hectares of the big companies. In this area hogbacks are culturally distinctive elements of the DOCG'S viticulture, which historically has shaped

<sup>2</sup> The CVP bottling structure relies on two fully integrated supply chains: where the same business unit (i.e. wine growers and cooperatives) realizes all three production phases (from growing grapes to wine bottling), and two non-integrated production chains, where the three production phases are not fully integrated (i.e. transformers bottlers and plain bottlers).

the Conegliano Valdobbiadene hills, determining additional values for the territory as a whole. In that area, chemical weeding (17.6% of DOCG’s area under vines) has a negative effect on landscape and soil disturbance while it has a positive impact on the ecological one despite the minor relevance (on average equal to 1.7%).

In order to perform the models, we used two groups of potential instruments for models (1 and 2) related both to the winery human resources and to the territorial values, because neither are known to the majority of visitors when visiting or simply do not create interest when they decide to visit that winery or territory.

In performing the model (1) and (2), where endogenous variable ( $x_K$ ) can be correlated with latent component, we assumed to have more than one instrumental variable for  $x_K$ , as the following (see also the reported descriptive statistics in Table 3):

- Firm’ size (based on bottles sold): small companies; medium companies, big companies, very big companies ( $Fsz$ ).
- Vineyard surface (hectares): Conegliano Valdobbiadene Prosecco DOCG under vines ( $Dav$ ).
- Youth’s employees number in business management (number): i.e. vine growers ( $Ygw$ ), oenologists ( $Yos$ ), business and administration ( $Yba$ ), export manager ( $Yem$ ); CEO ( $Yce$ ), owner ( $Yow$ ).
- Education (Business management youth’s employees - number): Secondary School ( $Yss$ ), Graduate ( $Ygr$ ).
- Foreign language (yes-no questions): English ( $Eng$ ), German ( $Ger$ ), others (French, Spanish, Russian, Portuguese, Chinese, Japanese, etc -  $Olg$ ).

The relevance of instruments listed above rely on previously published empirical studies (Barisan, Boatto, Pomarici, & Vecchio, 2016; Boatto, Dal Bianco, & Barisan, 2014; Boatto et al., 2013) and are confirmed by economic theory (Pine & Gilmore, 1999; Porter, 2008).

**Table 3.** Descriptive statistics of the available instruments.

Variables	Observations	Mean	Standard Deviation	Min	Max
<b>Youth’s employment:</b>					
Wine growers	143	0.748	1.165	0	6
Oenologists	143	1.356	0.899	0	5
Business and administration	143	1.366	2.309	0	16
Export manager	143	0.272	0.630	0	4
Chief executive Officer	143	0.083	0.278	0	1
Owner	143	0.433	0.736	0	4
Secondary School in business management	143	0.832	1.433	0	8
Graduates in business management	143	0.510	1.336	0	10
Foreign language spoken	143	1.594	0.958	0	3
<b>Productive structure:</b>					
Firm’s size ( $Fsz$ )	143	1.762	1.041	1	4
DOCG’s area under vines ( $Dav$ )	143	10.363	12.600	0	94

Source: own elaboration.

### 2.3 The empirical models

In order to assess the research questions, we used the method of instrumental variables (IV). The method is particularly useful in the context of errors-in-variables and simultaneous equation problems, and two-stage least squares (TSLS) (Cameron & Trivedi, 2009; Wooldridge, 2010). In our paper, winery visits were estimated through two different TSLS models.

The first model which we call “Core Product Sustainability” considers how the vineyard practices of the winery, the wine company’s behavior in the field of product sustainability, impacts the number of visits.

We consider an over identified model referred to winery visits equation for the Conegliano Valdobbiadene Prosecco’ sparkling wine District (structural equation).

$$\text{Log}(wv) = \beta_0 + \beta_1 Aipm + \beta_2 As + \beta_3 Lrpm + \beta_4 Wec + u \quad (1)$$



Where  $u$ , the latent component, is thought to be correlated with  $Wec$  ( $x_{kp}$ , the endogenous variable) because of omitted ability and skills of winery's human capital, as well as other factors, such as sensitive to environmental issues and education background. Having collected data on working tasks and levels of education per company, we used  $Bar$  and  $Yos$  as valid instruments for  $Wec$ . To be valid instruments for  $Wec$   $Bar$  and  $Yos$  have to be uncorrelated with  $u$ . The first-stage regression is the following:

$$Wec = \delta_0 + \delta_1 Aipm + \delta_2 As + \delta_3 Lrpm + \theta_1 Bar + \theta_2 Yos + r \quad (2)$$

For identification, instruments have to be correlated with  $x_{kp}$ . This will be tested by weak-instruments tests using the first-stage information.

The second model, a just identified one, which we call “Core Landscape Sustainability”, takes into account how the vineyard practices of the winery, the wineries' behavior in the field of landscape sustainability, impacts the number of visits, as follows:

$$\text{Log}(wv) = \beta_0 + \beta_1 Cwee + \beta_2 Ewee + \beta_3 Lsm + u \quad (3)$$

Where  $u$  is thought to be correlated with  $Lsm$  ( $x_{kl}$ ) which is used as a proxy component of omitted experience related to the territory, as well as other factors, such as sensitive to landscape issues and Conegliano Valdobbiadene Prosecco' beauty scenery and values. Having collected structural per each winery, we used  $Dav$  as valid instruments for  $Lsm$ . To be a valid instruments for  $Lsm$ ,  $Dav$  has to be uncorrelated with  $u$ . The first-stage equation is the following:

$$Lsm = \delta_0 + \delta_1 Cwee + \delta_2 Ewee + \delta_3 Lsm\delta_0 + \theta_1 Dav + r \quad (4)$$

For identification, the instrument has to be correlated with  $x_{kp}$  which we will verify through weak-instrument tests.

In the specifications models, standard error estimates have been corrected for heteroschedasticity through the White's procedure, in the version of the clustered co-variance estimator suggested by Arellano (1987) (Arellano, 1987; White, 1980).

### 3. RESULTS

#### 3.1 Core product sustainability

The equation's estimate (2) accommodates the effects (or roles) of wineries' capital youth skills and capabilities. For that we have taken into account both the number of oenologists and business management employees who are of relevance in winery visits performance through decisions on sustainability practices, where the latter are under the unit control.

The results reported in Table 4 shows the estimates obtained through a comparison of the TSLS, OLS and GMM estimators.

In this table are shown the analysis concerning the so-called Core Product Sustainability model with 5 estimators. The first column considers the estimates of the OLS model. The second estimator is TSLS that corrects standard errors for heteroschedasticity. The third estimator, GMM\_het, is the optimal GMM estimator under heteroschedasticity. The fourth estimator uses the iterative GMM, GMM\_igmm. The last uses TSLS with uncorrected standard errors, TSLS\_def.

On the one side the estimates obtained through TSLS differ from OLS; while on the other side the differences between TSLS, GMM\_het, GMM\_igmm and TSLS\_def estimators are negligible. A first result of the study concerns the fact that, in the case of the Core Product Sustainability model, the endogenous nature of the Wines variable 'environmentally certified' (*Wec*) is confirmed. A second result concerns the fact that the estimates of TSLS show substantial differences in the coefficient magnitude of some estimates compared to the OLS ones. Such differences primarily concern the positive effect of environmental sustainability certifications in increasing the number of visitors, significantly higher for *Wec* in the TSLS model compared to the OLS model, 2.46 and 1.09 respectively. The management of the sustainable product through Advanced Integrated Pest Management (*Aipm*) promoted by the Conegliano Valdobbiadene Prosecco's Tutelary Consortia shows a larger size in model (2) compared to model (1) but with an impact not yet appreciable on company visits. In addition, there is also a positive impact by the sustainable atomizers used to recover and play down the pesticide drift. This winery sustainable practices was considered as a key variable to improve both product and company equity (Nowak & Washburn, 2002). Finally, landscape importance in product marketing, that was considered as exogenous, have showed the expected positive sign in both models. Finally, landscape importance in product marketing, that was considered as exogenous, has shown positive impacts in both models.

Therefore, according to the latest research presented, our survey shows that our vision in product sustainability practices could be considered a kind of win-win strategy (Beckmann, Hielscher, & Pies, 2014; MacMillan & McGrath, 1997), given the importance of human capital that combines higher levels of product environmental sustainability and winery visits, while playing down the incompatibilities between goals (Boatto et al., 2017a; Galletto & Barisan, 2018; Pomarici et al., 2016).

In conclusion, from the analysis of the variables considered, concerning the Core Product Sustainability, the role of the skills and capabilities of human capital emerges, especially of young people, in achieving, through appropriate environmental sustainability policies, better performances in eno-tourist hospitality.

**Table 4.** Core Product Sustainability's model: estimation results.

Dependent variable: Log of number of winery visits  $Log(wv)$ .

Variables:	(1) OLS	(2) TSLS	(3) GMM_het	(4) GMM_igmm	(5) TSLS_def
Wines' environmentally certificated ( <i>Wec</i> )	1.091*** (0.239)	2.463*** (0.527)	2.451*** (0.500)	2.451*** (0.500)	2.463*** (0.551)
Advanced Integrated Pest Management ( <i>Aipm</i> )	0.078 (0.205)	0.251 (0.236)	0.249 (0.233)	0.249 (0.233)	0.251 (0.265)
Sustainable atomizers used ( <i>As</i> )	0.276*** (0.105)	0.224** (0.112)	0.224** (0.112)	0.224** (0.112)	0.224* (0.119)
Landscape importance in product marketing ( <i>Lim</i> )	0.621*** (0.200)	0.607*** (0.217)	0.605*** (0.215)	0.605*** (0.215)	0.607*** (0.206)
Constant	3.934*** (0.744)	3.680*** (0.790)	3.690*** (0.778)	3.690*** (0.778)	3.680*** (0.781)
R-squared	0.200	0.069	0.071	0.071	0.069
Robust F-test ( <i>p-value</i> )	-	0.000			
First-stage <i>F-stat</i>	-	43.16			
Sargan test $-\chi^2$ ( <i>p-value</i> )	-	0.942			
rk <i>F-statistic</i>	-	23.41			
5% critical value	-	20.60			
for 10% of worst-case-bias	-				

Notes: Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ , Number of observations = 143.

<sup>1</sup> Instrumented variable: *Wec*. Instruments: *Aipm*, *As*, *Lim*, *Bar*, *Yos*. Over identified. The rk F-statistic tests whether the model is only weakly identified. Critical values calculated according to Montiel Olea and Pflueger (2013).

### 3.2 Core landscape sustainability

The equation (4) has considered the relevance Conegliano Valdobbiadene Prosecco DOCG area under vines (*Dav*) at firm level as an instrument for the endogenous variable, *Lsm* (just identified model). We have adopted this instrument because is very important as a territorial component as both area under study and literature review highlighted (Hall & Mitchell, 2002) and assumed of low interest for wine tourists.

In particular, the results obtained in Table 5 show the estimates obtained through a comparison among TSLS, OLS and TSLS\_def models. In particular, it presents the analyses concerning the so-called Core Product Sustainability's model. The first column (1) considers the estimates of the OLS model. The second represents the TSLS estimator that corrects the standard error for heteroschedasticity. The third estimator is TSLS\_def\_het, TSLS with uncorrected standard errors.

In particular, from the examination of the results it emerges how on one side the estimates obtained through the TSLS model differ from those of the model without instrumental variables (OLS); while on the other side the differences between TSLS and TSLS\_def are confirmed to be negligible.

In the Core Landscape Sustainability model the Landscape's managing levels (*Lsm*) instrumented by *Dav* is confirmed as an endogenous variable in explaining the number of winery visits.

A second result concerns the estimates of the TSLS model, which show significant differences in the coefficient magnitude of all estimates, which are higher than OLS; such differences concerns the positive and synergic effects of sustaining organization of agricultural water supplies respecting environment, recovering local farming, cultural heritage and protecting cultural and artistic heritage. These estimates have showed how the number of visitors is significantly higher as levels of *Lms* increases and when TSLS is used (2.09 in TSLS vs 0.34 OLS).

Our estimates highlighted the role played by Conegliano Valdobbiadene Prosecco Docg's landscape in itself in promoting specific approaches towards a sustainable growth, where positive sustainable practice implemented by vine growers, like ecological weeding have positive impacts on winery visits, wherever vineyard management through chemical weeding have negative effects.

**Table 5.** Core Landscape Sustainability's model: estimation results.

Dependent variable: Log of number of winery visits *Log(wv)*.

Variables:	(1) OLS	(2) TSLS	(3) TSLS_def
Landscape's managing levels ( <i>Lsm</i> )	0.343* (0.189)	2.090*** (0.526)	2.090*** (0.641)
Chemical weeding ( <i>Cwee</i> )	-0.005 (0.003)	-0.006* (0.004)	-0.006 (0.005)
Ecological weeding ( <i>Ewee</i> )	0.007*** (0.002)	0.014*** (0.004)	0.014 (0.013)
Constant	6.541*** (0.165)	5.669*** (0.319)	5.669*** (0.361)
R-squared	0.042	0.069	0.047
Robust F-test ( <i>p-value</i> )	-	0.000	0.000
First-stage <i>F-stat</i>	-	28.603	
<i>rk F-statistic</i>	-	28.604	
5% critical value	-	37.418	
for 10% of worst-case-bias	-	23.100	
Pagan-Hall-test ( <i>p-value</i> )	-	0.302	

Notes: Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ , Number of observations = 143.

<sup>1</sup> Instrumented variable: *Lsm*. Instruments: *Cwee*, *Ewee*, *Dav*; just identified. The *rk F-statistic* tests whether the model is only weakly identified. Critical values calculated according to Montiel Olea and Pflueger (2013).

Therefore, from the analysis of the variables considered, relative to the Core Landscape Sustainability emerges the role of the territorial components (i.e. beauty landscape, etc), which through the implementation

of adequate territorial and corporate sustainability policies could have a return in terms of economic performance in committing towards an eno (-eco-) tourism hospitality.

To conclude, companies' landscape management is of importance on many territorial elements: from the preservation of viticultural and cultural heritage to achieving authenticity of wines.

#### 4. CONCLUSIONS

Nowadays, the adoption of an approach to the development of the eno-touristic supply that takes into account the values of environmental sustainability represents a relevant asset, which should be managed and developed, from the levels of wine making enterprise to those of territorial policies and up to those involving the Protection Consortium and public institutions (Montella, 2017). These requests originate *de facto* from an international eno-touristic demand that in recent years has evolved rather strongly, affecting the performance of companies and wine-growing areas.

In light of research results wineries can influence wine purchasing and tourists' behaviour after the visits and when planning repeated visits, which positively impact on the performance (Scott, Mark, & Murray, 2005). In order to improve the experience for wine tourists the considering of crucial supply factors is becoming more and more relevant. In this frame the Conegliano Valdobbiadene's wineries might rely upon current empirical and evolving evidences to face new challenges for the wine sector.

In our working paper, two TSLS models evaluating wineries sustainability's policies towards winery visits are estimated. The first model looks to better understand factors favouring or limiting core product sustainable practices (related to the vineyard) and their impacts on winery tourists. The second model compares the same goal starting from core landscape sustainable activities. Both the models would allow drawing a deeper knowledge about the territory under study.

Interestingly, results showed how in the case of the Conegliano Valdobbiadene's wineries, strategies based on evidence of product and landscape sustainability policies should be taken into account in managing more effective staging visits experiences.

The results of the first model show how investments in product certifications that comply with environmental standards represent an important tool in helping to create and maintain a relationship of trust aimed at increasing company visits. Among the tools involved in the sustainable management of production the Advanced Integrated Pest Management (*Aipm*) promoted by the Conegliano Valdobbiadene Prosecco's Tutelary Consortia shows a positive sign and coefficient in model but with an impact not yet appreciable on company visits. In this perspective the need emerges to fill a gap in communication, which does not appear to be easy to solve, presenting "latent elements" that can be considered as irrelevant (Silverman, Marshall, & Cordano, 2005). In addition, there is also a positive impact by the sustainable atomizers used to recovery and play down the pesticide drift. Finally, landscape importance in product marketing has shown positive expectations in both models.

The results of the second model focused on the drivers of landscape sustainability, showing the importance of a sustainable strategy, the so-called win-win strategy, which pursues on the one hand the objectives of preserving environmental values, creating positive externalities and a good image for the visitor, and on the other hand the economic ones (Santini et al., 2013). Interestingly, the estimates have showed how the number of visitors is significantly higher as levels of landscape management increases in explaining winery visits and the number of visitors is shown in the following explanation. These evidences are accompanied by the importance of a sustainable management of the beauty of the landscape, where the practices followed in the vineyard are a sign of sustainable quality of the landscape that can be directly perceived by the visitor or

communicated by the company, which could help consolidate a virtuous process with a positive return both in terms of the loyalty of the number of visitors and the repetition of company visits.

The analysis confirms the presence of companies with a different commitment in sustainability development linked to wine visits, denoting features that differentiate each other. In this context, the relationships between the core landscape area (with heroic viticulture features) and UNESCO recognition could be of importance within the frame of the so-called “nature value”, wherever it represents, interalia, the union of wine and landscape sustainability.

Nowadays, the Conegliano Valdobbiadene Prosecco DOCG’s wine companies represent an internationally recognized wine region with a certain commitment in environmental sustainability, which may evolve positively, in terms of wine visits, thanks also to the success of the Protected Denomination of Origin values. Among them, the skills and capabilities of human capital emerges, especially of young people, in order to achieve, through appropriate environmental sustainability policies, better performances in eno-tourist hospitality.

Therefore, the relevance of obtaining a good quality product following environmental sustainable method emerges. Have these objectives been achieved? In part they have and in part they have not (Bonn & Fisher, 2011). Through which paths can a sustainable production result be achieved in environmental profiles? In this perspective, a relevant role can be played by communication at company and territorial levels (Atkin, Gilinsky Jr, & Newton, 2012; Fairweather, Campbell, & Manhire, 2003; Gilinsky et al., 2015).

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