Vol. 9, No. 2, 2020

BAE

Bio-based and Applied Economics

FIRENZE UNIVERSITY PRESS

ISSN 2280-6180
www.fupress.net

Bio-based and Applied Economics is the official journal of the Italian Association of Agricultural and Applied Economics – AIEAA (www.aieaa.org; E-mail: info@aieaa.org).

Journal Contact: Meri Raggi, via Belle Arti 41, Dept. of Statistics, 40124 Bologna; Email: meri.raggi@unibo.it

Available online at: http://www.fupress.com/bae

Università degli Studi di Firenze
Firenze University Press
via Cittadella, 7 - 50144 Firenze, Italy
www.fupress.com/
E-mail: journals@fupress.com

ISSN 2280-6180 (print)
ISSN 2280-6172 (online)
Direttore Responsabile: Corrado Giacomini
Registrata al n. 5873 in data 10 maggio 2012
del Tribunale di Firenze

Bio-based and Applied Economics 9(2): 127-136, 2020
DOI: 10.13128/bae-9959

Editorial

Economics of culture and food in evolving agri-food systems and rural areas

Severino Romano[1], Francesco Vanni[2,*], Davide Viaggi[3]

[1] University of Basilicata (Italy)
[2] CREA (Italy)
[3] University of Bologna (Italy)

Abstract. The role of culture in connection with the development of food and bioeconomy issues has gained growing importance in recent years. In this editorial we provide background information on the three key topics addressed by the papers published in this special issue: cultural ecosystem services, cultural issues in the organisation of food chains, culture and food characteristics. In a way, the common denominator of these papers is the link between culture, food and territory, taken from different angles. More research and methodological advances are needed for a better consideration of culture in economic research accounting for the current needs of more systemic and holistic vision of the topic.

Keywords. Culture, agricultural economics, food economics, cultural ecosystem services, food chains, food characteristics.

JEL Codes. O13, Q13, Q18, Q57.

1. Introduction

This special issue of Bio-based and Applied Economics (BAE) features a selection of four papers previously presented at the 174th Seminar of the European Association of Agricultural Economists (EAAE) titled "Economics of culture and food in evolving agri-food systems and rural areas" (Matera, 10-12 October 2019)[1]. The seminar aimed at promoting academic debate about food and rural cultures and their implications for agricultural and food economics, with either an individual, chain or system perspective.

The role of culture in connection with the development of food and bioeconomy issues has recently gained growing attention. This has been emphasised by recent EU stra-

[1] Papers accepted for the Seminar were invited to submit to the journal or this special issue. The submitted papers followed regular double blind peer review according to BAE procedures.

*Corresponding author. E-mail: francesco.vanni@crea.gov.it

Editor: Fabio Gaetano Santeramo.

ISSN 2280-6180 (print)
ISSN 2280-6172 (online)

tegic documents, such as the New Green Deal (European Commission, 2019) and the Farm to Fork Strategy (European Commission, 2020), that give a paramount importance to education, awareness and changes in consumers' behaviour.

Culture is also a driver of a range of topics increasingly investigated by scholars working in the field of agricultural and food economics. Examples include consumer's behaviour facing cultural features of products (Guo *et al.*, 2019), touristic-driven development of rural areas (both remote areas and areas closely connected to cities) (Promsivapallop and Kannaovakun, 2020), change in food choices and working habits (Woodhall-Melnik and Matheson, 2017), innovation and technology acceptance (Kemper *et al.*, 2018; Yang and Hobbs, 2020), different forms of governance between supply and demand through food networks, chain organisation and trust (Evans and Mylan 2019; Sonnino, 2019), as well as the interplay between private action and public policy.

Economists often address the role of culture in a rather narrow way, where culture is considered as a driver of economic behaviour, related with individual products or locations, either on the supply or demand side of markets. Noticeably, the vast majority of these contributions consider culture as a static concept, i.e. *culture* is exogenous and immutable. It is assumed that it can be fully represented in a disciplinary or a 'traditional' fashion and coded into a well-defined set of behavioural rules determining the interaction and coordination among agents in rural communities, e.g. driving consumer choices and acceptance of innovation.

More recently, from both demand and supply side, attention is driven towards the need for a systemic view in which not only demand and supply are connected through coordination means beyond market, but cultural aspects are embedded in coordination solutions, e.g. through concepts such as alternative food networks and knowledge and innovation systems.

However, many of the issues implied by such needs remain largely unaddressed. For example, the role of culture in the organisation of food supply chains (Dowty and Wallace, 2010) and the way the culture is shared among actors in agri-food networks (Hubeau *et al.*, 2019; Reina-Usuga *et al.*, 2020) have hardly been investigated.

Some of these aspects are further challenged by new technologies. New communication technologies for example, are bringing not only new ways of communication, but also new discourses, evolving mindsets and new forms of social interaction. Another example is the bioeconomy, a sector that is bringing new avenues towards interpreting value creation and the interface with ethics. Although these phenomena are often studied separately by different branches of agricultural and food economists, cultural issues are often interconnected. Indeed, culture affects not only the relations between society and rural areas, farming, food and environment, but indirectly also the vitality and competitiveness of the agriculture, food and bio-economy systems.

The objective of this paper is to provide background information on the three key topics addressed by the papers published in this special issue: cultural ecosystem services, cultural issues in the organisation of food chains, culture and food characteristics. In addition, it tries to derive some lessons learned about current research on the topic and the need for further research.

The three topics are addressed respectively in section 2, 3 and 4, while section 5 provides some discussion and concluding remarks.

2. Cultural ecosystem services

While the primary goal of the agricultural sector is to produce provisioning services such as grain, livestock, fuel, forage, and other products, it is widely recognised that, along the production of commodities, farming also provides a large number of cultural, recreational, regulating, habitat, and supporting services (Swinton *et al.*, 2007; van Zanten *et al.*, 2014; Zhang *et al.*, 2007). Numerous studies underline the importance of intangible goods and services associated with agriculture, and amongst them, an increasing attention is devoted to the so-called cultural ecosystem services (CES). CES have been defined as *"the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences"* (MEA, 2005, p. 40). When looking at the farming sector and more broadly to rural areas, CES include important services that do not sustain agricultural production, but deliver benefits derived from the aesthetic function of landscapes, open-space, cultural heritage of rural lifestyles, recreational activities and rural tourism (Swinton *et al.*, 2007).

The analysis and assessment of CES associated with farming are a growing field of research also for agricultural economists, and major contributions have been made to understand both the monetary costs and benefits of CES delivery (van Berkel and Verburg, 2014). While most studies are strongly focused on economic and monetary valuation exercises, an interesting field of research is emerging, based on alternative evaluation approaches, drawing on a wide range of social science tools and methods. Indeed, in order to address the role of CES in a more comprehensive way, an increasing number of studies focuses on perceptions, values, attitudes, and beliefs of experts and citizens towards CES (Balàzsi *et al.*, 2021; Garcìa-Llorente *et al.*, 2012; Martín-López *et al.*, 2012; van Zanten *et al.*, 2014). Such studies address socio-cultural preferences towards ecosystem services in order, on one side, to generate more meaningful insights regarding the appreciation of CES by society and, on the other side, to better identify trade-offs between CES, biodiversity, commodity production and other ecosystem services at landscape level (Nelson *et al.*, 2009; Plieninger *et al.*, 2013).

Two articles of this the special issue contribute to this literature by providing additional evidence on the perception of aesthetic value of ecosystems and rural landscapes by EU citizens.

O'Donoghue *et al.* (2020, this issue) explore individual preferences for rural landscape attributes, based on the viewing of photographs of the Irish countryside. The authors aim at contributing to the literature on landscape preference valuation by investigating whether individuals' characteristics interact with landscape attributes, but also by exploring how these interactions may affect public preferences for landscapes. From a methodological perspective, this approach aims, on the one side, at facilitating the creation of a formalised model of landscape preferences based on the component attributes and, on the other side, at bridging the gap between the literature on Geographic Information Systems (GIS) and landscape analysis. Results show positive associations with natural attributes such as cliffs, mountainous landscapes, landscapes with water and native trees, and negative associations with events such as flooding, unmanaged landscapes, industrial turf cutting and mechanised features. More interestingly, a significant heterogeneity of preferences was observed across the urban-rural residency divide: while farmers and people living in rural areas

have the highest preference for agricultural landscape attributes, urban dwellers seem rather indifferent towards natural and farming landscapes.

The relations between citizens' characteristics and landscape appreciation are also explored by Targetti *et al.* (2020, this issue), who assess the perception of ecosystem services associated with rural landscape by local residents in a rural area located in Northern Italy (Po Delta lowlands, Province of Ferrara). This article shows that while the urban population has a rather generic and positive understanding of ecosystem services produced by landscape elements, rural population also tends to acknowledge the presence of disservices associated with specific socioeconomic sectors. In addition, urban dwellers attribute a higher value to the recreational function and cultural meanings attached to specific landscape elements, while people living in rural areas seem having a more complex and comprehensive understanding of landscape elements. In other words, living close to specific elements have a significant impact not only on the services perception, but also on the capacity to discern among benefits for residents, agriculture and tourism. This study shows the complex relation between landscape elements, awareness and perception of individual characteristics and - similarly to the paper by O'Donoghue *et al.* (2020, this issue) - it also provides interesting evidence that could be used to better design landscape valorisation policies.

In sum, these two articles not only confirm the important role of recreation, tourism and aesthetic values of agricultural landscapes, but also add interesting insights on how socio-economic drivers determine CES awareness and perceptions.

Finally, both contributions have interesting methodological and policy implications. From a methodological perspective, this kind of research sheds light on the need for using innovative methods to better understand the relationships between CES and final users, with a special attention to people imagination, expectation, experiences and preferences. From a policy perspective, the possibility to identify citizens' preferences on ecosystem services (and disservices) associated with farming, and on specific landscape attributes could be also a relevant approach to better target policy intervention. For example, the recognition of the high aesthetic value of specific elements of agricultural landscapes such as stone walls and hedgerows could be an important justification to incentivise farmers to maintain these public goods through targeted agri-environmental schemes or through other landscape conservation policies.

3. Culture in the organisation of food chains

Agri-food systems have become increasingly complex due to the processes of globalisation of the supply chain, the industrialisation of food production, and the economic concentration in the processing and retail sectors (Borsellino *et al.*, 2020). These systems are dealing with various sustainability challenges such as climate change, ecosystem degradation, biodiversity loss, and resource scarcity that require collective solutions and actions, as well as system innovations (Borsellino *et al.*, 2020; Hubeau *et al.*, 2019). In this context, a wide variety of new food networks have emerged to improve the sustainability of the global food regimes and foster innovation and change (Hubeau *et al.*, 2017, 2019; Maier *et al.*, 2020; Melkonyan *et al.*, 2020; Reina-Usuga *et al.*, 2020; Roep and Wiskerke, 2012).

Alternative food networks (AFNs) differ from these dominant food regimes "*by building new producers-consumer alliances and creating experimental spaces* (...)" where "*food is*

reconnected to the social, cultural, and environmental particularities of the context or the "local" in which it is produced" (Roep and Wiskerke, 2012). However, AFNs often either fail to reach their goals or cease to exist due to the organisational and collaborative difficulties between the members of the network. A solid societal embedding is therefore essential for the AFNs to develop and take paths of sustainable development. Here culture plays an important role. It is no longer just an element affecting consumer behaviour but rather something affecting the entire organisational process of food supply chains.

Culture can be conceptualised as inherently relational, meaning that the elements that characterise it, such as narratives, values and norms, and everyday practices, only contribute to a collective culture when they are shared among actors (Crossley, 2015; Hubeau *et al.*, 2019). According to Hubeau *et al.* (2019), it is possible to distinguish five levels of culture. Two of them, the culture related with (i) the landscape (dominant societal cultures) and (ii) the "conventional" agri-food regime (represented by policy measures and public actions) are not directly related with the organisation capacity of food supply chain. The latter depends on the culture related with (iii) agri-food networks (interactions and relations of the network members); (iv) the network member-organisations (culture of each organisations); and (v) the individuals within the member-organisations (culture of individual people). When members of a food network share the same culture, it is easier to agree on ideas and actions, simplifying the organisational process of food supply chain and the collaboration among the members, in order to achieve their common objectives and acknowledging their differences, such as expertise and viewpoints.

In this special issue, Kurtsal *et al.* (2020, this issue) seek to understand the governance mechanisms used in short food supply chains (SFSCs) driven by civil society, studying seven SFSC initiatives in the city of Izmir (Turkey). The research contributes to the literature on collaborative governance in local food systems by analysing the processes and mechanisms through which local food network actors get collectively organised and govern these systems. In this direction, qualitative semi-structured in-depth interviews were conducted to examine the governance mechanisms, challenges, and collaboration processes and outcomes of SFSCs, by collecting information from the actors (coordinators, producers and consumers) involved in the initiatives. The study shows that the local food system impacts positively on well-being and livelihoods of the rural community. However, differences of governance structures, institutional frameworks, as well as differing levels of shared goals and understanding among different initiatives studied are reported, which also lead to numerous governance challenges. Probably, some of these challenges may occur due to the lack of sharing of the same culture among the actors of the local agri-food systems. For example, the results show that the initiatives in which actors feel part of a "community", naturally have a higher level of shared understanding and collaboration among participants, in comparison to the initiatives where this sense of belonging is not present. This confirms the importance to conduct in-depth analyses on the cultural sphere in the organisational process of food supply chains.

Finally, two additional aspects deserve attention: (i) the need of a support mechanism or "decent policy framework" for SFSCs actors, and (ii) the need for collaboration, exchange of knowledge and experience and social learning among actors, public authorities and citizens. These can represent drivers, with culture, to foster innovation and the promotion of the local food networks.

4. Culture and food characteristics

Studies on consumers' preferences and behaviour have been one of the most fertile areas of agriculture and food economics in recent decades. While the link between consumer's behaviour and cultural issues is rather straightforward, in most of the literature this is treated indirectly through a variety of attributes. In addition, much of the literature in this field focuses on a specific product or a specific issue among potential attribute groups. For these reasons, it is difficult to grasp the overall outcomes of this branch of research and even have a full overview of the topic. However, it needs also to be highlighted that this area of the literature accounts some of the hottest issues directly linking culture and food attributes. One example is preferences for different innovation characteristics of the product, such as genetic engineering. Another is in the domain of religious or explicit cultural characteristics of a product.

Among the many potential attributes of interest for the connection between culture and consumer behaviour, one of special interest concerns the region-of-origin (RoO). The existing literature on the consumers' attitude towards RoO provides numerous and varying evidence on the role of this attribute as compared to other product characteristics (Henchion and Mcintyre, 2000; Stefani *et al.*, 2006). On the one hand, regional imagery is a relevant component of buying behaviour (Chamorro *et al.*, 2015; van der Lans, 2001) and can affect willingness to pay and hence agricultural income. On the other hand, different characteristics for the RoO can strongly affect actual impact on purchasing patterns (van Ittersum *et al.*, 2007; Verbeke *et al.*, 2012).

Santeramo *et al.* (2020, this issue) address this topic through a meta-analysis of the relative importance of RoO. In particular, the article aims at characterising the heterogeneity in the relative importance of RoO. After systematically reviewing the literature on RoO, the paper builds an ad hoc indicator to measure the relative importance of RoO as compared to other attributes of agri-food products. Then the authors use a meta-analytical approach to explain how the relative importance of RoO varies according to factors related with publication process, methodological issues and characteristics of articles. These topics yield interesting and complementary information that deserve separate considerations.

First, the findings reveal that the publication process and the methodological choices have limited influence on the relative importance of RoO. This is important as it contributes to validate the strength of the following considerations and somehow corroborates the robustness of the approaches used by authors.

In contrast, the authors find a strong effect of characteristics of articles, which include also the choice related with the topics studied. Notably, the relative importance of RoO is highly dependent on the products under investigation and on the characteristics of the RoO addressed.

Overall, the results also highlight that RoO is an effective differentiation instrument in the agri-food markets only if supported by geographical indication labels, such as Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and American Viticultural Area (AVA). However, managerial implications go beyond this simple statement. In particular, it is critical for policymakers to develop communication strategies focused on consumers, in order to convey attractive information about RoO by stimulating their interest in the origin of foods and building favourable perceptions about qual-

ity and distinctiveness of products. This entails enhancing communication strategies by targeting different messages to different target markets and consumers' groups, as well as developing new concepts of label in terms of contents and communication channels.

5. Final remarks

Culture somehow affects all aspects of agriculture and food economics. The agricultural literature connected with culture is extremely wide. However, it remains very difficult to grasp the main messages, as each paper is very often connected with extremely narrow topics, specific products, specific geographical areas and/or specific aspects of culture. In addition, culture touches aspects of agricultural and food economics that are traditionally addressed by different specialisations of scholars, e.g. consumer studies, innovation economics.

The current trend is towards the quest for more systemic approaches to agriculture, food and bioeconomy, as embedded in concepts such as value chains and food systems, planet boundaries and ecosystems services, and driven by global and systemic problems, such as climate change, globalisation of markets and population growth. In this direction, also the interplay with culture can be expected to become more relevant in the future and explicitly addressed by research.

In this special issue, we have collected four papers that deal with different aspects of such a relationship. In a way, their common denominator is the link between culture, food and territory, taken from different angles. This highlights a very important aspect of culture as related with food and probably of the future of food systems, which is their growing embedding in social systems that are geographically organised in connection with ecosystems.

Although this special issue certainly does not provide an exhaustive discussion on the role of culture in the agri-food systems, it provides some reflection points, not only related with the topics covered by the papers, but more generally on the relationship between culture and agri-food systems.

The papers of this special issue, through different methodological approaches, provide an indication of the variety of topics connected with culture (and increasingly studied by agricultural economists), covering issues relating to rural areas, organisation and innovation of supply chains, and food consumption.

Culture influences the production of public goods and above all the perception that citizens have of rural landscape; it influences supply chain relations and governance of agri-food systems; characterises the products, their quality and above all the consumers' perception of food products.

For these reasons, public policies must take into consideration aspects linked with culture, including values and visions not only of the direct beneficiaries (e.g., farmers or actors in the supply chain), but also more generally of society.

However, given the complexity of the topic, more studies and innovative approaches are needed to better support policy makers and decision-makers in general.

The special issue tries to contribute to this process, representing a starting point to promote further and improving studies related with culture and its role in the agri-food systems, highlighting the importance of a multidisciplinary approach and a higher degree of cross-fertilisation also among branches of agriculture and food economics.

References

Balázsi Á., Dänhardt J., Collins S., Schweiger O., Settele J., and Hartel T. (2021) Understanding cultural ecosystem services related to farmlands: Expert survey in Europe. Land Use Policy 100: 104900.

Borsellino V., Schimmenti E., and El Bilali H. (2020). Agri-Food Markets towards Sustainable Patterns. Sustainability, 12(6), 2193.

Chamorro A., Rubio S. and Miranda F.J. (2015). The region-of-origin (ROO) effect on purchasing preferences: the case of a multiregional designation of origin. British Food Journal, 117(2), 820–839.

Crossley N. (2015). Relational sociology and culture: A preliminary framework. International Review of Sociology 25(1) 65-85.

Dowty R. A., and Wallace W. A. (2010). Implications of organisational culture for supply chain disruption and restoration. International Journal of Production Economics 126(1) 57-65.

European Commission (2019). The European Green Deal, COM (2019) 640 final, Bruxelles.

European Commission (2020). A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system, COM (2020) 381 final, Bruxelles.

Evans D.M. and Mylan J. (2019). Market coordination and the making of conventions: qualities, consumption and sustainability in the agro-food industry, Economy and Society, 48 (3), pp. 426-449.

García-Llorente M., Martín-López B., Iniesta-Arandi I., López-Santiago C. A., Aguilera P. A. and Montes C. (2012) The role of multi-functionality in social preferences toward semi-arid rural landscapes: An ecosystem service approach. Environmental Science and Policy 19: 136-146.

Guo X., Heinberg M. and Zou S. (2019). Enhancing Consumer Attitude Toward Culturally Mixed Symbolic Products from Foreign Global Brands in an Emerging-Market Setting: The Role of Cultural Respect, Journal of International Marketing, 27 (3) pp. 79-97.

Henchion M. and Mcintyre B. (2000). Regional imagery and quality products: The Irish experience. British Food Journal 102(8): 630-644.

Hubeau M., Marchand F., and Van Huylenbroeck G. (2017). Sustainability experiments in the agri-food system: Uncovering the factors of new governance and collaboration success. Sustainability 9(6) 1027.

Hubeau M., Vanderplanken K., Vandermoere F., Rogge E., Van Huylenbroeck G., and Marchand F. (2019). Sharing is caring: The role of culture in the transformative capacity and continuation of agri-food networks. Environmental Innovation and Societal Transitions 33 127-139.

Kemper N.P., Popp J.S., Nayga R.M. Jr. and Kerr, J.B. (2018). Cultural worldview and genetically modified food policy preferences, Food Policy 80 pp. 68-83.

Kurstal Y., Ayalp E.K. and Viaggi D. (2020) Exploring Governance Mechanisms, Collaborative Processes and Main Challenges in Short Food Supply Chains: The Case of Turkey. Bio-based and Applied Economics: this issue. DOI: 10.13128/bae-8242.

Maier P., Klein O. and Schumacher K. P. (2020). Ecological benefits through alternative food networks? Prospects of regional barley-malt-beer value chains in Bavaria, Germany. Journal of Cleaner Production 121848.

Martín-López B., Iniesta-Arandia I., García-Llorente M., Palomo I., Casado-Arzuaga I., García del Amo D., Gómez-Baggethun E., Oteros-Rozas E., Palacios-Agundez I., Willaarts B., González JA., Santos-Martín F., Onaindia M., López-Santiago C. and Montes, C. (2012) Uncovering ecosystem service bundles through social preferences. PLoS ONE 7(6): e38970.

MEA (2005) Ecosystems and human well-being: our human planet. Summary for decision-makers. The Millennium Ecosystem Assessment series. https://doi.org/10.1196/annals.1439.003.

Melkonyan A., Gruchmann T., Lohmar F., Kamath V. and Spinler, S. (2020). Sustainability assessment of last-mile logistics and distribution strategies: The case of local food networks. International Journal of Production Economics 107746.

Nelson E., Mendoza G., Regetz J., Polasky S., Tallis H., Cameron D.R., Chan K.M.A., Daily G.C., Goldstein J., Kareiva P.M., Lonsdorf E., Naidoo R., Ricketts T.H. and Shaw M.R. (2009) Modelling multiple ecosystem services, biodiversity conservation, commodity production, and trade-offs at landscape scales. Frontiers in Ecology and the Environment 7: 4–11.

O'Donoghue C., Hynes S., Kilgarriff P., Ryan M. and Tsakiridis, A. (2020) Assessing preferences for rural landscapes: An attribute-based choice modelling approach. Bio-based and Applied Economics: this issue. DOI: 10.13128/bae-8416

Plieninger T., Dijks S., Oteros-Rozas E. and Bieling C. (2013). Assessing, mapping, and quantifying cultural ecosystem services at community level. Land Use Policy 33: 118-129.

Promsivapallop P. and Kannaovakun P. (2020). Factors influencing tourists' destination food consumption and satisfaction: A cross-cultural analysis, Asia-Pacific Social Science Review 20 (2) pp. 87-105.

Reina-Usuga L., de Haro-Giménez T. and Parra-López C. (2020). Food governance in Territorial Short Food Supply Chains: Different narratives and strategies from Colombia and Spain. Journal of Rural Studies.

Roep D. and Wiskerke J. S. (2012). On governance, embedding and marketing: reflections on the construction of alternative sustainable food networks. Journal of Agricultural and Environmental Ethics 25(2) 205-221.

Santeramo F.G., Lamonaca E., Carlucci D., De Devitiis B., Seccia A., Viscecchia R. and Nardone, G. (2020) On the relevance of the Region-Of-Origin in consumers studies. Bio-based and Applied Economics: this issue. DOI: 10.13128/bae-8337.

Sonnino R. (2019). The cultural dynamics of urban food governance, City, Culture and Society 16 pp. 12-17.

Stefani G., Romano D. and Cavicchi A. (2006). Consumer expectations, liking and willingness to pay for specialty foods: Do sensory characteristics tell the whole story? Food Quality and Preference 17(1-2): 53-62.

Swinton S.M., Lupi F., Robertson G.P. and Hamilton, S.K. (2007) Ecosystem services and agriculture: cultivating agricultural ecosystems for diverse benefits. Ecological Economics 64: 245-252.

Targetti S., Raggi M. and Viaggi, D. (2020) Benefits for the local society attached to rural landscape: An analysis of residents' perception of ecosystem services. Bio-based and Applied Economics: this issue. DOI: 10.13128/bae-8340

van Berkel D.B. and Verburg P.H. (2014) Spatial quantification and valuation of cultural ecosystem services in an agricultural landscape. Ecological indicators 37: 163-174.

van der Lans I.A., van Ittersum K., De Cicco A. and Loseby M. (2001). The role of the region of origin and EU certificates of origin in consumer evaluation of food products. European Review of Agricultural Economics 28(4): 451-477.

van Ittersum K., Meulenberg M.T.G., van Trijp H.C.M. and Candel, M.J.J.M. (2007). Consumers' appreciation of regional certification labels: A pan-european study. Journal of Agricultural Economics 58(1): 1-23.

van Zanten B. T., Verburg P. H., Espinosa Gomez-Y-Paloma S., Galimberti G., Kantelhardt J., Kapfer M., Lefebvre M., Manrique R., Piorr A., Raggi M., Schaller L., Targetti S., Zasada I. and Viaggi D. (2014) European agricultural landscapes, common agricultural policy and ecosystem services: a review. Agronomy for sustainable development 34(2): 309-325.

Verbeke W., Pieniak Z., Guerrero L. and Hersleth M. (2012). Consumers' awareness and attitudinal determinants of European Union quality label use on traditional foods. Bio-based and Applied Economics 1(2): 213-229.

Yang Y. and Hobbs J.E. (2020). How Do Cultural Worldviews Shape Food Technology Perceptions? Evidence from a Discrete Choice Experiment, Journal of Agricultural Economics 71 (2) pp. 465-492.

Woodhall-Melnik J. and Matheson F.I. (2017). More than convenience: the role of habitus in understanding the food choices of fast-food workers, Work, Employment and Society 31 (5) pp. 800-815.

Zhang W., Ricketts T. H., Kremen C., Carney K. and Swinton, S. M. (2007) Ecosystem services and dis-services to agriculture. Ecological economics 64(2): 253-260.

Bio-based and Applied Economics 9(2): 137-154, 2020
DOI: 10.13128/bae-8337

Full Research Article

On the relevance of the Region-Of-Origin in consumers studies

Fabio Gaetano Santeramo[1], Emilia Lamonaca[1,*], Domenico Carlucci[2], Biagia De Devitiis[1], Antonio Seccia[1], Rosaria Viscecchia[1], Gianluca Nardone[1]

[1] University of Foggia (Italy)
[2] University of Bari (Italy)

Abstract. The existing literature on the consumers' attitude toward region-of-origin (RoO) provides numerous and varying evidence on the relative importance of this extrinsic attribute as compared to other product characteristics. The article aims at characterising the heterogeneity in the relative importance of RoO. We systematically review the literature on RoO and build an *ad hoc* indicator to measure the relative importance of RoO as compared to other attributes of agri-food products under investigation. We then explain, through a meta-analytical approach, how the relative importance of RoO varies according to factors related to publication process, methodological issues, and characteristics of articles. Findings reveal the limited influence of publication process and methodological issues on the relative importance of RoO. In contrast, we find a strong effect of characteristics of articles, with the relative importance of RoO being highly dependent on products and origins under investigation. The results also highlight that RoO is an effective differentiation instrument in the agri-food markets only if supported by geographical indication labels. Managerial implications are also provided.

Keywords. Agri-food, Consumer, Meta-analysis, Region-of-origin, Systematic review.

JEL codes. Q13, P46, M31.

1. Introduction

Regional imagery is increasingly being recognised as having a commercial value for agri-food products. It provides a subjective source of quality differentiation (Henchion and Mcintyre, 2000; Marcoz *et al.*, 2016). In fact, even though countries operate within an increasingly globalised context, the indication of the region-of-origin (RoO) of agri-food products still appears to be a relevant cue for both consumers and producers or marketers (Pucci *et al.*, 2017). The RoO of agri-food products still matters when examining consum-

*Corresponding author. E-mail: emilia.lamonaca@unifg.it

Editor: Davide Viaggi.

ISSN 2280-6180 (print)
ISSN 2280-6172 (online)

ers' product evaluations and buying behaviour (Chamorro *et al.*, 2015). For producers and marketers, RoO allows them to charge prices above marginal cost, thus achieving market power. By using a regional indication, producers and marketers are able to exploit existing associations consumers have with RoO and provide their product with an image (Bruwer *et al.*, 2012). Indeed, the strategic advantage of regional branding is that an agri-food product can be differentiated on the basis of geographic origin, an unique attribute difficult to reproduce and presumed to be a quality cue for the product (van Ittersum *et al.*, 2007; Chan and Marafa, 2013).

The existing literature on the consumers' attitude towards RoO provides numerous and varying evidences on the relative importance of this extrinsic attribute as compared to other product characteristics. The RoO effect has been analysed, among others, by Henchion and Mcintyre (2000), who concluded that RoO is an important consideration for two out of three Irish consumers when deciding to buy quality products and that products from rural areas are generally perceived to be of high quality. In addition, Stefani *et al.* (2006) showed that the narrower and more precisely defined the RoO, the higher the quality expectation of consumers supporting the role of origin as a quality cue. Empirical evidence shows that RoO effect on product evaluation is product-specific and varies depending on the characteristics of consumers. In particular, consumers from different countries tend to perceive RoO in a different manner and their knowledge influences the impact of RoO on their behaviour (Perrouty *et al.*, 2006). In this regard, Engelbrecht *et al.* (2014) demonstrated that RoO of wine plays a secondary role in influencing consumers when faced with a purchasing decision on its own, while Dekhili and d'Hauteville (2009) found that the image of RoO has a specific influence on consumers' selection behaviour for olive oil although with differences between consumers from different countries. Similarly, Dekhili *et al.* (2011) showed that French consumers tend to choose olive oil based on official signals, while Tunisian consumers mainly use RoO and sensory cues. Differences across consumers emerges also at the regional level, as in Aranda *et al.* (2015) who found that Spanish consumers tend to value La Mancha region less than Rioja region in choosing wine. Their findings suggest different level of importance for RoO, relative to other products' attribute under investigation. Overall, RoO has an effect if consumers perceive substantial differences between regions in terms of their product-origin associations (Marcoz *et al.*, 2016).

Literature on RoO is vast and fragmented, so we aim at characterising the heterogeneity in the relative importance of RoO. On the basis of a systematic review of the literature on RoO, we have built an *ad hoc* indicator to measure the relative importance of RoO as compared to other attributes of agri-food products under investigation. We have then explained, through a meta-analytical approach, how the relative importance of RoO varies according to specific factors related to publication process, methodological issues, and characteristics of articles. The meta-analysis is based on a sample of 27 papers, which differ by products and origins under investigation, and type of methodological framework. We have also expanded the study by Santeramo and Lamonaca (2020), who evaluated geographical label in consumers' decision-making process, by proposing a quantile regression analysis. The quantile regression allows us a better representation of the heterogeneity in the index measuring the relative importance of RoO. Indeed, the quantile regression estimator is robust, which means that the influence of outlying observations is bound.

Our analysis would identify patterns in heterogeneous results in the vast body of research that examines the regional branding construct and the various effects of RoO on consumer buying behaviour (e.g. Atkin *et al.*, 2017; Pucci *et al.*, 2017). The success of regional branding strategies and of regulations protecting regional products largely depends on consumers' evaluation of RoO that informs them on the authenticity of those products (van Ittersum *et al.*, 2007). Our contribution is to provide a finer granular overview of the RoO effects as relates to consumer product evaluations. A better understanding of consumers' evaluation of RoO may benefit producers and marketers in designing differentiation strategies that support the competitiveness of regional products more effectively. Furthermore, it may facilitate policymakers in developing RoO-based communication strategies and policies on the protection of regional products aimed at supporting rural economies, especially disadvantaged areas.

The reminder of the article is as follows. The next section describes the protocol adopted for the systematic review of literature on consumers' evaluation of RoO, as well as the quantitative methods used to examine determinants of heterogeneity in the relative importance of RoO across studies. The results, presented in section 3, describe the contribution of publication process, methodological issues and characteristics of studies in explaining heterogeneity in the index measuring the relative importance of RoO as compared to other attributes of the product under investigation. The last section concludes with implications for the food industry and policymakers.

2. Materials and methods

2.1 Systematic review and sample description

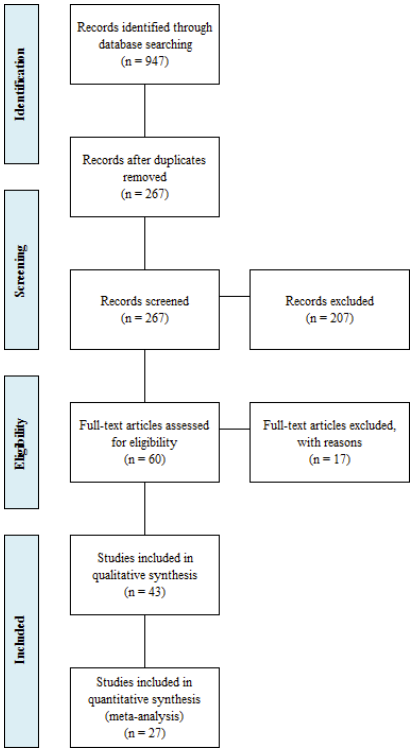
We systematically reviewed the literature based on RoO following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Moher *et al.*, 2009; Shamseer *et al.*, 2015). Our bibliographic research took place in July-September 2018 and focused on articles published in Scopus, including articles up to 2018[1].

In order to be included in the quantitative synthesis (i.e. meta-analysis), papers had to meet two general criteria. First, they had to deal with consumers' attitude, or preference, or intention to buy or willingness to pay for RoO of agri-food products. Second, papers had to provide a comparison between RoO and other products' attributes. Further inclusion criteria allowed us to select only peer-reviewed published studies, supposed to be validated knowledge with a potentially greater impact in the field, and papers in English, the foremost language used to spread scientific knowledge.

We identified an initial set of articles (n = 947) which contained all possible combinations of RoO-based, consumer-related, and sector-specific keywords in their title, abstract or keywords. In particular, we ran separate searches in Scopus using the following strings: ["place brand" OR "region-of-origin" OR "umbrella brand"] AND ["attitude" OR "attribute" OR "behaviour" OR "choice" OR "consumer" OR "consumption" OR "preference" OR "segmentation" OR "willingness to pay"] AND ["agri food" OR "food"]. After removing duplicates (n = 680), two independent researchers screened 267 studies and selected eli-

[1] We do not set time limits in the bibliographic search.

Figure 1. PRISMA flow diagram.



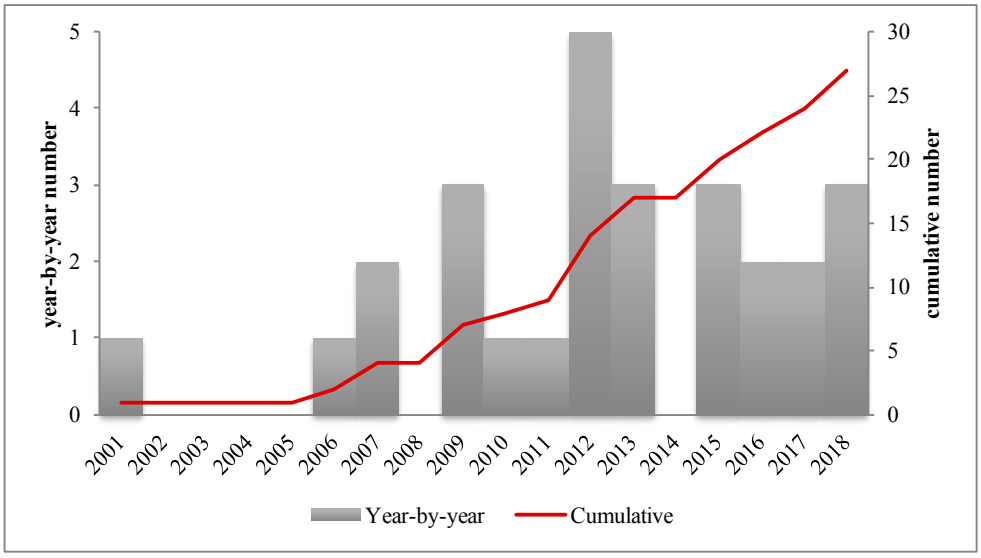
Source: Elaboration on Moher *et al*. (2009).

gible articles on the basis of information contained in the full text (n = 60). We excluded 17 full text articles with reasons[2]. The steps of the systematic review are synthesised in a PRISMA flow diagram (figure 1). The final sample includes 43 articles, of which 27 (listed in table 1) included in the quantitative synthesis for a total of 194 observations (articles may include more than one observation).

The vast majority of articles in the sample are published in peer-reviewed journals of high-medium prestige (48% in Q1, 37% in Q2); 37% of articles falls into the subject areas of Agricultural and Biological Sciences, 33% into Business, Management and Accounting, 26% into Economics, Econometrics and Finance. The first study was published in 2001 (van der Lans *et al.*, 2001), however the interest for the topic has grown progressively overtime. Indeed, about two thirds of articles (74%) were published after 2010, demon-

[2] A general review of place branding literature was excluded due to the lack of evidence on consumers' attitude, or preference, or intention to buy or willingness to pay for RoO of agri-food products. Other articles were excluded due to their focus, i.e. city brand not agri-food specific, private brands, physicochemical composition parameter and sensory attributes. Further articles not in English (3 out of 17) and not peer-reviewed published (8 out of 17) were excluded.

Figure 2. Evolution of the literature on Region-of-Origin.



strating the dynamic character of the literature on RoO (figure 2). More than half of the papers share at least one of co-authors, and the author with the most articles on the topic is S. Mueller Loose (author of 3 articles).

2.2 A measure of the relative importance of RoO

We identified 47 types of attributes within our sample, other than RoO. We ideally classified them in three categories (table 2): i) intrinsic attributes (13 types) which directly describe products; ii) extrinsic attributes (14 types) which indirectly characterise products (Dekhili and d'Hauteville, 2009); iii) additional attributes (20 types) which refer to the level of product knowledge and involvement (Arancibia *et al.*, 2015). The most frequent attributes in our sample are two extrinsic attributes, namely price and packaging, followed by two intrinsic attributes, namely type and variety.

In order to measure the relative importance of RoO as compared to other attributes of a product under investigation, we built an index specific for each *i*-th observation (i.e. estimate) within the *j*-th reviewed study. The index ($z_{i,j}^{RoO}$) is equal to the ratio between the sum of the relative importance of each *k*-th attribute ($z_{i,j}^{k}$) and the number of attributes other than RoO ($K_{i,j}$):

$$z_{i,j}^{RoO} = \frac{\sum_{k=1}^{K} z_{i,j}^{k}}{K_{i,j}} \tag{1}$$

where $z_{i,j}^{k}$, the relative importance of the *k*-th attribute compared to RoO, may assume the following values:

Table 1. List of articles included in the meta-analysis.

Reference	Journal	Journal rank	Journal subject area
Arancibia *et al.* (2015)	Agricultural Economics Review	Q2	ABS
Atkin *et al.* (2017)	Wine Economics and Policy	Q1	EEF
Bernabéu *et al.* (2012)	British Food Journal	Q1	BMA
Bruwer *et al.* (2012)	Journal of Foodservice Business Research	Q3	ABS
Bryła (2015)	Appetite	Q1	Nursing
Dekhili and d'Hauteville (2009)	Food Quality and Preferences	Q1	ABS
Dekhili *et al.* (2011)	Food Quality and Preferences	Q1	ABS
Fernandes-Ferreira-Madureira *et al.* (2013)	International Journal of Wine Business Research	Q2	BMA
Grebitus *et al.* (2018)	Agribusiness	Q2	EEF
Hollebeek *et al.* (2007)	Food Quality and Preferences	Q1	ABS
Johnson and Bruwer (2007)	International Journal of Wine Business Research	Q3	BMA
Marcoz *et al.* (2016)	International Journal of Tourism Research	Q1	BMA
McCutcheon *et al.* (2009)	International Journal of Wine Business Research	Q2	BMA
Mtimet *et al.* (2013)	Journal of International Food and Agribusiness Marketing	Q2	BMA
Mueller Loose and Szolnoki (2012)	Food Quality and Preferences	Q1	ABS
Mueller Loose *et al.* (2013)	Food Quality and Preferences	Q1	ABS
Mueller Loose and Szolnoki (2010)	Food Quality and Preferences	Q1	ABS
Nunes *et al.* (2016)	Wine Economics and Policy	Q1	EEF
Perrouty *et al.* (2006)	Agribusiness	Q2	EEF
Rahnama and Fadei (2017)	Journal of Food Products Marketing	Q2	BMA
Resano-Ezcaray *et al.* (2012)	Food Policy	Q1	EEF
Robertson *et al.* (2018)	Journal of Wine Research	Q3	ABS
Sanjuán-López *et al.* (2009)	Spanish Journal of Agricultural Research	Q3	ABS
Scarpa *et al.* (2015)	Agribusiness	Q2	EEF
Schnettler *et al.* (2018)	British Food Journal	Q1	BMA
Sutanonpaiboon and Atkin (2012)	Journal of Food Products Marketing	Q2	BMA
van der Lans *et al.* (2001)	European Review of Agricultural Economics	Q2	EEF

Notes: The rank, provided by the Scimago Journal & Country Rank (SJR), refers to the date of publication for the corresponding SJR subject area. Abbreviations are Agricultural and Biological Sciences (ABS), Business, Management and Accounting (BMA), Economics, Econometrics and Finance (EEF).

$$z_{i,j}^{k} = \begin{cases} -1 \; if \; RoO < k \\ 0 \; if \; RoO = k \\ 1 \; if \; RoO > k \end{cases} \tag{2}$$

The index, $z_{i,j}^{RoO}$, measures the relative importance of RoO with respect to other generic attributes of a product, and ranges between -1 and 1: the higher the index, the

Table 2. Relative frequencies (RF) of intrinsic, extrinsic, and additional attributes in the sample.

Intrinsic	RF	Extrinsic	RF	Additional	RF
Type	0.53	Price	1.00	Distribution channel	0.39
Variety	0.45	Packaging	0.62	Frequency of choice	0.28
Appearance	0.26	Brand name	0.39	Accompaniment	0.23
Alcohol content	0.25	Appellation	0.33	Concerns for environment	0.21
Colour	0.23	Medal	0.32	Recommendation by others	0.16
Vintage	0.21	Label information	0.21	Concerns for health	0.07
Taste	0.20	Producer	0.20	Preparation format	0.07
Sensorial characteristics	0.15	Production process	0.14	Availability	0.06
Serving temperature	0.13	Organic label	0.13	Advertising	0.05
Hedonic liking	0.10	Country-of-origin	0.10	Consumption for specials	0.04
Product quality	0.09	Retailer	0.09	Nostalgia	0.04
Expiry date	0.03	Informed liking	0.06	Concerns for animal welfare	0.03
Smell	0.03	Concerns for safety	0.03	Curiosity	0.03
		State	0.02	Fashion of consumption	0.03
				Knowledge level	0.03
				Loyalty	0.03
				Pleasure of consumption	0.03
				Touristic issues	0.03
				Traceability	0.03
				Uniqueness	0.03

Notes: The relative frequencies are computed on a total of 194 observations.

greater the relative importance of RoO as compared to other attributes. The index is distributed with mean 0.34 and standard deviation 0.64, however the relative importance of RoO tends to vary according to structural and methodological differences across studies.

2.3 Meta-analytical approach and data description

We adopt a meta-regression approach to investigate the determinants of heterogeneity in the relative importance of RoO as compared to other attributes of products under investigation. We regress the index measuring the relative importance of RoO ($z_{i,j}^{RoO}$) on its accuracy (i.e. sample size[3]) and on a set of - and -type moderator variables:

$$z_{i,j}^{RoO} = \alpha + \alpha_0 N_{i,j} + \sum_{r=1}^{R} \gamma_r \mathrm{X}_r + \sum_{s=1}^{S} \delta_s \Psi_s + \varepsilon_{i,j} \tag{3}$$

[3] Stanley *et al.* (2008) suggest to use degrees of freedom (or sample size) as a measure of the accuracy of the variable under investigation. Other meta-analyses on the issue follow the same approach (e.g. Deselnicup *et al.*, 2013).

where the accuracy of the index ($N_{i,j}$) models and corrects publication selection bias[4]; X_r is a vector of R regressors thought to affect the magnitude of the publication selection bias[5]; Ψ_s is a vector of S regressors, related to relevant characteristics of a study, that influence the magnitude of the index and explain its systematic variation across the observations (i) of the reviewed studies (j); γ_r and δ_s are coefficients which reflect the biasing effect of publication selection and of study's characteristics; $\varepsilon_{i,j}$ is an independently and identically distributed error term.

The vector of X-type moderator variables includes information related to the publication process and methodological issues (table 3). It controls, through a dummy variable, for the presence of more than one article published by the same author (42% of observations). In order to account for the prestige of the journal, specific dummies control for articles published in Q1 (51% of observations), Q2 (baseline), and Q3 (6% of observations) journals, according to the rank provided by the Scimago Journal & Country Rank at the date of publication. The dynamic character of the literature on the issue is accounted for using a dummy that discriminates between articles published before and after 2010[6], whereas a numerical variable controls for the cumulative number of articles published overtime. As for methodological issues, dummies control for methods and reference variables adopted to assess the relative importance of RoO. In our sample, we observe articles based on best-worst scaling analyses (6% of observations), choice models (8% of observations), conjoint analyses (19% of observations), focus groups (1% of observations), hedonic price models (9% of observations), latent classes analyses (12% of observations), descriptive statistics (baseline). The reference variables mostly used are percentages in terms of importance of attributes (41% of observations), average importance of attributes (40% of observations), estimated willingness to pay (3% of observations), beta (baseline). The set of Ψ-type moderator variables includes dummies related to specific characteristics of studies, to account for heterogeneity in the relative importance of RoO (table 3). It controls for specific product category such as olive oil (13% of observations), wine (58% of observations), other products (baseline), and origin such as Argentina (13% of observations), Australia (14% of observations), Chile (2% of observations), New Zealand (5% of observations), Tunisia (4% of observations), United States (9% of observations), other countries (baseline). Lastly, a dummy identifies paper that associate a certified label, such as PDO or PGI, to RoO (25% of observations).

In order to correct for heteroskedasticity and to obtain efficient estimates, we normalised all but one elements (i.e. X_r[7]) of the equation (3) by the accuracy of the index, $N_{i,j}$.

---

[4] Publication selection may distort evidence from literature, undermining the external validity of inferences and implications (Santeramo and Lamonaca, 2021). Biases from publication selection may occur if certain results are more likely to be published (e.g. statistical significant results, estimated coefficients of certain sign or magnitude) (Stanley, 2005).

[5] The X-type moderator variables allow us to capture the wide dimension of selection bias, which is a complex socio-economic phenomenon that goes beyond the mere publication selection (Stanley *et al.*, 2008).

[6] The year 2010 is the median year of the articles in the sample. In addition, 72% of observations are included in articles post 2010.

[7] The rationale of the exclusion is that X-type moderator variables may influence the likelihood of acceptance for publication, but should not be informative on the index.

Table 3. List and description of moderator variables.

Moderator variable	Type of variable	Mean	Std. dev.	Obs.
X-type moderator variables				
Sample size	Numerical	372.89	373.47	159
Authorship	Dummy	0.42	0.50	194
Q1 (journal prestige)	Dummy	0.51	0.50	194
Q3 (journal prestige)	Dummy	0.06	0.24	194
Post-2010	Dummy	0.72	0.45	194
Number of paper (cumulative)	Numerical	15.41	7.07	194
Best-worst scaling analysis (method)	Dummy	0.06	0.24	194
Choice model (method)	Dummy	0.08	0.27	194
Conjoint analysis (method)	Dummy	0.19	0.39	194
Focus group (method)	Dummy	0.01	0.07	194
Hedonic price model (method)	Dummy	0.09	0.29	194
Latent classes analysis (method)	Dummy	0.12	0.33	194
% (reference variable)	Dummy	0.41	0.49	194
Avg. (reference variable)	Dummy	0.40	0.49	194
WTP (reference variable)	Dummy	0.03	0.16	194
Ψ-type moderator variables				
Certified origin	Dummy	0.25	0.43	194
Argentina	Dummy	0.13	0.34	194
Australia	Dummy	0.14	0.35	194
Chile	Dummy	0.02	0.14	194
New Zealand	Dummy	0.05	0.22	194
Tunisia	Dummy	0.04	0.20	194
United States	Dummy	0.09	0.28	194
Olive oil	Dummy	0.13	0.34	194
Wine	Dummy	0.58	0.50	194

After the normalisation, the intercept and slope coefficients are reversed from the equation (3). The new intercept (α_0) is a test for publication selection bias and the new slope (α) is a test for the average value beyond the publication selection bias (Stanley *et al.*, 2008). If statistically significant, α_0 suggests the existence of publication selection bias, and α allows to conclude on the accuracy of the index (Santeramo and Shabnam, 2015).

We used Probit specifications to assess how determinants of heterogeneity in the relative importance of RoO influence the likelihoods of observing lower or higher values of the index $z_{i,j}^{RoO}$. These likelihoods are captured by two dependent variables defined as dummies, that distinguish between cases in which RoO tend to be less or more important for consumers as compared to other attributes of the product under investigation. The likelihood of observing lower values of the index equals to 1 for negative observations of $z_{i,j}^{RoO}$, and zero otherwise. The likelihood of observing higher values of the index equals to 1 for positive observations of $z_{i,j}^{RoO}$, and zero otherwise. Observations of $z_{i,j}^{RoO}$ equal to zero, indicating that RoO is important as much as a generic attribute of the product under investigation, serve as baseline.

The model in equation (3) is also estimated in a quantile regression fashion. These models allow us to identify factors determining more or less importance of RoO (observations of $z_{i,j}^{RoO}$ within 50th percentile), less importance of RoO (observations of $z_{i,j}^{RoO}$ within 25th percentile), more importance of RoO (observations of $z_{i,j}^{RoO}$ within 75th percentile). The quantile regression allows us to particularise the dependency of the index on determinant of heterogeneity in the relative importance of RoO for every quantile and, thus, it can be tailored to the extremes by conditioning on lower quantiles. In addition, the quantile regression estimator is robust, which means that the influence of outlying observations is bound. These properties lead to a better representation of the heterogeneity in the index $z_{i,j}^{RoO}$.

3. Results and discussion

The results of the Probit and quantile regression models are presented in table 4. The analysis of the constant term (α_0) and slope coefficient (α) allows us to detect potential publication selection bias. Looking at the results from Probit models, we find that publication selection bias is more likely to occur for higher values of the index, measuring the relative importance of RoO as compared to other product's attributes under investigation; in contrast, lower values of the index are less likely to be affected by publication selection bias. However, the results of the quantile regression reveal that the constant term is not significantly different from zero at any conventional level, suggesting that the publication selection bias is not a major issue in our sample. We conclude that publication selection does not distort evidence from the literature on RoO, or undermine the external validity of inferences and implications on the relative importance of RoO (Stanley, 2005). This implies that all the heterogeneity we observe in the index depends on publication process, methodological issues, and characteristics of studies. Given the absence of publication selection bias, values of the index within the 50th and 75th percentiles tend to be more accurate with the estimated coefficients being positive and significant at 1% level.

Reflecting on the publication process, the likelihood of having RoO more important increases for studies co-authored by experienced scholars (column A); in addition, the higher the values of the index (75th percentile), the greater the importance of RoO (column E). As for journal prestige, the quantile regression results show that the relative importance of RoO decreases in articles published in Q3 journals. This is true in particular for higher values of the index (within 50th and 75th percentile). A comparable result is found in Probit models, where the coefficients estimated for articles published in Q1 and Q3 journals are negative and significant in the specifications in column (B). The probability of having RoO more important decreases for studies published in medium-high prestigious journals. However, the probability of having RoO less important increases for studies published in journals with lower prestige (Q3, for which the estimated coefficient in the specification in column (A) is positive and significant). It is worth noting that, in our sample, the vast majority of articles published in Q3 journals are wine-based studies (e.g. Johnson and Bruwer, 2007; Bruwer *et al.*, 2012; Robertson *et al.*, 2018) that tends to be negatively correlated with the relative importance of RoO (negative and significant coefficient reported in column E). Overall, the relative importance of RoO tends to decrease with the prestige of the journal in which articles are published. Similarly, Santeramo and

Lamonaca (2019) argue that the authorship and the prestige of the publication outlet help in explaining the variability in studies' outcome. If articles are published after 2010, RoO less important is less likely to be observed; the opposite is true for RoO more important. This evidence support the idea that the importance of RoO is likely to increase when the background on the issue is based on a wider set of empirical evidence; indeed, evidences available on the issue show an increasing trend overtime (cfr. figure 2) and the vast majority of them, in our sample, are observed in articles published after 2010.

As for methodological issues, both methods or reference variables used in our sample tend to have a limited influence in determining the relative importance of RoO. The few exception are best-worst scaling and latent classes analyses. The former tends to be associated with higher relative importance of RoO (positive and significant coefficient reported in column E); the latter tends to provide evidence of lower likelihood of RoO more important (negative and significant coefficient reported in column B). Our results differ from Deselnicup *et al.* (2013), who find a positive influence of conjoint analysis and hedonic price model on the price premium for origin-based labels (not statistically significant in our specifications). The result is not surprising. In fact, estimation techniques may influence the estimated willingness to pay (WTP), whereas latent characteristics of specific sub-sample within the population under investigation are likely to affect the relative importance of RoO.

The characteristics of studies have a varying contribution on the relative importance of RoO. The relative importance of RoO decreases in country-specific studies (columns C-E), in particular for Australia and New Zealand for which the probability of having RoO less important increases (column A) and the probability of having RoO more important decreases (column B). As suggested in Dekhili *et al.* (2011), nationality or culture appears to influence consumers' perceptions of the importance of RoO as compared to other product's attributes. Similarly, Perrouty *et al.* (2006) show that consumers from different countries tend to perceive RoO in a different manner and their knowledge influences the impact of RoO on their behaviour. Verbeke *et al.* (2012) suggest the existence of substantial differences in consumers' awareness of geographical origin between countries with versus countries without a tradition of geographical indications in their agri-food quality policies. For instance, such awareness tends to be higher in countries with a strong tradition of using these quality schemes, e.g. Southern (Italy and Spain) and Western (France) Europe. We also find product-specific differences; the relative importance of RoO decreases in the analysis of olive oil (negative and significant coefficients in columns C-E), for which the probability of having RoO more important is decreasing (negative and significant coefficient in column B). In fact, consumers tend to judge olive oil more for intrinsic than for extrinsic attributes (Dekhili and d'Hauteville, 2009; Dekhili *et al.*, 2011). Lastly, the relative importance of RoO increases in studies where RoO is certified by an origin-based label. Our result is in line with findings from Deselnicup *et al.* (2013), who provide evidence of greater price premiums for product with certified origin than one using a non-regulated regional name. The interest in the origin of foods is a strong direct and indirect driver of consumers' use of labels (Verbeke *et al.*, 2012). Adding regional certification labels (e.g. Protected Designation of Origin –DOP–, Protected Geographical Indication –PGI–, American Viticultural Area–AVA–) allows to strengthen regional branding, in particular in the case of lesser known regions (Bruwer and Johnson,

Table 4. Probit model estimation: analysis of publication selection bias.

Variables	Probit estimates		Quantile regression estimates		
	Negative index (A)	Positive index (B)	25^{th} percentile (C)	50^{th} percentile (D)	75^{th} percentile (E)
Constant (α_0)	-1.291*	2.215***	0.001	-0.001	-0.001
	(0.729)	(0.841)	(0.004)	(0.00325)	(0.002)
Bias (α_0)	6.324	-21.900	-0.106	0.573***	0.591***
	(50.360)	(50.200)	(0.207)	(0.173)	(0.087)
Authorship	-0.845	1.892**	0.001	0.002	0.002**
	(0.597)	(0.762)	(0.003)	(0.002)	(0.001)
Q1 (journal prestige)	0.637	-1.061**	-0.001	-0.001	-0.001
	(0.577)	(0.511)	(0.003)	(0.002)	(0.001)
Q3 (journal prestige)	1.268*	-1.451*	-0.001	-0.012***	-0.004***
	(0.705)	(0.873)	(0.003)	(0.003)	(0.001)
Post-2010	-2.627***	4.590***	0.004	0.004	0.002
	(0.836)	(1.094)	(0.004)	(0.003)	(0.002)
Cumulative	0.146**	-0.235***	-0.0003	-0.0001	-0.00004
	(0.058)	(0.073)	(0.0003)	(0.0002)	(0.0001)
Best-worst (method)	Omitted	Omitted	0.003	0.001	0.004**
			(0.004)	(0.003)	(0.002)
Choice (method)	-0.798	-0.439	-0.0001	0.001	0.001
	(0.652)	(0.660)	(0.003)	(0.003)	(0.001)
Conjoint (method)	0.348	-0.358	-0.001	-0.001	0.001
	(0.501)	(0.503)	(0.003)	(0.002)	(0.001)
Focus group (method)	Omitted	Omitted	0.003	0.003	0.003
			(0.008)	(0.007)	(0.004)
Hedonic price (method)	0.192	-1.163	-0.001	-0.0003	-0.001
	(0.722)	(0.765)	(0.003)	(0.003)	(0.001)
Latent class (method)	0.816	-2.021***	-0.001	-0.002	-0.0002
	(0.689)	(0.655)	(0.003)	(0.003)	(0.001)
% (reference variable)	-0.479	0.254	0.002	0.001	0.001
	(0.361)	(0.332)	(0.002)	(0.002)	(0.001)
Avg. (reference variable)	-0.662	-0.598	0.002	0.001	0.001
	(0.567)	(0.650)	(0.003)	(0.003)	(0.001)
WTP (reference variable)	0.748	Omitted	-0.001	-0.001	-0.003*
	(0.498)		(0.004)	(0.004)	(0.002)
Certified origin	-0.327	0.330	0.440**	0.431***	0.409***
	(0.289)	(0.376)	(0.187)	(0.156)	(0.079)
Argentina	4.470	-4.236	-0.447	-0.106	0.250
	(3.187)	(3.338)	(1.469)	(1.228)	(0.618)
Australia	2.616***	-3.562***	-0.749***	-0.689***	-0.609***
	(0.730)	(1.001)	(0.253)	(0.212)	(0.107)
Chile	Omitted	1.642*	0.702*	-0.004	-0.123
		(0.929)	(0.396)	(0.331)	(0.167)

Variables	Probit estimates		Quantile regression estimates		
	Negative index (A)	Positive index (B)	25th percentile (C)	50th percentile (D)	75th percentile (E)
New Zealand	3.037**	-4.326***	-0.762**	-1.310***	-1.331***
	(1.253)	(1.291)	(0.342)	(0.286)	(0.144)
Tunisia	2.164	Omitted	0.960	0.154	-0.093
	(2.074)		(0.695)	(0.581)	(0.292)
United States	5.237	-11.470**	-0.915	-0.914	-0.043
	(5.005)	(4.921)	(1.912)	(1.598)	(0.805)
Olive oil	0.887	-1.733**	-0.950***	-0.825***	-0.379**
	(0.612)	(0.772)	(0.359)	(0.300)	(0.151)
Wine	-0.323	0.823	-0.132	-0.066	-0.216**
	(0.524)	(0.577)	(0.242)	(0.202)	(0.102)
Observations	142	137	159	159	159

Notes: Probit and quantile regression estimates of model in equation (3). The dependent variable is a dummy equal to 1 for negative observations of the index in specification in column (A), a dummy equal to 1 for positive observations of the index in specification in column (B), the index in specifications in columns (C), (D) and (E). Coefficients estimated for -type moderator variables, related to study characteristics, have been scaled by a factor of 10^2 in specifications in columns (A) and (B). The index is -0.001 in 25th percentile, 0.001 in 50th percentile, 0.003 in 75th percentile. Omitted variables in Probit models due to a perfect prediction of failure for observations different from zero.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

2010). Similarly, van der Lans *et al.* (2001) find that the RoO cue and PDO label influence regional product preferences through perceived quality.

In a nutshell, the relative importance of RoO is highly dependent on structural characteristics of studies and, to a lower extent, on issues related to the publication process and methodological issues.

The paper however is not exempt from limitations. The evaluation of the relative importance of RoO for consumers, through a meta-analytical approach, is based on information retrieved from literature, thus, it is highly dependent on the quality of each article. Although the comprehensive analysis of heterogeneity in the relative importance of RoO should minimise the biasing effect due to the quality of each article, further studies on the issue should consider to applying a quality assessment tool of articles included in the quantitative synthesis (e.g. Cox *et al.*, 2016).

4. Conclusions and implications

The existing literature on the consumers' attitude toward region-of-origin (RoO) provides numerous and varying evidences on the relative importance of this extrinsic attribute as compared to other product characteristics. In order to characterise the heterogeneity in the relative importance of RoO, we systematically reviewed a large number of

studies on the issue and provided a quantitative synthesis of empirical evidences on the consumers' perception of RoO. We explained the differences in the relative importance of RoO with several control factors related to publication process, methodological issues, and characteristics of articles.

The meta-regression results allowed us to conclude on the limited influence of publication process and methodological issues on the relative importance of RoO. In contrast, we found a strong effect of characteristics of articles, with the relative importance of RoO being highly dependent on products and origins under investigation. We can also conclude that RoO is an effective differentiation tool in the agri-food markets only if supported by geographical indication (GI) labels, such as Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), American Viticultural Area (AVA). For instance, it is well-known the higher propensity of consumers in attributing a great importance to GI labels for agri-food products; consumers benefit from GI schemes that certify quality at different geographical levels (van Ittersum *et al.*, 2007; Verbeke *et al.*, 2012). In this regard, it is worth of mention the positive relation between RoO and GI; the addition of regional information on a product label increases consumer confidence in the quality of that product (Bruwer and Jhonson, 2010).

Overall, our study suggests that protecting and marketing agri-food products with regional certification labels, such as PDO or PGI, may be beneficial for producers and marketers. They should fine-tune the differentiation of agri-food products through RoO, particularly when RoO have a positive reputation (Santeramo *et al.*, 2020a, b). Consider as a representative example the Tuscan Experience, characterised by a strong regional image (Stefani *et al.*, 2006; Bryła, 2015). It is therefore critical for policymakers to develop focused communication strategies towards consumers in order to convey attractive information about RoO that, as suggested in Verbeke *et al.* (2012), stimulates their interest in the origin of foods and builds favourable perceptions about quality and distinctiveness of products with RoO labels. For instance, Italian consumers stated that the label of origin "produced in Puglia" is considered the preferred attribute for mozzarella cheese due to the high reputation of this region for mozzarella production (Viscecchia *et al.*, 2019). The effectiveness of communication strategies should be enhanced by targeting different messages to different target markets (van Ittersum *et al.*, 2007; Marcoz *et al.*, 2016) and by a new concept of label in terms of contents and communication channels (Corallo *et al.*, 2019). Indeed, our analysis revealed that the importance of RoO for consumers tends to vary according to products and countries involved. Hence, communication efforts should stimulate consumers' interest in RoO, especially for wine and in countries without a strong tradition of geographical indications in their agri-food quality policies. Furthermore, policymakers should consider the benefits of a collaborative marketing program for regional products. Indeed, while many regional products are already under regional certification labels, many more remain out of the protection of an incisive regional logo. In this regard, examples of best practices come from Rural Development Programmes 2014-2020 implemented in the EU Member States, where the Measure 03 "Quality schemes for agricultural products and foodstuffs" allows local policymakers to support regional agri-food products in order to improve competitiveness of producers, create value added for agri-food products of high quality, promote regional products at the local, national and international level. The Measure 03 also compensate producers for costs arising from specific management activities

required to adhere to quality schemes. Similar policy approaches would benefit consumers, who obtain information on the authenticity of regional products, producers, who enhance competitiveness in marketing regional products, and overall rural economies, in particular disadvantaged areas. As suggested in Atkin *et al.* (2017), a cohesive effort in promoting strong regional labels may result in growth and success.

References

Arancibia, R.G., Rossini, G.and Guiguet, E.D. (2015). Wine label descriptors and shelf price paid by argentine consumers. Agricultural Economics Review 16(2): 56-72.

Aranda, E., Gómez, M. and Molina, A. (2015). Consumers' brand images of wines: Differences between two leading spanish denominations of origin. British Food Journal 117(8): 2057-2077.

Atkin, T., Wilson, D., Thach, L. and Olsen, J. (2017). Analyzing the impact of conjunctive labeling as part of a regional wine branding strategy. Wine Economics and Policy 6(2): 155-164.

Belsley, D. A., Kuh, E., Welsch, R.E. *Regression Diagnostics*. New York: Wiley, 1980.

Bernabéu, R., Díaz, M., Olivas, R., Olmeda, M. (2012). Consumer preferences for wine applying best-worst scaling: A spanish case study. *British Food Journal*, 114(9), 1228-1250.

Bruwer, J., Johnson, R. (2010). Place-based marketing and regional branding strategy perspectives in the California wine industry. *Journal of Consumer Marketing*, 27(1), 5-16.

Bruwer, J., Li, E., Lang, S., Chaumont, S. (2012). Perspectives on consumers' attitudes to wine's region of origin in a restaurant setting. *Journal of Foodservice Business Research*, 15(3), 300-318.

Bryła, P. (2015). The role of appeals to tradition in origin food marketing. A survey among polish consumers. *Appetite*, 91, 302-310.

Chamorro, A., Rubio, S. Miranda, F.J. (2015). The region-of-origin (ROO) effect on purchasing preferences: the case of a multiregional designation of origin. *British Food Journal*, 117(2), 820–839.

Chan, C.S., Marafa, L.M. (2013). A review of place branding methodologies in the new millennium. *Place Branding and Public Diplomacy*, 9(4), 236-253.

Corallo, A., Latino, M.E., Menegoli, M., De Devitiis, B. and Viscecchia, R. (2019). Human Factor in Food Label Design to Support Consumer Healthcare and Safety: A Systematic Literature Review. Sustainability 11(15): 4019.

Cox, D.N., Hendrie, G.A., Carty, D. (2016). Sensitivity, hedonics and preferences for basic tastes and fat amongst adults and children of differing weight status: A comprehensive review. *Food Quality and Preference*, 48, 359-367.

Dekhili, S., d'Hauteville, F. (2009). Effect of the region of origin on the perceived quality of olive oil: An experimental approach using a control group. *Food Quality and Preference*, 20(7), 525-532.

Dekhili, S., Sirieix, L., Cohen, E. (2011). How consumers choose olive oil: The importance of origin cues. *Food Quality and Preference*, 22(8), 757-762.

Deselnicu, O.C., Costanigro, M., Souza-Monteiro, D.M., McFadden, D.T. (2013). A meta-analysis of geographical indication food valuation studies: what drives the premium for origin-based labels?. *Journal of Agricultural and Resource Economics*, 204-219.

Dias, C., Mendes, L. (2018). Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Speciality Guaranteed (TSG): A bibiliometric analysis. *Food Research International*, 103, 492-508.

Engelbrecht, J.A., Herbst, F. and Bruwer, J. (2014). Region-of-origin (ROO) certification as marketing strategy in the South African wine market. International Journal of Wine Business Research 26(2): 139-162.

Fernandes Ferreira Madureira, T.C. and Simões de Sousa Nunes, F.J. (2013). Relevant attributes of portuguese wines: Matching regions and consumer's involvement level. International Journal of Wine Business Research 25(1): 75-86.

Grebitus, C., Peschel, A.O. and Hughner, R.S. (2018). Voluntary food labeling: The additive effect of "free from" labels and region of origin. Agribusiness 1-14.

Henchion, M. and Mcintyre, B. (2000). Regional imagery and quality products: The Irish experience. British Food Journal 102(8): 630-644.

Hollebeek, L.D., Jaeger, S.R., Brodie, R.J. and Balemi, A. (2007). The influence of involvement on purchase intention for new world wine. Food Quality and Preference 18(8): 1033-1049.

Johnson, R. and Bruwer, J. (2007). Regional brand image and perceived wine quality: The consumer perspective. International Journal of Wine Business Research 19(4): 276-297.

Marcoz, E.M., Melewar, T.C. and Dennis, C. (2016). The value of region of origin, producer and protected designation of origin label for visitors and locals: The case of Fontina cheese in Italy. International Journal of Tourism Research 18(3): 236-250.

McCutcheon, E., Bruwer, J. and Li, E. (2009). Region of origin and its importance among choice factors in the wine-buying decision making of consumers. International Journal of Wine Business Research 21(3): 212-234.

Moher, D., Liberati, A., Tetzlaff, J. and Altman, D.G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097.

Mtimet, N., Zaibet, L., Zairi, C. and Hzami, H. (2013). Marketing olive oil products in the Tunisian local market: The importance of quality attributes and consumers' behavior. Journal of International Food and Agribusiness Marketing 25(2): 134-145.

Mueller Loose, S., Peschel, A. and Grebitus, C. (2013). Quantifying effects of convenience and product packaging on consumer preferences and market share of seafood products: The case of oysters. Food Quality and Preference 28(2): 492-504.

Mueller Loose, S. and Szolnoki, G. (2010). The relative influence of packaging, labelling, branding and sensory attributes on liking and purchase intent: Consumers differ in their responsiveness. Food Quality and Preference 21(7): 774-783.

Mueller Loose, S. and Szolnoki, G. (2012). Market price differentials for food packaging characteristics. Food Quality and Preference 25(2): 171-182.

Nunes, F., Madureira, T., Oliveira, J.V. and Madureira, H. (2016). The consumer trail: Applying best-worst scaling to classical wine attributes. Wine Economics and Policy 5(2): 78-86.

Perrouty, J.P., D'Hauteville, F. and Lockshin, L. (2006). The influence of wine attributes on region of origin equity: An analysis of the moderating effect of consumer's perceived expertise. Agribusiness 22(3): 323-341.

Pucci, T., Casprini, E., Rabino, S. and Zanni, L. (2017). Place branding-exploring knowledge and positioning choices across national boundaries: The case of an Italian superbrand wine. British Food Journal 119(8): 1915-1932.

Rahnama, H. and Fadaei, M. (2017). Modeling the factors affecting organic or local cucumber purchasing motivations in Northern Iran. Journal of Food Products Marketing 23(6): 705-716.

Resano, H., Sanjuán, A.I. and Albisu, L.M. (2012). Consumers' response to the EU quality policy allowing for heterogeneous preferences. Food Policy 37(4): 355-365.

Robertson, J., Ferreira, C. and Botha, E. (2018). The influence of product knowledge on the relative importance of extrinsic product attributes of wine. Journal of Wine Research 29(3): 159-176.

Sanjuán-López, A.I., Resano-Ezcaray, H. and Camarena-Gómez, D.M. (2009). Developing marketing strategies for jiloca saffron: A price hedonic model. Spanish Journal of Agricultural Research 7(2): 305-314.

Santeramo, F.G. and Lamonaca, E. (2019). The Effects of Non-tariff Measures on Agri-food Trade: A Review and Meta-analysis of Empirical Evidence. Journal of Agricultural Economics 71(3): 595–617.

Santeramo, F.G. and Lamonaca, E. (2020). Evaluation of geographical label in consumers' decision-making process: a systematic review and meta-analysis. Food Research International 108995.

Santeramo, F.G. and Lamonaca, E. (2021). Objective risk and subjective risk: The role of information in food supply chains. Food Research International 139: 109962.

Santeramo F.G., Lamonaca, E., De Devitiis, B., Viscecchia, R., Nardone, G. (2020a). Assessing the role of regional labels for consumers. Acta Horticolturae [In press]

Santeramo F.G., Lamonaca, E., Carlucci, D., De Devitiis, B., Seccia, A., Viscecchia, R., Nardone, G. (2020b). Innovative quality-based strategies for the agri-food sector. Acta Horticolturae [In press]

Santeramo, F.G. and Shabnam, N. (2015). The income-elasticity of calories, macro-and micronutrients: What is the literature telling us?. Food Research International 76: 932-937.

Scarpa, R., Philippidis, G. and Spalatro, F. (2005). Product-country images and preference heterogeneity for mediterranean food products: A discrete choice framework. Agribusiness 21(3): 329-349.

Schnettler, B., Sepúlveda, N., Bravo, S., Grunert, K.G. and Hueche, C. (2018). Consumer acceptance of a functional processed meat product made with different meat sources. British Food Journal 120(2): 424-440.

Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., *et al.* (2015). Preferred reporting items for systematic review and meta-analysis protocols (prismap) 2015: Elaboration and explanation. BMJ 349: g7647.

Stanley, T.D. (2005). Beyond publication bias. Journal of Economic Surveys 19(3): 309-345.

Stanley, T.D., Doucouliagos, C. and Jarrell, S.B. (2008). Meta-regression analysis as the socio-economics of economics research. The Journal of Socio-Economics 37(1): 276-292.

Stefani, G., Romano, D. and Cavicchi, A. (2006). Consumer expectations, liking and willingness to pay for specialty foods: Do sensory characteristics tell the whole story? Food Quality and Preference 17(1-2): 53-62.

Sutanonpaiboon, J. and Atkin, T. (2012). Using region to market wine to international consumers. Journal of Food Products Marketing 18(1): 1-18.

van der Lans, I.A., van Ittersum, K., De Cicco, A. and Loseby, M. (2001). The role of the region of origin and EU certificates of origin in consumer evaluation of food products. European Review of Agricultural Economics 28(4): 451-477.

van Ittersum, K., Meulenberg, M.T.G., van Trijp, H.C.M. and Candel, M.J.J.M. (2007). Consumers' appreciation of regional certification labels: A pan-european study. Journal of Agricultural Economics 58(1): 1-23.

Verbeke, W., Pieniak, Z., Guerrero, L. and Hersleth, M. (2012). Consumers' awareness and attitudinal determinants of European Union quality label use on traditional foods. Bio-based and Applied Economics 1(2): 213-229.

Viscecchia, R., Nocella, G., De Devitiis, B., Bimbo, F., Carlucci, D., Seccia, A. and Nardone, G. (2019). Consumers' Trade-Off between Nutrition and Health Claims under Regulation 1924/2006: Insights from a Choice Experiment Analysis. Nutrients 11(12): 2881.

Bio-based and Applied Economics 9(2): 155-170, 2020
DOI: 10.13128/bae-8340

Full Research Article

Benefits for the local society attached to rural landscape: An analysis of residents' perception of ecosystem services

Stefano Targetti[1,*], Meri Raggi[2], Davide Viaggi[1]

[1] Department of Agricultural and Food Sciences, University of Bologna
[2] Department of Statistical Sciences, University of Bologna

Abstract. Ecosystem services are the benefits for society deriving from ecosystems. The perception of ecosystem services by local residents is relevant to understand the extent to which such services contribute to society and regional development. The objective of this study is to assess the perception of ecosystem services associated to rural landscape by local residents and to use them to respond to two main questions: Are residents able to attribute flows of services from specific landscape elements to the different socioeconomic sectors? Are such perceptions affected by the different landscape features of the area of residency (e.g. rural vs. urban dwellers)? The analysis is carried out using data from a survey (n=295) in a rural area located in North Italy (Po Delta lowlands, Province of Ferrara). The results show that the urban population has a rather generic and positive consideration of ecosystem services associated to rural landscape elements and that perception is largely related to their recreational experience. The rural population has a more complex understanding of services and is more prone to acknowledge disservices associated to specific elements and/or specific socioeconomic sectors. Such differences are likely connected to a more direct experience and to the different spatial scales that affect the perception of ecosystem services. The results indicate that cultural services such as recreation and actions linked to the promotion of the territory are commonly acknowledged. On the other hand, initiatives to enhance the awareness of less visible services (e.g. regulation services) would be useful for improving the valorization of specific landscape elements.

Keywords. Sociocultural valuation, ecosystem disservices, social preference, values, Emilia-Romagna, agriculture.

JEL Codes. Q26, Q57.

1. Introduction

The extent to which landscape and its management impact on socio-economic benefits has been investigated in several studies, following a wide range of approaches (e.g.

*Corresponding author. E-mail: stefano.targetti@unibo.it

Editor: Francesco Vanni.

ISSN 2280-6180 (print)
ISSN 2280-6172 (online)

Courtney *et al*. 2013; Schaller *et al*. 2018). Evidence from several case studies supports the idea that landscapes play a relevant role on regional economic and social development and that rural landscape is a resource for the different sectors of the rural economy. For instance, impacts on local economies that can be directly or indirectly related to landscape can be summarized as: opportunities for employment (Dissart and Vollet, 2011), population growth and socio-cultural benefits (ENRD *et al*., 2010), tourism and recreation (Vanslembrouck *et al*., 2005; Vandermeulen *et al*., 2011), added-value for local products and estates, and attraction of investments and businesses (Cooper, Hart, and Baldock 2009). Nevertheless, disentangling the processes affecting the pathways between landscape and local economy is challenging in particular when pubic goods are included in the assessment (Schaller *et al*., 2018). For instance, Cooper, Hart, and Baldock (2009) reviewing the provision of public goods by agriculture reported several case studies with positive impacts of landscape on regional economies, but also underlined that the economic quantification of such impacts was a remarkable challenge. In a recent study carried out in Finland, Tienhaara *et al*., (2020) confirm a high consideration of landscape-related benefits by the society. Nevertheless, they reported a significant gap between citizens' willingness to pay and farmers' willingness to accept for such benefits. Such evidence supports the need of a more comprehensive evaluation of the impacts of landscape on local economies and a better understanding of what factors influence people perceptions of these impacts (Fieldsend, 2011).

In this context, the ecosystem services (ES) approach (MEA, 2005) provides an appropriate framework of anaysis that focuses on the broad range of socio-economic benefits linking ecosystems and the rural economy (Hein *et al*., 2006). Recently, van Zanten *et al*., (2014a) adapted the ES cascade (Haines-Young and Potschin, 2010) to connect agricultural landscapes with regional competitiveness and support the assessment of the complex range of benefits for society linked to agro-ecosystems. In the context of ES evaluation, three main methodological streams can be identified: ecological approaches focusing on the biophysical processes involved in service provision, economic valuations and sociocultural evaluations (de Groot *et al*., 2002; Ruiz-Frau *et al*., 2018). The latter is rooted in the research stream focused on the assessment of people perceptions to assess values and trade-offs between different bundles of ecosystem services and/or landscape elements (Martín-López *et al*., 2012). As such, the sociocultural approach entails a wide range of processes of value attribution that relate to intrinsic and relational values as well as mental, social, and health well-being (Chan *et al*., 2016; Kumar and Kumar, 2008). A common approach to study people perception is based on collecting information on the perception of ecosystem or landscape services from different groups of stakeholders or local residents through different techniques such as participatory methods (e.g. Brown and Raymond, 2014), or statistical surveys (e.g. Martín-López *et al*., 2012). The aim of these studies is generally to find which services are more demanded, the relevant spatial scale of analysis and determinants of values, and the trade-offs between different services and stakeholder groups. A range of works in different rural areas highlights some general trends or drivers of landscape perception from local dwellers. For instance, a general negative perception towards changes in traditional landscapes is very often reported (Van Zanten *et al*., 2014b). A relevant heterogeneity is also common in rural societies and spatial scales are considered as one of the most relevant aspect influencing such differences in landscape

perception (Tempesta, 2010). Indeed, the mismatch between the biophysical scale of service provision and the institutional scales of benefit perception greatly influence people values and their interaction with the environment (Hein *et al*., 2006). Therefore, several studies have focused on different determinants of the attribution of benefits and the links between awareness and both the use of the landscape and the acknowledgment of ecosystem services. In general, it is underlined that: i) the same landscape can be perceived differently by different observers according to their interests and feelings and ii) these differences affect people attitude towards landscape. Therefore, evidence reported in literature is consistent with a bi-directional relationship between humans and landscape: on the one hand, landscape affects people values and on the other hand, values affect attitudes and intrinsic motivation of residents towards the environment (Eigenbrod, 2016). Even though it is commonly acknowledged that non-tangible or less visible ES are perceived by people (Bell, 2001), the assessment of ES perception and its usefulness for the evaluation of landscape effects on regional economies is still in its infancy. Less studied issues regards for instance i) the capacity of people to acknowledge the different flows of services to the different sectors of the local economy, and ii) the different perception of services and disservices of residents of areas featuring different landscape features (Adams *et al*., 2003; Zhang *et al*., 2007).

In this study, we present an analysis carried-out in a rural coastal region in North Italy (Po Delta lowlands, Emilia-Romagna). The objective is to assess the different perception of benefits associated to rural landscape in different groups of residents. The goal of the analysis is to respond to two main questions: Are residents able to identify different flows of services from landscape elements to the economic sectors? Are there gradients of benefit perception related to the different landscape features of the area of residency (e.g. rural vs. urban dwellers)?

Our work builds on a phone-questionnaire aimed at exploring the relations between the residents' perception of the benefits and disservices flow from specific landscape elements to agriculture, tourism and residents. In our approach, we employ the definition of landscape as a territory 'perceived by people' (Council of Europe, 2000). Therefore, the survey is concerned with the assessment of benefits from biophysical elements of the landscape (e.g. wetlands) and also from less-tangible elements directly related to rural landscape and its character (e.g. "wine roads" or "food festivals"). In that interpretation, landscape entails both "physically" determined elements and socio-cultural aspects that together drive and characterize the territory and its peculiarities (Eigenbrod, 2016). Such an approach is supported by recent literature that considers social values and perception studies complementary to the analyses focused on economic and ecological criteria (de Groot *et al*., 2002). Indeed, the relationship between people and ecosystems and therefore the generation of ES, includes intangible aspects linked to 'relational values', sense of place and belonging to a community (Chan *et al*., 2016; Diaz *et al*., 2015).

The remainder of the paper is organized as follows. Section 2 provides the description of the Po Delta area, the statistical sampling, the questionnaire and the methodological approach aimed at analyzing the database. Sections 3 presents the results of the data analysis showing the relations between perception of benefits and the variables describing the respondents' zone of residency. Section 4 discusses the results related to the differences between urban and rural people, the different scale of perception of ES and ecosystem dis-

services and the limitations of the study. Section 5 concludes highlighting the most salient issues and providing policy implications related to the study.

2. Methods

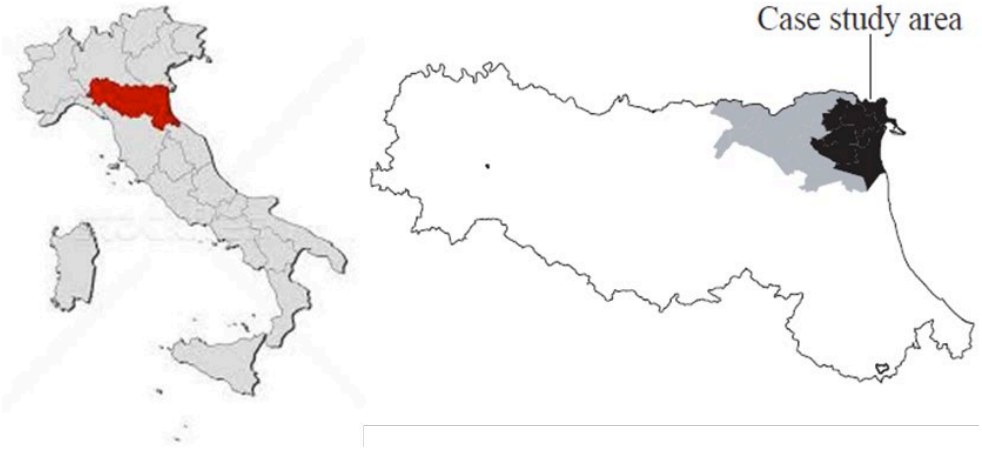
2.1 Description of the case study area.

The case study area (CSA) is in the Po River Delta (Ferrara Province, Emilia Romagna administrative Region, North Italy; table 1; Figure 1). The area is predominantly plain with intensive agricultural activities, an urbanized coastal area and the relevant presence of landscape elements dominated by water (overall 153 Km^2 of the CSA features water elements such as wetlands, ponds and water channels). Population is slightly decreasing in the inner part of the area (-6%) whereas the trend is opposite in the urban centers on the coast (+7% between 1980 and 2000; data: National Institute of Statistics [ISTAT]). 55% of the CSA is under agricultural management with rice as a typical product of the area (namely the PGI: "*Riso del Delta del Po*"). Agriculture has traditionally an important impact on the local economy, but farm structure is rapidly changing: in the decade 2000-2010, almost 1/3 (28%, ISTAT, 2010) of farms has ceased activity, whereas utilized agricultural area has been stable (-1%, ISTAT, 2010). That trend of farm concentration is similar to other parts of the EU (Piorr, 2003). On the contrary, the tourism sector has developed significantly (mainly on the seaside) since the last decades of the 20th Century. A peculiarity of the CSA is the historical impact of reclamation activities that transformed a wetland-dominated landscape in an agriculture-dominated area (wetlands area is currently c.a. 25% of the original). Around 30% of the CSA is currently included in the Po Delta Natural Park and the whole area is part of the UNESCO site "Ferrara, City of the Renaissance, and its Po Delta". The main criticalities of the CSA are connected to water regula-

Table 1. General features of the case study area (data: National Institute of Statistics).

Area (km^2)	957
Altitude (m a.s.l.)	(–3, +8)
Topography	Plain
Protected areas/Total area (%)	29
UAA/Total area (%)	55
Main agricultural systems	Cereals, horticulture industrial crops
Population (inhabitants)	67,988
Population density (inhabitants/km^2)	71
Population trend (% last ten years)	–6 (average; +7 in the coastal strip)
Employed population/Total population (%)	49
Jobs in tertiary sector/Total jobs (%)	47
Jobs in industry/Total jobs (%)	35
Jobs in agriculture and forestry/Total jobs (%)	18

Figure 1. Location of the case study area: Po River Delta, Ferrara Province, Emilia-Romagna.



tion (part of the CSA is under the sea level) and the growing anthropic impact on the coastal area. In particular, issues related to agricultural activities and the related pollution is relevant also for the tourism (eutrophication of the Adriatic Sea), whereas the concentration of human settlements on the coast and the summer season tourism has significant effects on availability of water resources for agricultural production and the salinization of groundwater.

2.2 Survey description and data analysis.

In 2013, a phone survey was carried out in the CSA. The survey (295 questionnaires) targeted local residents of the ten municipalities of the CSA that were aggregated in three zones according to the main landscape characteristics:

- *Comacchio* (Comacchio municipality) located by the coast is the main urban center (c.a. one third of the population of the CSA lives in Comacchio) with relevant tourism activities and historical heritage features;
- *Po Delta* (Codigoro, Goro, Mesola municipalities) located in the Delta where the River Po dominates the landscape.
- *Rural wetlands* (Lagosanto, Jolanda di Savoia, Ostellato, Migliarino, Migliaro, Massa Fiscaglia municipalities) located in the hinterlands and with a rural-dominated 'landscape where rice paddy fields and protected areas such as wetlands characterize the territory;

The three zones of residency, together with gender and age classes were employed as stratification levels in the survey (table 2).

The questionnaire aimed at collecting information about the perception of benefits from a list of elements typical of the CSA including tangible components of the landscape (e.g. wetlands) and other less tangible elements that were strictly connected to the charac-

Table 2. Demographic features of the CSA (ISTAT, 2013) and sample description according to the three stratification levels: residency area, gender and age class. Response rate of the survey was 41%.

	Area	Inhabitants (>18 years) of the CSA	Share of inhabitants per area	Gender		Age class (years)		
				FF	MM	18 - 30	30 - 50	50 – 70
ISTAT, 2013	Comacchio	19,485	32%	51%	49%	13%	36%	51%
	Po Delta	20,635	34%	52%	48%	12%	28%	61%
	Rural wetlands	21,016	34%	52%	48%	11%	33%	56%
Sample	Comacchio		35%	48%	52%	22%	47%	31%
	Po Delta		29%	55%	45%	20%	44%	36%
	Rural wetlands		36%	51%	49%	23%	46%	31%

terisation and promotion of the rural territory (e.g. PGIs and PDOs, wine and typical food roads, etc.). According to the information collected during a local focus group (composed by 15 representatives of relevant local stakeholder groups such as agriculture and tourism associations, local government and land planning agencies, the Po Delta Natural Park, researchers, and the president of the Local Action Group) carried in 2012, the list of elements selected for the survey included nine items that together were considered to contribute to the overall perception of typical landscape: "water channels" (channels and ponds), "waterfowls" (flamingos being the most typical wader in the CSA), "wetlands" (wetlands and natural areas), "rice paddy fields" (paddy fields and related fauna), "protected areas", "bicycle paths", "wine roads" (wine and typical food roads), "local food festivals", and "local food products" (local PGIs and PDOs). The interviewees were asked to state their perception of the benefits flow from the landscape elements to specific sectors of the local economy (agriculture and tourism) and to residents. In particular, the respondent was asked to state for each of the three socio-economic sectors if the element represented a benefit, a disservice or if it was indifferent[1]. The questionnaire also included a self-assessment question to characterize the respondents' place of living: As the most typical landscape feature of the CSA was related to water, the interviewee was asked to specify if his dwelling area was characterized by water-related elements, rural elements (but not water), or if he/she was living in or close to a urban center. Additionally, the job sector of the respondent was recorded to test for potential effects on benefit perceptions related to employment in the specific sectors included in the survey (agriculture and tourism sectors).

The respondents' perception of benefits was categorised as *homogenous* if the same perception (benefit, disservice or indifference) was attributed to agriculture, tourism and residents, or *heterogeneous* if the interviewee was able to acknowledge a differentiated perception (i.e. benefit for one sector and disservices or indifference for the others). A multiple correspondence analysis (Husson *et al.*, 2020) was employed to assess the relationships between the categorical variables (perception of landscape element benefits, zone of residency and place of living). The variable scores on the axes of the multiple correspondence analysis were also analysed through hierarchical cluster analysis (Kaufman and Rous-

[1] Benefits and disservices were translated from the Italian "*vantaggio*" and "*svantaggio*" respectively.

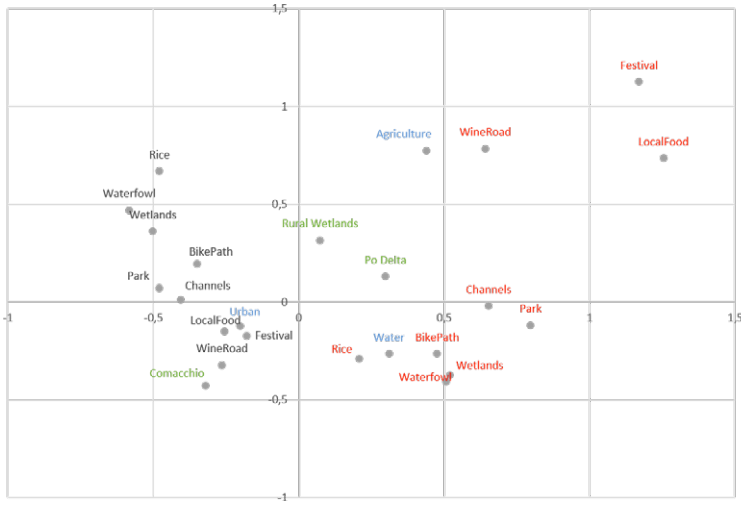
seeuw, 1990) for the identification of the associations between the variable categories. The perception differences were further analysed with cross tabulation to test whether significant differences were linked with general features of the dwelling area (i.e. coast vs. rural wetlands vs. Delta) or to more micro-scale proximity to specific landscape elements (i.e. water vs. urban vs. rural elements). To this aim, the Chi-squared test was performed to evaluate the frequency of heterogeneous perceptions attached to the landscape elements and their correlation with the variables "place of living" and "zone of residence". Data analysis was performed with the R statistical software (R Core Team, 2018).

3. Results

In general, the largest part of the sample (82%) considered the different landscape elements or initiatives of local promotion linked to the territory as a benefit for at least one socio-economic sector (agriculture and/or tourism and/or residents). The perception of benefits was homogenous in 62% of cases (i.e. the attribution of benefit, disservice or indifference from a specific landscape element did not differ between the three socio-economic sectors), whereas a heterogeneous perception was outlined in the remaining 38% of cases. The most positive elements were those linked with the promotion and characterization of the territory. In particular, "local food festivals" and "local food products" were considered on average the most positive elements (between 92% and 96% of the sample attributed benefits from these elements to agriculture, tourism and residents). "Local products" was also perceived as the most positive for the agricultural sector (96%), whereas the highest perception of benefits for tourism and residents (97% and 96% respectively) was attributed to "bicycle paths". On the other hand, "rice paddy fields" were the element with the lowest perception of benefits (53% on average of acknowledged benefits) and in particular the least positive element of the landscape for tourism and residents (48% and 41% of acknowledged benefits respectively).

The results of the multiple correspondence analysis (figure 2 and Appendix A) show the variable categories linked to a heterogeneous perception (e.g. benefit for one sector and disservices or indifference for the others or vice versa) grouped on the positive side of axis 1. The categories linked to no differences between sectors concerning the perception of benefits are clustered on the negative side of axis 1. The second axis of the multiple correspondence analysis indicates a gradient between the perception towards elements related to initiatives of local landscape promotion and variables linked to more tangible elements of the landscape like "wetlands", "waterfowls" and "bicycle paths". The multiple correspondence analysis also shows a relation between the category "Comacchio" in the variable "zone of residence" and the category "urban" in the variable "place of living" and the categories linked to a homogenous perception of benefits for all the sectors (left-hand side of fig. 2) and particularly to the variables of local promotion. On the contrary, the categories linked to a differentiated perception of benefits for agriculture, tourism and residents are more related with the categories "Po Delta" and "rural wetlands" and the categories "water" and "agriculture". Figure 2 shows a close relation between living closer to water-related elements (category "water") and a higher perception of differentiated benefits from landscape elements such as "wetlands", "waterfowl" and "rice paddy fields". Similarly, living close to an agricultural area (category "agriculture") is linked to a more differentiated

Figure 2. biplot of the multiple correspondence analysis showing the relation between residents' perception of benefits from the landscape elements and the variables "place of living" and "zone of residence". Landscape variable categories identifying a heterogenous perception are reported in red; categories linked to homogenous perception are reported in black. In blue are reported the categories for the variable "place of living" (close to agricultural areas, water-related elements, urbanized area) and in green the categories for the variable "zone of residence" (Comacchio, rural wetlands, Po Delta). Cfr. to table 3 for the acronyms of the variable categories.



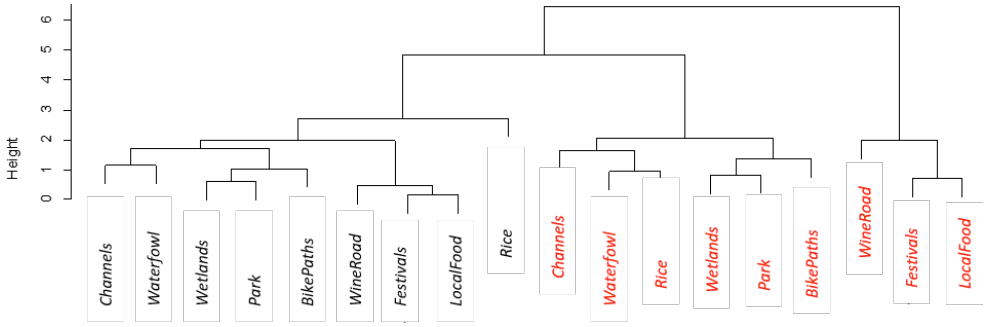
Variable name	Acronyms
Zone of residence	Comacchio
	Po Delta
	Rural wetlands
Place of living	Agriculture
	Urban
	Water
Water channels	Channels
Waterfowl	Waterfowl
Wetlands	Wetlands
Rice paddy fields	Rice
Protected areas	Park
Bicycle paths	BikePaths
Wine roads	WineRoad
Local food festivals	Festivals
Local food products	LocalFood

perception of benefits from "wine roads" and elements of landscape promotion like "local products" and "local food festivals".

The presence of these associations between variables in the dataset is confirmed by the hierarchical cluster analysis (figure 3) performed on the scores of the first five axes (overall, 54% of variance explained by the five axes of the multiple correspondence analysis). The cluster analysis clearly shows the presence of two separate groups in the dataset: a sub-group highlighting a differentiated perception of benefits between the economic sectors and a sub-group with a more positive perception towards the landscape elements.

The relations between "place of living" and "zone of residence" and the landscape elements evidenced in the multiple correspondence analysis are tested through the Chi squared test (table 3, cfr. Appendix for further details and Pearson residuals). Heterogeneous perceptions of benefits are significantly different in the three zones of residence for the elements "water channels" and "protected areas". Similarly, living close to specific landscape elements outlines significant differences for "water channels" and "protected areas" but also for "wetlands" and "local food festivals". In particular, living close to water elements and to rural areas is significantly related with a heterogeneous benefit perception of benefits for the different socio-economic sectors, whereas living in urban areas and in the municipality of Comacchio is related with a lower frequency of perceiving differentiated benefits for agriculture, tourism and residents. The job sector of the respondent does not record significant effects on the benefit perception (Appendix C). The only exception

Figure 3. Hierarchical cluster analysis performed on the first 5 axes of the multiple correspondence analysis (overall 54% of variance explained). The dendrogram shows the similarity between the variable categories (acronyms are presented in figure 2). Labels identifying a heterogeneous perception of benefits between agricultural and tourism sectors, and residents are reported in red; categories linked to a homogenous perception are reported in black.



regards wetlands that are more frequently considered a disservices for the agricultural sector by the respondents working in the agro-food sector (with $p < 0.05$).

The influence of living close to specific landscape elements is further described in figures 4 and 5. On the one hand, cases living in urban centers have a higher frequency of perceiving benefits from the landscape and the perception of benefits is less differentiated between the different economic sectors. On the other hand, living close to water or rural elements has an impact on the perception of benefits from water-related landscape. More specifically, cases living close to rural elements have a higher perception of disservices from water channels and waterfowl and generally a higher perception of ben-

Table 3. relation between place of living, zone of residence and the frequency of differentiated perceptions of benefits from the landscape elements for agriculture, tourism and residents in the sample. Chi-square test and p-values (* = < 0.05; **= < 0.01; ns= not significant) of differences (cfr. Appendix B for Pearson residuals).

	Place of living	Zone of residence
Water channels	* X-squared = 7.0743, p-value = 0.0291	* X-squared = 7.2596, p-value = 0.02652
Waterfowl	NS X-squared = 0.38567, p-value = 0.8246	NS X-squared = 1.3773, p-value = 0.5022
Wetlands	** X-squared = 10.89, p-value = 0.004318	NS X-squared = 0.91837, p-value = 0.6318
Rice paddy fields	NS X-squared = 1.2321, p-value = 0.5401	NS X-squared = 2.7338, p-value = 0.2549
Protected areas	≈* X-squared = 5.4052, p-value = 0.06703	* X-squared = 6.6451, p-value = 0.03606
Bicycle paths	NS X-squared = 0.28116, p-value = 0.8689	NS X-squared = 1.0128, p-value = 0.6027
Wine roads	NS X-squared = 0.91085, p-value = 0.6342	NS X-squared = 3.8925, p-value = 0.1428
Local food festivals	≈* X-squared = 4.98, p-value = 0.08291	NS X-squared = 1.9833, p-value = 0.371
Local products	NS X-squared = 2.1278, p-value = 0.3451	NS X-squared = 1.0804, p-value = 0.5826

Figure 4. perceived benefits from water channels and waterfowls, and wetlands and protected areas. Results are presented as gap (%) from total average for cases living close to urban areas, water elements, and rural elements (but not water elements).

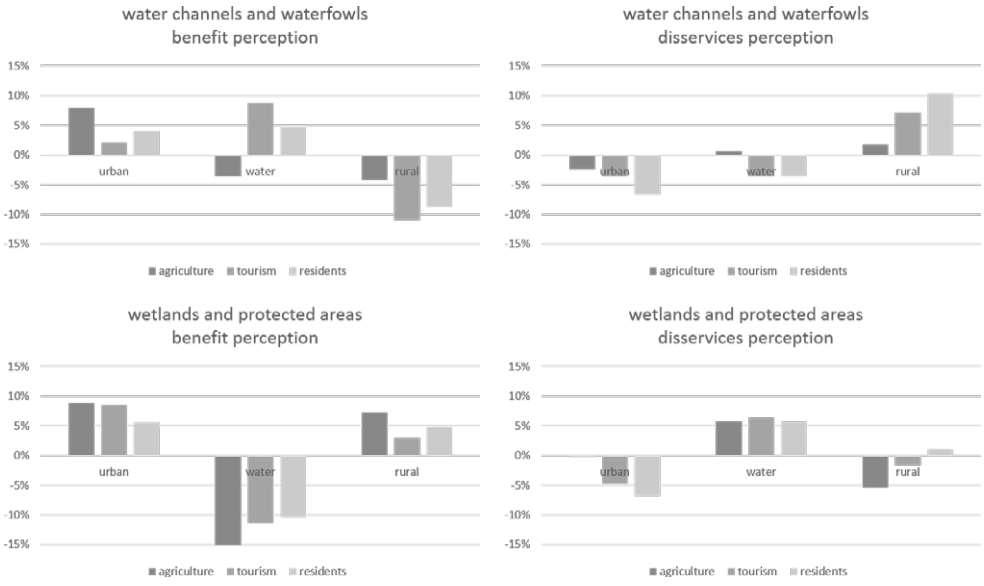
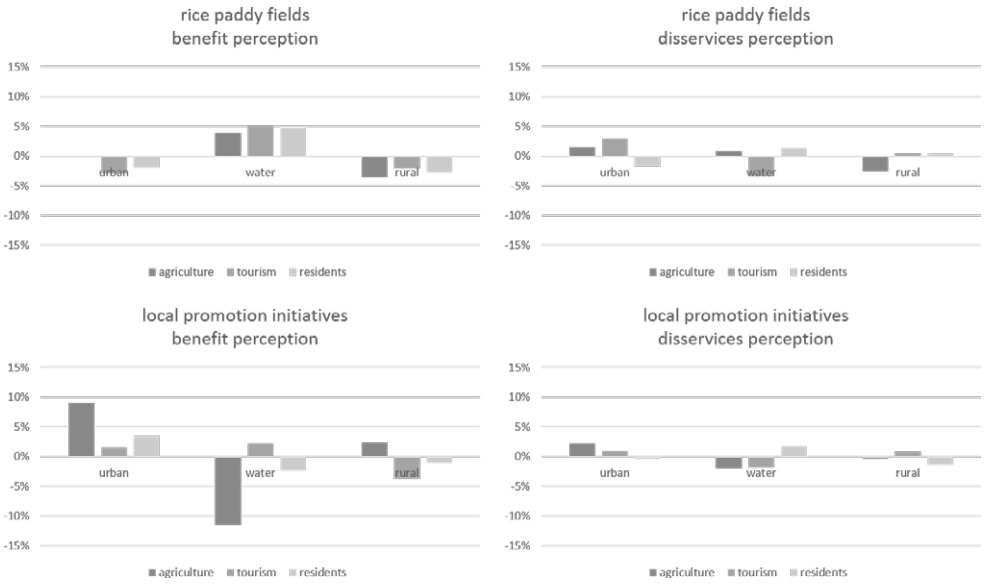


Figure 5. perceived benefits from rice paddy fields and local promotion initiatives. Results are presented as gap (%) from total average for cases living close to urban areas, water elements and rural elements.



efits from elements such as wetlands and protected areas. On the contrary, cases living by water elements have a higher perception of benefits in particular for tourism and residents from elements such as water channels and waterfowl and a higher perception of disservices from wetlands and protected areas. Cases linked to water elements have also a slightly higher perception of benefits from paddy fields in comparison to the average, but a lower tendency to consider the local promotion initiatives as a benefit in particular for the agricultural and tourism sectors.

4. Discussion

The survey outlines that a large share of the respondents associate ecosystem services to specific local landscape elements. Moreover, the majority of the sample does not perceive differences in the flow of benefits to the different sectors of the local society. However, a relevant portion of the population (almost 40%) shows a more nuanced awareness concerning the capacity of the territory to deliver benefits to residents, tourism or agriculture. Such perception also outlines contrasts in some cases. For instance, rice paddy fields are very often considered as a benefit for the agricultural sector only and a disservice for residents and tourism activities. On the contrary, most of the population acknowledges that the elements linked to the promotion and characterization of the territory are positive. As expected, such elements are perceived as the most advantageous for tourism and for residents. Even though many of the considered elements of local promotion were clearly linked to food production, the perception of benefits for agriculture is rather low. That result may be linked to the peculiarity of the CSA where multifunctional forms of agricultural production are less developed than in other areas. A further element of interpretation concerns a diffused perception in the CSA of agriculture as an artificial activity linked to reclamation and not as part of the authentic traditions of the region.

Our evidence supports the presence of differences between urban-dominated areas and rural areas. Namely, rural dwellers evidenced a more articulated perception of the territory, whereas urban people had the tendency to attribute a more positive meaning to the landscape. An explanation could be that rural people have the tendency to weigh services with disservices from specific landscape elements and are more able to discern a differentiated attribution of benefits between the different economic sectors. Also, micro-scale effects were relevant for the perception of disservices: closeness to water elements increased the perception of disservices from swamp-related areas such as wetlands and protected areas (indeed the areas of the natural park are strictly connected to wetlands), whereas in more agriculture-related areas the perception towards waterfowl and water channels was less positive. A potential explanation of that evidence may relate to the different awareness of rural people about the role and the functions of the territory. For instance, living close to specific elements increases the perception of disservices from these elements (e.g. mosquitos, fog, etc. in the case of wetlands). On the other hand, people living in urban areas may attribute a higher value to the recreational function and cultural meanings attached to specific landscape elements, whereas the perception of disservices may be less important. The impacts of micro-scale effects that is evidenced in this work could entail the need to consider with more attention the attitudes of the portion of the population living in rural areas or in more direct relation with specific elements of the landscape. The micro-scale effect on

the perception of landscape elements was however not confirmed in the case of rice paddy fields. Indeed, the generalized low perception of benefits from those areas was not linked to spatial effects. Such result is likely related with the less positive perception of paddy fields in the urban population. The scarce association of ES to those elements of the territory can be related to three main factors related to cultural and regulation services: i) recreational activities that can be attached to paddy fields are limited in comparison to the other landscape features included in the survey, ii) traditional elements of the territory are perceived more positively by people (Van Zanten *et al*., 2014) and rice paddy fields are more linked to the reclamation activities carried out in the CSA and iii) awareness of regulation services such as the potential of paddy fields in protecting the territory from flood events is often inadequate in local populations (Adams *et al*., 2003).

The results point to considerable differences in comparison to other studies on ES perception. For instance, Muhamad *et al*., (2014) report a direct relation between ES perception and proximity to the ecosystem elements providing the services. The analysis carried out in our CSA seems to indicate, though, that people living close to specific elements of the landscape ponder disservices and services. That points to a different spatial scale between ES and ecosystem disservices: while ES perception covers a wider spatial scale, the perception of disservices is more localized. On the other hand, that result could be interpreted according to a common finding concerning the relation between people and the environment. Indeed, a consistent body of literature (e.g. Brody *et al*., 2004) outlines a higher knowledge of people in relation to their proximity to specific landscape elements. In our CSA, living closer to specific landscape elements was confirmed to be related with the capacity to attribute services or disservices to specific socioeconomic sectors and thus to a higher knowledge. However, further research would be required to disentangle the cause-effect mechanisms between perception of disservices, spatial scales and awareness of ES.

Various limitations apply to this study. The specificities of the case study limit to some extent the potential for generalization of the results and the nature of the elaborations carried out which remain rather explorative and descriptive. Nonetheless, this work suggests the need of in-depth analyses focusing more on the perception of disservices. Even though the qualification of benefits and disservices was carried out using rather simple scales and constructs that do not allow more precise quantifications of the relationships among variables, our results support the idea of peculiar attitudes of rural residents driven by disservices rather than by services. This might also be driven by a better knowledge of the related ecosystem services, that tend to suggest that benefits are something "given" because are part of normal rural life, while disservices are more evident as they provide disutility either related to agricultural production or to quality of life. This asymmetry certainly deserves further investigation.

5. Conclusions

In this study, we analyzed residents' perception of ES associated with rural landscape in a CSA featuring relevant anthropic pressure and historical heritage features. The objectives were to assess whether residents were able to identify different flows of services from landscape elements to the different economic sectors and whether such a perception was mediated by different landscape features of the area of residency.

The work confirms the complex relation between landscape elements, awareness and perception of people that is reported in a range of other studies. In our work, we found that living closer to specific elements have a significant impact on the perception of services and also on the capacity to discern between benefit for residents, agriculture and tourism. The results also corroborate the idea that urban population has a rather generic understanding of ecosystem services produced by landscape elements and tends to see them in a rather indistinct way, largely related to their recreational experience. Rural population has a much more complex understanding of benefits and disservices, likely connected to direct experience and/or knowledge of the investigated landscape elements. That effect is probably associated to the different perception scale between services such as recreation (perceived at a wider range) and disservices (perceived more in proximity of specific landscape elements).

Our results attain to the specificity of the CSA, but they support the idea that the different scale of perception between services and disservices is a topic that deserves further research. In particular, regional assessments (including monetary evaluation such as the willingness to pay) should consider with more attention the role of disservices and the spatial heterogeneity of people perception that can entail micro-scale effects. These results can also support a better design of policies related to landscape valorization. The results clearly hint at the usefulness of different communication strategies to inform residents about landscape, building on their different experience. Also, levers for value creation maybe different and relate to valorization of different landscape elements depending on the target beneficiary/user.

An aspect of our results concerns the rather negative perception of rice paddy fields that is not related to proximity to specific elements. Even though rice is a feature of the territory and a traditional product, the residents' perception in the CSA is the least positive. That evidence is in contrast with the general positive results for traditional rural elements that are reported in the literature. Such a result is likely related to the low multifunctional value attached to paddy fields but also to the historical background of the CSA where agriculture is more connected to the reclamation of the territory and less to the traditions of the region. This however may hint at further reflections about the discrepancy between historically relevant features and the ability to actually valorize them, as well as among the different understanding of these historical features between residents and non-residents. Clearly, where these discrepancies do exist, it can be a key priority issue to address in actions for landscape valorization.

Acknowledgements

This work was funded by the EU 7th FP for Research, Technological Development and Demonstration under grant agreement n° 289578 (CLAIM project, www.claimproject.eu). This work does not necessarily reflect the view of the EU and in no way anticipates the Commission's future policy. Authors' contribution: ST performed data analysis, interpretation of results and the bibliographic research. MR designed the survey and revised the data analysis. DV coordinated the study. All the authors contributed to writing and revising the paper.

References

Adams, W.M., Brockington, D., Dyson, J. and Vira, B. (2003). Managing tragedies: Understanding conflict over common pool resources. Science (80) 302: 1915–1916.

Bell, S. (2001). Landscape pattern, perception and visualisation in the visual management of forests. Landscape and Urban Planning. 54: 201–211.

Brody, S.D., Highfield, W. and Alston, L. (2004). Does location matter? Measuring environmental perceptions of creeks in two San Antonio watersheds. Environmental Behavior 36: 229–250.

Brown, G. and Raymond, C.M. (2014). Landscape and urban planning methods for identifying land use conflict potential using participatory mapping. Landscape and Urban Planning 122: 196–208.

Chan, K.M.A., Benessaiah, K., Muraca, B., Chapman, M., Luck, G.W., Gould, R., Hannahs, N., Tadaki, M., Ott, K., Taggart, J., Gómez-Baggethun, E., Martín-López, B., Balvanera, P., Satterfield, T., Turner, N., Klain, S., Pascual, U., Díaz, S., Jax, K. and Norton, B. (2016). Opinion: Why protect nature? Rethinking values and the environment. Proceedings of the National Academy of Sciences 113: 1462–1465.

Cooper, T., Hart, K. and Baldock, D. (2009). Provision of Public Goods through Agriculture in the European Union. Institute for European Environmental Policy. London.

Council of Europe (2000). The European Landscape Convention, Florence, 20.X.2000. ETS No. 176.

Courtney, P., Mills, J., Gaskell, P. and Chaplin, S. (2013). Investigating the incidental benefits of Environmental Stewardship schemes in England. Land Use Policy 31: 26–37.

de Groot, R.S., Wilson, M.A. and Boumans, R.M.J. (2002). A typology for the classification, description and valuation of ecosystem services. Ecological Economics 41: 393–408.

Diaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M., Ash, N., Larigauderie, A., Adhikari, J.R., Arico, S., Bartuska, A., Baste, I.A., Bilgin, A., Brondizio, E., Chan, K.M.A., Figueroa, V.E., Duraiappah, A., Fischer, M., Hill, R., Koetz, T., Leadley, P., Lyver, P., Mace, G.M., Martin-lopez, B., Okumura, M., Pacheco, D., Reyers, B., Pascual, U., Pe, E.S., Roth, E., Saito, O., Scholes, R.J., Sharma, N., Tallis, H., Thaman, R., Watson, R., Yahara, T., Hamid, Z.A., Akosim, C., Al-hafedh, Y., Amankwah, E., Asah, S.T., Asfaw, Z., Bartus, G., Brooks, L.A., Caillaux, J., Dalle, G., Darnaedi, D., Driver, A., Erpul, G., Escobar-eyzaguirre, P., Failler, P., Moustafa, A., Fouda, M., Fu, B., Gundimeda, H., Hashimoto, S., Homer, F., Lavorel, S., Lichtenstein, G., Mala, W.A., Mandivenyi, W., Matczak, P., Mbizvo, C., Mehrdadi, M., Metzger, J.P., Mikissa, J.B., Moller, H., Mooney, H.A., Mumby, P., Nagendra, H., Nesshover, C., Oteng-yeboah, A.A., Rubis, J., Schultz, M., Smith, P., Sumaila, R., Takeuchi, K. and Thomas, S. (2015). The IPBES Conceptual Framework — connecting nature and people. Current Opinion in Environmental Sustainability 14: 1–16.

Dissart, J.C. and Vollet, D. (2011). Landscapes and territory-specific economic bases. Land Use Policy 28: 563–573.

Eigenbrod, F. (2016). Redefining Landscape Structure for Ecosystem Services. Current Landscape Ecology Reports 1: 80–86.

ENRD, European Network for Rural Development (2010). Thematic Working Group 3: Public Goods and Public Intervention. Brussels.

Fieldsend, A.F. (2011). Determining the socio-economic value of agricultural landscapes. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Horticulture 68: 338–347.

Haines-Young, R. and Potschin, M. (2010). The links between biodiversity, ecosystem services and human well-being. In: Raffaelli, D.G. and Frid C.L.J. (eds.), Ecosystem Ecology: A New Synthesis. CUP, Cambridge.

Hein, L., van Koppen, K., de Groot, R.S. and van Ierland, E.C. (2006). Spatial scales, stakeholders and the valuation of ecosystem services. Ecological Economics 57: 209–228.

Husson, A.F., Josse, J., Le, S., Mazet, J. and Husson, M.F. (2020). Package ' FactoMineR '.

Kaufman, L. and Rousseeuw, P.J. (1990). Finding Groups in Data: An Introduction to Cluster Analysis. Wiley, New York, NY.

Kumar, M. and Kumar, P. (2008). Valuation of the ecosystem services: A psycho-cultural perspective. Ecological Economics 64: 808–819.

Martín-López, B., Iniesta-Arandia, I., García-Llorente, M., Palomo, I., Casado-Arzuaga, I., Del Amo, D.G., Gómez-Baggethun, E., Oteros-Rozas, E., Palacios-Agundez, I., Willaarts, B., González, J.A., Santos-Martín, F., Onaindia, M., López-Santiago, C. and Montes, C. (2012). Uncovering ecosystem service bundles through social preferences. PLOS ONE 7(6): e38970.

MEA, (2005). Millennium Ecosystem Assessment. Ecosystems and human well-being : our human planet : summary for decision-makers. The Millennium Ecosystem Assessment series.

Muhamad, D., Okubo, S., Harashina, K., Parikesit, Gunawan, B. and Takeuchi, K. (2014). Living close to forests enhances people's perception of ecosystem services in a forest-agricultural landscape of West Java, Indonesia. Ecosystem Services 8: 197–206.

Piorr, H.P. (2003). Environmental policy, agri-environmental indicators and landscape indicators. Agriculture Ecosystems and Environment 98: 17–33.

R Core Team, 2018. R: A language and environment for statistical computing.

Ruiz-Frau, A., Krause, T. and Marbà, N. (2018). The use of sociocultural valuation in sustainable environmental management. Ecosystem Services 29: 158–167.

Schaller, L., Targetti, S., Villanueva, A.J.A.J., Zasada, I., Kantelhardt, J., Arriaza, M., Bal, T., Fedrigotti, V.B.V.B., Giray, F.H.H., Häfner, K., Majewski, E., Malak-Rawlikowska, A., Nikolov, D., Paoli, J.C.J.-C., Piorr, A., Rodríguez-Entrena, M., Ungaro, F., Verburg, P.H., van Zanten, B. and Viaggi, D. (2018). Agricultural landscapes, ecosystem services and regional competitiveness-Assessing drivers and mechanisms in nine European case study areas. Land Use Policy 76: 735–745.

Tempesta, T. (2010). The perception of agrarian historical landscapes: A study of the Veneto plain in Italy. Landscape and Urban Planning 97: 258–272.

Tienhaara, A., Haltia, E. and Pouta, E. (2020). Demand and supply of agricultural ES : towards benefit-based policy. European Review of Agricultural Economics 47(3): 1–27.

Van Zanten, B.T., Verburg, P.H., Koetse, M.J. and Van Beukering, P.J.H. (2014). Preferences for European agrarian landscapes: A meta-analysis of case studies. Landscape and Urban Planning 132: 89–101.

van Zanten, B.T., Verburg, P.H., Espinosa, M., Gomez-Y-Paloma, S., Galimberti, G., Kantelhardt, J., Kapfer, M., Lefebvre, M., Manrique, R., Piorr, A., Raggi, M., Schaller, L.,

Targetti, S., Zasada, I. and Viaggi, D. (2014). European agricultural landscapes, common agricultural policy and ecosystem services: A review. Agronomy for Sustainable Development 34: 309–325.

Vandermeulen, V., Verspecht, A., Vermeire, B., Van Huylenbroeck, G. and Gellynck, X. (2011). The use of economic valuation to create public support for green infrastructure investments in urban areas. Landscape and Urban Planning 103: 198–206.

Zhang, W., Ricketts, T.H., Kremen, C., Carney, K. and Swinton, S.M. (2007). Ecosystem services and dis-services to agriculture. Ecological Economics 64(2): 0–7.

Internet references

UNESCO site "Ferrara, City of the Renaissance, and its Po Delta". http://whc.unesco.org/en/list/733

ISTAT (2010). Agricultural census. http://www4.istat.it/en/agricultural-census

ISTAT (2013). Censimento Popolazione e Abitazioni. http://dati-censimentopopolazione.istat.it/Index.aspx

Bio-based and Applied Economics 9(2): 171-200, 2020
DOI: 10.13128/bae-8287

Full Research Article

Assessing preferences for rural landscapes: An attribute based choice modelling approach

Cathal O'Donoghue[1], Stephen Hynes[1], Paul Kilgarriff[2], Mary Ryan[3,*], Andreas Tsakiridis[3]

[1] National University of Ireland, Galway
[2] Luxembourg Institute for Socio Economic Research
[3] Teagasc, the Irish Agriculture and Food Development Authority

Abstract. This study adopts a choice modelling framework to disentangle individual preferences for rural landscape attributes based on the viewing of photographs of the Irish countryside. Using ordered logit and standard panel and pooled regression models, societal preferences are quantified for rural landscape attributes, grouped into natural, agricultural and human-built non-agricultural categories. The preferences of 430 individuals towards 50 rural landscape photographs are analysed. The results show positive preferences for landscapes with natural attributes such as cliffs, mountainous features, water and native trees, as well as preferences for neat/managed agricultural landscapes and traditional human-built features such as stone walls and planted hedgerows. The study shows negative preferences for features such as flooding, unmanaged landscapes, industrial turf cutting and mechanised features such as wind turbines. There is significant preference heterogeneity observed across the sample particularity across the urban-rural residency divide. It is argued that analysing preferences for specific attributes of landscapes rather than preferences for individual landscape photographs allows for further applications particularly in the area of simulation.

Keywords. Rural landscapes, choice modelling, ordered logit, attribute preference heterogeneity.

JEL codes. Q18, Q24, Q57.

1. Introduction

Agriculture is a multifunctional, natural resource based sector that takes place predominately in rural areas. It provides private goods like the '5 fs': food, feed, fuel, fibre and forest (Kern, 2002), generating income for farm families and contributing to the aesthetic character of human-ecological systems. These landscapes also support the delivery of other public goods such as recreation and cultural heritage (Kantelhardt *et al.*, 2015)

*Corresponding author. E-mail: mary.ryan@teagasc.ie

Editor: Francesco Vanni.

ISSN 2280-6180 (print)
ISSN 2280-6172 (online)

and ecosystem services (ES) relating to greenhouse gas emissions, water quality and biodiversity (Vanni, 2014; van Zanten *et al.*, 2014; OECD, 2015; Kantelhardt, 2006). These benefits, supplied by a sustainable agricultural sector, are reflected at EU policy level with increasing levels of funding dedicated to protecting rural landscapes and providing additional public goods from farming.

As landscape values are often perceived as public goods, in the sense that they are non-excludable and non-rival in consumption, markets cannot place a price on landscape features and quality of landscape services (Hanley *et al.*, 2009), nor can they guarantee their adequate provision (Schaller *et al.*, 2018; Villanueva *et al.*, 2015; Rodríguez-Entrena *et al.*, 2017). Thus, where there is a market failure, there is a case that governments should implement measures to ensure an adequate provision. To do that however knowledge is required in terms of the preferences of society for alternative landscape types and features.

A wide range of studies, using different methodologies, have attempted to examine rural landscape preferences and values in order to guide policy and better target expenditure to the most 'valued' landscapes. There are a number of studies that use expert judgement to assess the aesthetic quality of landscapes (Frank *et al.*, 2013; Hermes *et al.*, 2018). However, the perception of value may vary with perspective. For example, land owners and agricultural scientists may place a higher value on landscape attributes that involve the delivery of provisioning of ecosystem services, while members of the general public may subjectively place a higher value on cultural ecosystem services such as the aesthetics and recreational opportunities (Lothian, 1999). Thus expert opinion may not reflect what is of value personally to individuals or the wider population (Tveit, 2009).

Elsewhere, Kirillova *et al.* (2014) and Plieninger *et al.* (2013) perform a qualitative assessment of the cultural importance of landscapes, while willingness to pay (WTP) is assessed by Hynes *et al.* (2011; van Berkel and Verburg, (2014); Rodríguez-Entrena *et al.*, (2017); Dupras *et al.*, (2018); Bernués *et al.*, (2019) and Huber and Finger, (2019). The publics' stated preferences for landscapes and their features have also been surveyed (Howley, 2011; Howley *et al.*, 2012; Schirpke *et al.*, 2016, Santos-Martín *et al.*, 2019). Stated preference surveys often measure landscapes in a holistic way focusing on concepts or characteristics reflected in the landscape (Ives and Kendal, 2013; Tveit *et al.*, 2006).

Many landscape preference studies also employ non-monetary techniques where landscapes are assessed through rankings of a number of photographs, or monetary techniques to estimate direct and indirect use values (e.g. forest fibres) and/or non-use values (e.g. biodiversity, wilderness, spiritual) for preserving landscapes (García-Llorente *et al.*, 2012). Assessments based on cognitive attributes, such as landscape coherence, mystery, safety, and naturalness, provide a holistic assessment of a visual entity through its single components, rather than defining or focusing on specific physical landscape attributes, such as tree density or presence of hedges (Tagliafierro *et al.*, 2013; van Zanten *et al.*, 2014). Hynes and Campbell (2011) analysed the most appropriate economic valuation methodologies for agri-environment policies. They concluded that a holistic valuation approach should be used where the objective is the valuation of the landscape as a whole, whereas an attribute-based approach is appropriate if the objective is to understand preferences for individual components, which may allow for extrapolation using other GIS datasets in policy evaluation.

Choice experiments have been utilised to assess the preference for individual characteristics (Hynes and Campbell, 2011; Rodríguez-Entrena *et al.*, 2017; Dupras *et al.*,

2018). Although they present monetary measures of the willingness to pay for landscape attributes, there is a limit to how many attributes can be considered, albeit some papers (such as Bernués *et al.*, 2019) have an extensive array of choice attributes. Thus, it may be difficult to apply a choice experiment methodology to assess the preferences for a wide variety of landscape characteristics. García-Llorente *et al.* (2012) used photographs within the contingent valuation method to examine preferences for alternative landscape types. Follow-up expert opinion was employed to relate the observed willingness to pay for ecosystem services connected to the different landscapes in the photographs.

Two studies of particular relevance to this research are Howley (2011) and Schirpke *et al.* (2016). Howley (2011) assessed the effect of personal, geographic and environmental value orientations on landscape preferences. They did not however examine how the landscape attributes themselves could influence preferences or whether the potential effects could vary across survey respondents according to their personal, socio-demographic and geographic characteristics. Schirpke *et al.* (2016) similarly examined attitudes in relation to landscape images by assembling specific landscape attributes using viewsheds from a digital elevation model. Although Schirpke *et al.* (2016) consider the relationship between socio-economic characteristics and holistic image-based landscape attributes (as does Howley, 2011), their study does not consider the differential preference for specific landscape preferences across socio-demographic characteristics.

This paper aims to contribute to the literature of landscape preference valuation by (a) investigating whether individuals' characteristics interact with landscape attributes, and (b) how these interactions may ultimately affect public preferences for landscapes. The paper used data from Howley's (2011) analysis and builds on Schirpke *et al.* (2016)'s approach by applying expert judgement as opposed to a combination of GIS-based and observational attributes to each of the photos. The literature is extended by utilising an attribute choice framework to disentangle individual preferences for a holistic image of a landscape photograph into preferences for specific attributes of that landscape. The approach adopted in this paper facilitates the creation of a formalised model of landscape preferences based on the component attributes.

The study uses Ireland's rural landscapes as a case study. The Irish rural landscape has, and still is undergoing considerable change. Agriculture remains the largest rural land use with the Irish agri-food sector accounting for over half of the country's exports and almost 10% of the economy and employment (Teagasc, 2017). In many predominantly rural countries like Ireland, landscape images provide a visible representation of how the world sees the country and advertising campaigns such as Ireland's 'Origin Green' are used to promote global agri-food exports. As rural based sectors and the public goods they provide are heavily influenced by public policy, societal preferences in relation to rural areas are important. Landscape aesthetics, as one of the most visual and understandable public goods, is as a result, one of the most important drivers of support for the delivery of additional rural public goods.

The next section of this paper presents a review of models of landscape preference as a basis for model development. Section 3 then describes the data used in the analysis. The methodology is reviewed in section 4 while section 5 presents results and discussion. Finally, policy relevant conclusions are provided in section 6.

2. Models of Landscape Preferences

Increasingly, policy is focusing on the role of landscapes in the provision of ES, with landscape aesthetics being consistently included as an example of cultural ES. Many of these ES relate to the structure and composition of the landscape (Tscharntke *et al.*, 2005; Zhang *et al.*, 2007; van Berkel and Verburg, 2014; van Oudenhoven *et al.*, 2012). A variety of ecological/landscape indicators have been used to estimate the relationship between landscape characteristics and the potential for supply of ES (Kienast *et al.*, 2009; Burkhard *et al.*, 2010; van Berkel and Verburg, 2014), whilst integrative analytical approaches and models have been developed to assess trade-offs between ES and economic decisions (Vidal-Legaz *et al.*, 2013). Studies have also assessed the socio-cultural values of ecosystem services delivered by different landscape types (Hynes and Campbell, 2011; Martín-López *et al.* 2012).

While the value of the agricultural provisioning function of landscapes can be quantified using farm activity data, the quantification of the aesthetic value of landscapes remains a challenge. There are however studies that focus on particular cultural services that can be attributed to visual landscape characteristics, rather than the totality of potential ES. Such landscape preference studies use landscape photos to represent different types of landscapes (see for example Campbell *et al.*, 2006; Rambonilaza and Dachary-Bernard, 2007; Moran *et al.*, 2007; Hynes and Campbell, 2011). While the use of interviews with photo-elicitation and ranking enables researchers to identify landscape preferences and propose reasons underlying them, there are some criticisms of the reliability of evaluating aesthetic preference using photos. Bias in stated preferences may arise due to photo quality, light, weather, photo composition, and the number of photos presented (van Berkel and Verburg, 2014, Gill *et al.*, 2015). However, empirical results from numerous studies support the use of landscape images and other visual approaches combined with questionnaires, as a reliable method for the public evaluation of landscapes (Svobodova *et al.*, 2012; Häfner *et al.*, 2018).

2.1 Landscape Attributes

The concept of utilising landscape photographs as a proxy for landscape characteristics is commonplace in the literature (Kaltenborn and Bjerke, 2002; Arriaza *et al.*, 2004). While a photographic image does not represent the actuality of the experience of being in a landscape, there is a substantial literature that supports their use (Häfner *et al.*, 2018). According to Dramstad *et al.* (2006), preferences based on well-selected colour photographs of landscapes are similar to those made in the field. In this study, landscapes are decomposed into their individual attributes to examine the personal preferences for these attributes.

In a meta-analysis, van Zanten *et al.* (2014) created a typology of landscape attributes consisting of two levels. At the first level there are four attribute groups: human influence on agricultural landscapes, land cover attributes, landscape elements and biophysical features. The second level decomposes level one attributes into their various components, e.g. farm system, level of fragmentation, mountains etc.

Landscape scenes used in preference studies need to account for these different types of attributes. It is also important to distinguish the intensity of the various attributes. Häfner *et al.* (2018) found there was a higher preference for point attributes such as

individual trees, as opposed to lines of trees or hedgerows, with a higher frequency preferred. The attributes extracted from landscape scenes for this analysis are also in line with those of De Ayala *et al.* (2012). They list the common attributes in landscape level discrete choice experiment studies as vegetation (e.g. trees, hedgerows), rural aspects (grassland, farm buildings), wildlife, water, cultural heritage (monuments, traditional farming), boundaries (stone walls and fences) and recreation (walking trails, fishing).

2.2 Judgements

Landscape has been described as the intersection between physical attributes of a place and individuals' perceptions of that place (Hanley *et al.*, 2009). Studies examining landscape values may use either expert judgement (objectivist approach), where the focus is on characterizing the landscape as an object, or personal preferences in the form of a survey (subjectivist approach), where the focus is on viewers' experiences of the landscape (Lothian, 1999; Tveit *et al.*, 2006). The objective approach considers landscape quality as an intrinsic attribute of the landscape, and requires an implicit understanding of human preferences for landscape. The subjectivist approach considers landscape quality as a human construct based on the interpretation of what is perceived as landscape through individuals' memories, associations and imagination. In the subjectivist approach, landscapes provide a means of understanding preferences of landscape viewers (Lothian, 1999). Within the field of landscape aesthetics, evolutionary theories and cultural preference theories have been developed to explain landscape perception and identify the factors and mechanisms that shape human preferences towards landscapes (Häfner *et al.*, 2018).

When using personal preferences, the context in which the survey is collected is important. Studies that are context specific make upscaling of results difficult (van Zanten *et al.*, 2014). Studies should therefore control for local context such as attitudes, location and demographics of the respondents. Education, for example, has been found to positively influence landscape preferences (Häfner *et al.*, 2018). However, in an assessment of landscape aesthetics, Frank *et al.* (2013) found few differences in the preference values across three different categories of respondents: the general population, experts and stakeholders.

The location in which a respondent lives can also influence their preferences. Meta-analysis results show that urban residents have a higher preference for forest and natural landscapes (van Zanten *et al.*, 2014). The landscape value of an area also includes the value placed on it by tourists and those not living in an area. Kirillova *et al.* (2014) examined the aesthetic judgement of tourists using semi-structured interviews and disaggregated their judgements into a total of nine dimensions. Zoderer *et al.* (2016) found that tourists' perceptions of landscape value vary with the land-use type and their socio-economic characteristics. In summary, some of the spatial, methodological and attribute choices in recent studies are presented in Table 1.

3. Methodological Framework

A range of indicators is required to comprehensively describe landscapes. The European Landscape Convention (ELC, 2000) for example integrates biophysical, cul-

Table 1. Choice of Landscape Attribute in Recent Studies.

Paper	Country	General scene or attributes	Scale (local or national)	Expert or survey
Häfner *et al.* (2018)	Germany	Attributes	Local	Stated preference survey (n=200)
Hermes *et al.* (2018)	Germany. 100m x 100m	Scene	National	Expert
Vidal-Legaz *et al.* (2013)	Spain. No spatial component	Scene	Local	Stated preference survey (n=226)
van der Jagt *et al.* (2014)	Scotland	Scene	Local	Preference matrix survey (n=100)
Zoderer *et al.* (2016)	Italy	Scene	Local	Stated preference survey (n=659)
Frank *et al.* (2013)	Germany	Scene	Local	Survey consisting of laymen and experts (n=153)
Bernués *et al.* (2019)	Multiple countries (Spain, Norway, Italy)	Attributes	Country regional/ provincial	Stated preference survey (n=1,044)
Dupras *et al.* (2018)	Canada (three regions; Saint-Jacque, Repentigny, and Montréal)	Attributes	Country regional	Survey consisting of laymen (n=250)

tural, social, and visual attributes of landscapes. In order to incorporate this integrated view and to combine public and expert opinion, Sowinska-Swierkosz and Chmielewski (2016) developed a methodological framework to identify Landscape Quality Objectives (LQOs) which include GIS analysis, quality assessments, social survey and expert value judgements.

This study also combines expert and public viewpoints in developing a model that links the visual attributes of landscapes (as defined by agricultural scientists) with individuals' landscape preferences, socio-demographic data and GIS analysis. The main benefit of using such a modelling approach is the ability to rank a landscape, using personal preferences derived from a survey but without the need to conduct surveys in every location. Similar to the use of value transfer approaches this means that the parameters of the preference model can be used to estimate rank orderings of landscapes without the need for further primary surveys providing time and monetary savings to both researcher and policy maker (Hynes *et al.* 2018).

In creating a formalised model of landscape preferences, it is first necessary to define the characteristics or attributes of landscapes. In doing so, choices are made (discussed previously), between broad holistic descriptions and more discrete, generalisable and quantifiable attributes of the landscape. The objective of this study to estimate a landscape preference model that is generalisable in an Irish context, thus a model of quantifiable landscape attributes is developed (equation 1) where:

$$Max\ U = \sum_i \beta_i \times l_i \tag{1}$$

such that in maximising landscape preferences, or in economic terms utility from the landscape, U, a series of parameters β_i are estimated that indicate a level of preference for individual attribute l_i.

As a social science analysis, we are interested not only in the landscape attributes that are preferred but also preference heterogeneity across individuals or across groups of attributes , with personal characteristics and attitudes Z.

$$Max\ U_j = \Sigma_i\, \beta_i \times l_i \times Z_j \tag{2}$$

Individuals' preference heterogeneity can be decomposed into different components. Beyond standard demographic characteristics in describing different groups, attitudinal factors are important (Swanwick, 2009). Appleton (1975) argues that individual preferences for landscapes depend upon the relationship between an individual and their environment, their experiences of the landscape, where individuals live and how they experience the landscape, while Howley (2011) finds heterogeneity in landscape preferences due to both demography and environmental orientations. The model should therefore account for the different drivers of preference variability (equation 3):

$$Max\ U_j = \Sigma_i\, \beta_i \times l_i \times Z_j\ (Demograhics, Attitudes, Location) \tag{3}$$

In order to understand the structure of individuals' preferences for landscape attributes, survey respondents were first asked to rank preferences for individual photographs on a 6-point Likert scale from (1) 'not very highly' to (6) 'very highly'. While the ranking variable is potentially continuous over the range 1 to 6, discrete values were used for convenience. Treating the ranking as an underlying continuous variable, an Ordinary Least Squares (OLS) model, of the form:

$$Y_i = \beta' X_i + \varepsilon_i \tag{4}$$

can be used for individual i, where Y_i^* is the dependent variable reflecting landscape preferences and X_i the explanatory variables and ε_i the error term.

As an alternative modelling strategy the dependent variable can also be treated as discrete and the ranking is ordinal, an ordered logit model is employed (Greene, 2004):

$$Y_i^* = \beta' X_i + \varepsilon_i \tag{5}$$

for individual i, where Y_i^* is the underlying latent variable reflecting landscape preferences and X_i the explanatory variables and ε_i the error term.

Where there are six preference values 1,…,6, the following is the observed value of the dependent variable:

$$\begin{aligned} &Y = 1\ if\ 0 < Y_i^* < \mu_1 \\ &Y = 2\ if\ \mu_1 < Y_i^* < \mu_2 \\ &\qquad\qquad \\ &Y = 6\ if\ \mu_5 < Y_i^* < \mu_6 \end{aligned} \tag{6}$$

where Y is the preference value for the landscape image and μ, the vector of unknown threshold parameters that is estimated with the β vector. Since the dependent variable is an ordered, qualitative variable, we estimate the relationship between Y and X with an ordinal response model assuming a logistic distribution.

However, as respondents were asked to rank their preference level, the difference between ranking variables has a meaning and is consistent between values. Given that the difference between values has a meaning, utilising the ordered logit loses information in the estimation. Thus even though the survey respondents use discrete values in their judgement, a continuous framework is also employed to model preferences.

3.1 Landscape Attributes

In classifying landscape attributes, we move from preferences for individual photographs to preferences for a number of specific attributes . These include agricultural attributes, natural attributes, human-built non-agricultural attributes, topography and other attributes. Given the nature of the data, where there are repeated values for each survey respondent for each of the 30 attributes selected, we employ a fixed effect panel data ordered logit model (Greene, 2001, 2004), which has been widely used for attitudinal studies (Fairlie *et al.*, 2014), for the panel data continuous dependent variable:

$$Y_{ij} = \beta' Z_{ij} + u_i + \varepsilon_{ij} \tag{7}$$

and for the panel data ordered logit (equation 8):

$$Y_{ij}^{*} = \beta' Z_{ij} + u_i + \varepsilon_{ij} \tag{8}$$

where Z_{ij} represents the landscape characteristics' specific attributes, u_i represents the individual fixed effect and where the panel data variance component σ^2_{u} is also estimated.

3.2 Preference Heterogeneity

We move from person-specific preferences (X_i) in the cross-sectional ordered logit model to landscape attributes (Z_{ij}) in the panel data model. Interaction terms (taste-shifters) between the personal and the landscape attributes are incorporated in equation 9 so that the influence of personal characteristics on preferences can be examined:

$$XZ_{ij} = X_i \times Z_{ij} \tag{9}$$

to produce the following model:

$$Y_{ij}^{*} = \beta' Z_{ij} + \beta_1' XZ_{ij} + u_i + \varepsilon_{ij} \tag{10}$$

However, given that there are many landscape characteristic attributes, we combine the attributes into three aggregate characteristics representing natural, agricultural and human-built (non-agricultural) attributes:

$$Y_{ij}^{*} = \beta' Z_{ij} + \beta_1' XZ_{ij}^{nature} + \beta_2' XZ_{ij}^{agri} + \beta_3' XZ_{ij}^{human} + u_i + \varepsilon_{ij} \quad (11)$$

4. Data

To assess the preferences of the public in relation to landscape attributes, a nationally representative survey[1] of 430 individuals aged 15+ was conducted in Ireland in 2010 (Howley, 2011).

The survey contained a number of components including:

- personal information and demographic characteristics
- preferences and attitudes to agriculture, the environment and natural resources
- landscape characteristics

This demographic and environmental information is later interacted with the respondents' locations to generate 'taste-shifters'. The initial parts of the survey also elicited responses in relation to the respondent's environmental attitudes and orientations. Respondents were then asked to indicate their preferences (from 1 - not very highly ranked, to 6 – highly ranked) at an aesthetic level, for a range of photographs of rural landscapes. Respondents were asked to make full use of the ranking scale and to give the highest ranking to their most preferred landscapes.

4.1 Landscape preferences

To ascertain landscape preferences, 50 photographs of rural landscapes with a variety of different characteristics were presented to survey respondents. The photos used were selected from a database of 1,000 photos from the national agricultural development authority. They were selected in collaboration with colleagues to attempt to be representative of rural settings, incorporating extensive farming landscapes along with intensive farming landscapes. As the process of selecting images to represent the range of landscapes is relatively arbitrary, it is possible that a different set of photos would produce different outcomes. In order to improve reliability, photos were selected that had similar weather and light conditions. To ensure a representative sample, the survey was collected at different times of the day over the summer months.

Tables 2 and 3 respectively report the six most preferred and the six least preferred landscapes. The most obvious conclusion is that there is a higher preference for water and coastal features in the landscape. Similarly, the presence of animals or heritage features is important. On the other hand, the least preferred landscapes contain human-built features such as motorways or wind turbines and also contain disorder such as flooding or unmanaged scrub and grassland or contain harvested peat bogs. In the Data Annex, we report the preferences for all photographs. Beyond the six most preferred, the next cohort of photos represents well-managed pastoral agriculture scenes and broadleaf forests/trees. Those photos ranked just above the least preferred landscapes, represent intensive cereal and horticultural farming on the one hand, as well as marginal scrubland, along with conifer forest.

[1] Quota sampling and survey validation are reported in Howley (2011).

Table 2. Most Preferred Landscapes (photo numbers correspond to ranks in Table A1-Data Annex).

1. Coastal image of sea and headland

2. Aerial photo of a river estuary

3. Coastal cliffs

4. Lake in rural setting

5. Horses in field

6. Large tree next to castle ruin in field

Table 3. Least Preferred Landscapes (photo numbers correspond to ranks in Table A1).

50. Flooded farmland

49. New motorway cutting through landscape

48. Scrubland next to woodland

47. Barren hillside with wind turbine

46. Landscape of industrial bogland

45. Trees and scrubland with blue horizon

4.2 Landscape Attributes

This study took a relatively simple approach to classifying attributes, attempting to score the significant presence of an attribute, rather than trying to grade the photo for the degree of importance of a particular attribute. Thus the presence of an attribute that was immediately visible on a quick inspection was scored as 1, as it was felt that these reflect the dominant attributes of an image. If an attribute was not immediately visible on a quick inspection, the attribute was scored as 0. Thus while each photograph has a specific rating of 1-6, we have added additional dummy attributes or explanatory variables for each photo. In the dataset, it is expressed as a separate line for every attribute, with 1 for the presence of the attribute and a 0 otherwise. It thus appears as a panel, with personal characteristics invariant over the panel and landscape attributes varying over the panel.

Table 4 describes the share of ratings from 'not very highly' (1) to 'very highly' (6) for these landscape attributes based on the original landscape rankings. Ranking these attributes on the basis of where they appear in landscapes with 'very highly' ranked preferences, we note the higher preferences for the attributes lakes, cliffs, horses, water, monuments, hedgerows and Connemara-type landscape which can be collectively described as 'landscape descriptions'[2]. The next highly ranked attributes can be described as 'pastoral agriculture' attributes such as livestock and pasture. At the other end of the preference scale, anthropogenic features such as wind turbines, fencing and problems like flooding and rough grazing landscapes (including gorse) have the lowest preference rankings.

4.3 Environmental Attitudes

To gain a deeper understanding of how environmental attitudes might influence landscape preferences, the survey instrument included questions relating to preferences for landscapes as a provider of ES (in addition to its aesthetic or intrinsic value), or as a provider of food and fibre, and questions relating to negative attitudes towards the environment in general. The resulting environmental attitudes were aggregated using factor analysis as described by Howley (2011), resulting in three underlying factors that accounted for 61% of the underlying variation in responses to the attitudinal statements, namely 'multifunctionalist', 'productivist' and 'environmental apathy'. These factors are used in the models as explanatory variables.

4.4 Spatial heterogeneity

Given the heterogeneity of landscapes, spatial heterogeneity of preferences for attributes may exist. Previous approaches to account for this used distance decay, where WTP is a function of distance between residence and the site being valued (Hanley *et al.*, 2003) or where area-based approaches improve basic distance decay using a radial analysis to model WTP as a function of both distance and quantity of the ES (Granado-Díaz *et al.*, 2020). The distance decay function may also be impacted by the presence of substitute environmental attributes (Jørgensen *et al.*, 2013). Use and non-use values are also impact-

[2] Connemara is a remote, scenic, rugged landscape in the west of Ireland.

Table 4. Landscape Attribute Summary Statistics showing shares of preference rankings from not very highly (1) to very highly (6).

Attribute	1	2	3	4	5	6
Lakes	0.04	0.05	0.09	0.16	0.21	0.46
Cliffs	0.07	0.06	0.07	0.13	0.22	0.44
Horses	0.1	0.03	0.09	0.17	0.2	0.41
Water	0.06	0.08	0.13	0.15	0.23	0.36
Monuments	0.09	0.08	0.11	0.18	0.24	0.3
Hedgerows	0.07	0.07	0.15	0.19	0.24	0.28
Connemara-type landscape	0.04	0.19	0.16	0.17	0.19	0.25
Pasture	0.1	0.09	0.15	0.2	0.22	0.24
Sloping	0.11	0.12	0.16	0.18	0.21	0.23
Stonewalls	0.11	0.1	0.15	0.21	0.22	0.22
Cattle	0.13	0.1	0.15	0.2	0.21	0.21
Mountains	0.16	0.17	0.16	0.15	0.16	0.2
Neat Agricultural Landscape	0.1	0.13	0.16	0.2	0.21	0.2
Sheep	0.11	0.11	0.16	0.21	0.22	0.2
Green	0.11	0.13	0.17	0.19	0.2	0.2
Blue Sky	0.15	0.17	0.17	0.17	0.17	0.18
Bog (peatland)	0.15	0.16	0.16	0.17	0.17	0.18
Sunny	0.14	0.17	0.17	0.18	0.17	0.17
Native Trees	0.18	0.16	0.16	0.17	0.17	0.17
Old Buildings	0.1	0.14	0.17	0.21	0.21	0.17
Flowers	0.11	0.17	0.19	0.21	0.19	0.14
Flat	0.16	0.19	0.18	0.17	0.16	0.14
Cars and Machinery	0.22	0.2	0.17	0.15	0.14	0.13
Crops	0.13	0.17	0.19	0.21	0.18	0.12
Turf	0.18	0.23	0.19	0.16	0.1	0.12
Brown	0.19	0.21	0.18	0.16	0.14	0.12
Yellow	0.16	0.16	0.2	0.2	0.17	0.12
Unmanaged Landscape	0.19	0.21	0.2	0.16	0.13	0.12
Conifer Trees	0.17	0.18	0.21	0.18	0.15	0.11
Other Buildings	0.18	0.2	0.2	0.17	0.15	0.1
Gorse	0.26	0.21	0.18	0.14	0.12	0.09
Fencing	0.4	0.21	0.12	0.09	0.09	0.09
Turbine	0.21	0.21	0.19	0.18	0.13	0.08
Flooding	0.58	0.27	0.1	0.03	0.01	0.01

ed by distance (Jørgensen *et al.*, 2013). For option value related reasons, non-users may prefer an improvement in local landscapes (Hanley *et al.*, 2003). We also attempt to capture some of the spatial heterogeneity of preferences by using an urban-rural classification based on the respondent's location.

Summary statistics for a variety of taste shifters are presented in Table 5. These are categorised in terms of city, town and rural dwellers and include characteristics of individ-

Table 5. Summary Statistics of Personal Characteristics and Environmental Preferences used as Taste Shifters.

Personal Characteristic	City	Town	Rural	Total
Has a Child (p)	0.365	0.352	0.424	0.379
Aged Under 30	0.256	0.246	0.250	0.251
Aged 30-50	0.410	0.423	0.394	0.409
Aged 50-60	0.103	0.092	0.152	0.114
Aged 60+	0.231	0.239	0.205	0.226
University Educated	0.442	0.254	0.242	0.319
Believes landscape is important in choosing where to live	0.186	0.268	0.424	0.286
Satisfied with area in which they live	0.147	0.113	0.106	0.123
Believes surrounding landscape is of high quality	0.487	0.599	0.689	0.586
Higher Social Class	0.763	0.634	0.606	0.672
Farming Background	0.231	0.394	0.614	0.402
Care about Conservation	0.301	0.359	0.432	0.360
Concerned about the environment	0.186	0.324	0.242	0.249
Factor Loading: Multifunctionalist	-0.114	0.128	-0.002	0.000
Factor Loading: Environmental Apathy	-0.036	0.114	-0.081	0.000
Factor Loading: Productivist	-0.173	0.073	0.126	0.000

ual respondents, along with their environmental attitudes, illustrating the degree to which preferences vary depending on where respondents live. Specifically, social and demographic information includes respondent's age range as a continuous variable with values of 1 (under 30) to 4 (60+), with dummy variables indicating respondents' education level and whether they have a child. Two social groups were created; the first includes manual workers and unemployed individuals, whereas professional and managerial workers were classified in the second social class (high social class). In addition, respondents or family members who are involved in farming were compared with those without a farming background. Similarly, dummy variables were created to control for the importance of landscape in choosing where to live, the level of respondents' satisfaction with respect to the area in which they live, the quality of surrounding landscape, and their concern about the environment and conservation.

5. Results

The results of the models of landscape attribute preferences are considered separately for the ordinal logit and the continuous dependent variable panel and pooled OLS models. The influence of personal characteristics on preferences, using taste-shifters (interaction terms) between the personal characteristics and landscape types are also presented and discussed.

In Table 6, the coefficients for the landscape attributes are reported in terms of natural, agricultural and human-built features, as well as other general attributes such as colour and unmanaged landscapes. Although there are many variables, the OLS specification

Table 6. Coefficients of Panel and Pooled Ordered Logit Model and Panel and Pooled OLS Models for Landscape Attributes.

	Panel Ordered Logit Model		Pooled Ordered Logit Model		Panel OLS Model		Pooled OLS Model	
Explanatory Variables	Beta	SD	Beta	SD	Beta	SD	Beta	SD
Natural Landscape Characteristics								
Connemara type landscape	1.397*	0.419	1.454*	0.118	1.005*	0.073	0.98*	0.075
Lakes	0.988*	0.531	1.004*	0.149	0.67*	0.096	0.662*	0.094
Cliffs	1.033*	0.294	1.015*	0.083	-0.039	0.035	0.592*	0.052
Water	0.628*	0.202	0.632*	0.056	0.393*	0.041	0.383*	0.036
Flowers	0.37*	0.213	0.383*	0.058	0.214*	0.045	0.258*	0.038
Bogland	0.35*	0.016	0.349*	0.016	0.189*	0.01	0.213*	0.01
Sloping	0.193	0.182	0.165*	0.05	0.117*	0.033	0.11*	0.032
Native Trees	0.034	0.138	0.061	0.038	0.066*	0.03	0.057*	0.025
Mountains	-0.188	0.26	-0.136*	0.072	-0.095*	0.049	-0.097*	0.046
Flat	-0.389*	0.153	-0.254*	0.051	-0.113*	0.027	-0.138*	0.033
Conifer Trees	-0.547*	0.314	-0.435*	0.087	-0.262*	0.064	-0.25*	0.057
Gorse	-0.806*	0.269	-0.639*	0.08	-0.34*	0.047	-0.365*	0.052
Flooding	-2.409*	0.482	-2.375*	0.134	-1.681*	0.086	-1.708*	0.085
Agricultural Landscape Characteristics								
Horses	0.533	0.467	0.6*	0.132	0.26*	0.084	0.26*	0.082
Neat Agricultural Landscape	0.424*	0.232	0.362*	0.067	0.167*	0.048	0.198*	0.043
Pasture	0.184	0.176	0.166*	0.049	0.115	0.194	0.109*	0.032
Crops	-0.375	0.274	-0.368*	0.093	-0.249	0.298	-0.246*	0.06
Cut-Silage	-1.245*	0.591	-1.145*	0.169	-0.755	0.65	-0.688*	0.11
Human Landscape Characteristics								
Monuments	0.947*	0.294	0.874*	0.096	0.618*	0.321	0.568*	0.061
Hedgerows	0.347	0.302	0.291*	0.095	0.297	0.329	0.257*	0.061
Stonewalls	0.117	0.309	0.109	0.095	0.123	0.338	0.123*	0.062
Old Buildings	0.026	0.3	0.036	0.094	0.073	0.328	0.082	0.06
Turf	-0.122	0.397	-0.33*	0.125	-0.099	0.434	-0.26*	0.079
Turbine	-0.271	0.326	-0.429*	0.105	-0.151	0.355	-0.284*	0.068
Other Buildings	-0.167	0.212	-0.395*	0.075	-0.1	0.228	-0.273*	0.048
Cars and Machinery	-0.382*	0.225	-0.509*	0.074	-0.285	0.244	-0.393*	0.047
Other Landscape Characteristics								
Yellow	1.019*	0.388	0.905*	0.107	0.646	0.428	0.564*	0.069
Green	0.129	0.155	0.138*	0.042	0.091	0.171	0.092*	0.027
Unmanaged Landscape	0.072	0.257	-0.051	0.074	0.035	0.283	-0.062	0.048

	Panel Ordered Logit Model		Pooled Ordered Logit Model		Panel OLS Model		Pooled OLS Model	
Brown	-0.368*	0.204	-0.325*	0.056	-0.261	0.226	-0.238*	0.036
Constant					3.686	0.276	3.674	0.061
Cut Point 1	-2.623	0.258	-2.548	0.102				
Cut Point 2	-1.435	0.256	-1.378	0.096				
Cut Point 3	-0.202	0.256	-0.175	0.095				
Cut Point 4	1.105	0.256	1.102	0.095				
Cut Point 5	2.531	0.256	2.508	0.096				
Sigma Squared (u)					0.358			
Sigma Squared (e)					1.149		1.168	
Rho					0.089			
							0.223	
Pseudo R^2			0.079					
Within					0.080			
Between					0.866			
Overall					0.240			
N	20600.000		20600.000		20600.000		20600.000	
Number of Groups	50.000				50.000			

is satisfactory from a multi-collinearity perspective, as the VIF (Variance Inflation Factor) for all values is less than 10 (Kassie *et al.*, 2008). In comparing the models, it is evident that virtually all of the coefficients are within the significance limits of the panel data ordered logit model, so that the models do not in general have substantial differences in their coefficients. We note however that the confidence intervals are wider for the panel data ordered logit than for the pooled version of the model or for the panel and pooled OLS specifications, reflecting perhaps that we utilise less of the information in the panel ordered logit model estimation than the in the pooled version or continuous dependent variable OLS models. Unsurprisingly the Breusch-Pagan Lagrangian multiplier finds the fixed effects insignificant. Therefore, we focus on the OLS pooled model for the discussion and for the introduction of the taste shifter interactions. Overall, the pseudo R^2 is 24%, representing relatively large unexplained heterogeneity of landscape preferences.

Of the natural attributes, the Connemara type landscape, which represents a remote rugged mountainous area, has the highest positive coefficient. This is followed by preferences for cliffs, lakes and water as landscape attributes. Landscapes with flowers, native trees, bog (peat), sloping land and native trees have the next highest coefficients. Landscapes with flooding have the lowest coefficient of the natural landscapes. The mountain landscape has an unexpected sign, but it shares considerable information with the Connemara type landscape.

In relation to the agricultural landscape attributes, the presence of horses has the greatest positive significance, followed by neat agricultural land and pasture, whilst crops and cut-silage have negative coefficients. In relation to human-built landscape attributes, the presence of monuments has the highest positive and significant coefficient. Indeed, it has the second highest coefficient overall. Human-built landscape attributes associ-

ated with farming such as hedgerows and stone walls have the next highest coefficient, followed by old buildings. Meanwhile negative preferences are observed on average for industrial or mechanised objects or activities such as wind turbines, cars and industrial turf-cutting. Also, yellow and green colours (conditional on other attributes) are positive while unmanaged rural landscapes have a negative coefficient. This preference for managed agricultural landscapes highlights the frequent mismatch between aesthetic preferences and ecological diversity (Gobster *et al.*, 2007). Interestingly, amongst the least preferred landscapes are unmanaged (potentially biodiversity-rich) landscapes, perhaps reflecting evolutionary processes that favour landscapes that have a greater possibility of providing food and shelter.

5.1 Taste Shifters

We interact personal characteristics and attitudes with preferences for natural, human built and agricultural attributes to form taste shifters. Interaction terms between the personal characteristics and landscape types allow us to examine the influence of personal characteristics on preferences and are a means of controlling for observed heterogeneity in preferences within the model. In interacting personal characteristics and landscape characteristics, we group characteristics into natural, human and agricultural characteristics, thus reducing the degrees of freedom. Reflecting the fact that attributes have both positive and negative signs in Table 8, we break up the groups into positive and negative coefficients.

We combine 15 personal characteristics with six different types of landscape attribute. Given that there are 90 combinations of these variables with potentially overlapping information and multi-collinearity, we use a Principal Component Analysis (PCA) to reduce the dimensionality, and present the detailed results in Table A2 Data Annex. Although there are 25 factors with an Eigenvalue of more than 1, accounting for 75% of information, on the grounds of parsimony, we select only those with an Eigenvalue of 2 or higher (Hair *et al.,* 2010). To aid the interpretation of these, we employed a method known as Component Rotation (Bechtold and Abdulai, 2014). This method was used to distinguish between components and to facilitate the interpretation of components (see Table A3 Data Annex for detail on rotated components). The widely applied Varimax Rotation (Abdi and Williams, 2010) was also employed. Table 7 presents the interpretation of the principal components and the coefficients of the pooled OLS model interacted with the taste shifters, referencing both the socio-economic characteristics and the landscape attribute group associated with the principal component. For half of these principal components, a single socio-economic characteristic was found to be dominant combined with four landscape attribute groups, positive natural, positive agricultural, positive human and negative natural, highlighting a coherent association with different landscape attribute types.

Taste shifters capture preference heterogeneity relative to observed characteristics. For example, PC1 corresponds to a negative coefficient on agricultural landscapes for high social class (professional and managerial workers) city dwellers. A positive coefficient on this component suggests a less negative preference for crops and cut-silage than other groups. PC2 refers to the preferences of town dwellers for human and agricultural characteristics that have a positive coefficient. Here, a positive coefficient indicates a higher preference for these attributes than the general population. PC3 relates to preferences for natural attributes,

Table 7. Coefficients of Pooled OLS Model interacted with Taste Shifter Principal Components.

Explanatory Variables				
Landscape Characteristics Interactions	Interpretation	Landscape attributes	Coefficient	Standard Error
PC1	High social class city dwellers	na	0.038	0.005***
PC2	Town dwellers	ph pa	0.019	0.007**
PC3	Older, town dwellers and higher social class	nn	-0.031	0.008***
PC4	Higher educated city dwellers with children	nh	-0.042	0.006**
PC5	City dwellers	ph pa	-0.015	0.006***
PC6	Town dwellers	pa, nh, na	0.015	0.006***
PC7	Satisfaction of area	pn, ph, pa, nn,	-0.030	0.004***
PC8	Environmentally concerned	nh	-0.035	0.006***
PC9	Importance of landscape in choosing where to live	pn, ph, pa, nn,	0.040	0.005***
PC10	Farming background	pn, ph, pa, nn,	0.005	0.005
PC11	Multi-functional agriculture	pn, ph, pa, nn,	-0.048	0.005***
PC12	Concerned about the environment	pn, ph, pa, nn,	-0.015	0.006**

Note: pn – natural attributes (positive sign); ph – human attributes (positive sign) ; pa – agricultural attributes (positive sign); nn – natural attributes (negative sign); nh – human attributes (negative sign); na – agricultural attributes (negative sign).

where higher social classes, older respondents and those living in towns have lower than average preferences for these attributes. There is a similar impact on human attributes (PC4) with a negative score for higher-educated city dwellers or those with children. City dwellers in PC5 have lower than average preferences for human and agricultural attributes, while for PC6, town dwellers have higher preferences for both positive and negative agricultural attributes and more negative human attributes than average. In PC8, those with environmental concerns and landscape views have a lower preference for negative human aspects.

The remaining principal components all relate to individual socio-economic characteristics interacted with the four sets of attributes highlighted above. Those that place a high ranking on the importance of landscape in choosing where to live have higher landscape preferences than average, while those that are concerned about the environment or with multi-functional attitudes have lower preferences.

In summary, grouping the landscape attributes into natural, agricultural (including human built) and non-agricultural human-built attributes, the results show positive associations with natural attributes such as cliffs, mountainous landscapes, landscapes with water and native trees, neat/managed agricultural landscapes and traditional human-built features such as stone walls and planted hedgerows. The results, as expected, show negative associations with events such as flooding, unmanaged landscapes, industrial turf cutting and mechanised features.

There is significant preference heterogeneity however with different groups favouring or disfavouring different attributes. An urban-rural classification used to capture the spatial heterogeneity of preferences (based on the respondents' locations) showed that those living in urban areas feel they have a lower quality of surrounding landscape compared to rural areas. Unsurprisingly those that have chosen to live in a rural landscape place the highest value on this type of landscape, while farmers have the highest preference for agricultural landscape attributes. Urban dwellers are more indifferent towards natural and farming landscapes. Underlying eco-centric attitudes are also important drivers.

6. Conclusions

This study adopted an attribute choice framework to disentangle individual preferences for a holistic image of landscape photographs into preferences for specific attributes of that landscape, and subsequently used these attributes in landscape preference models to relate societal preferences to quantifiable landscape attributes. The study further investigated whether individuals' characteristics interact with landscape attributes and how these interactions ultimately affect public preferences for landscapes.

This paper adopts a middle-ground approach between the methods found in the literature for landscape preference modelling. On the one hand, it is ambitious in relation to the range of landscape attributes as in the case of Schirpke *et al.* (2016) or Bernués *et al.* (2019), but is less ambitious in focusing on preference attributes rather than willingness to pay, as in the stated preference valuation literature. It also extends the work of Schirpke *et al.* (2016) by considering the preference heterogeneity for specific landscape attributes. Although unobserved heterogeneity is not considered in this study, the variety of observed heterogeneity incorporated may be more useful for policy and from a simulation modelling perspective. Ultimately, the model results highlight differences in how people with different attitudes and characteristics rank landscape features. The impact of taste shifters on various groups illustrates the heterogeneity in rankings.

As noted by Hynes *et al.* (2011) the attribute based approach to landscape preferences allows the researcher to examine the general trade-offs which society is willing to make between different attributes of the countryside. On the other hand, modelling landscape preferences based on landscape photos, such as in Howley's (2011) study, is useful if the researcher is interested in understanding preferences for the wider landscape. The approach adopted here is particularly useful where one is interested in the utility gained or lost through a policy that may cause only incremental changes in the landscape or impact on only a small number of attributes. Interacting personal characteristics as taste shifters can help us to understand local preferences if the characteristics of the local population differ. The analysis does have the limitation of not being able to identify local preferences in terms of sense of place or relational value. Qualitative studies or localised surveys are needed to understand these more nuanced perspectives (Pérez-Ramírez *et al.*, 2019; Vannier *et al.*, 2019; Wartmann and Purves, 2018).

Moving from a holistic view of landscapes to analysing preferences for specific attributes of landscapes allows for further applications particularly in the area of simulation. Being able to assess preferences for an individual attribute makes it possible to extrapolate the preference ranking of a landscape in an area that has not been ranked directly. It is

important to note however that the method adopted in this paper is based on the assumption that the sum of the singular landscape element's preference scores equates to the preference ranking of the landscape as a whole. That simplifies the way in which humans value the environment and should be considered as a limitation of our study. As such, the method is more appropriate when there are only a limited number of attributes to be considered in a given landscape.

Human-built landscape characteristics such as stone walls and hedgerows are found to be positively associated with the preference rankings of photos in this study. Thus, future land-use changes and landscape development plans should promote the aesthetic role of stone walls and hedgerows and prioritise their conservation. Similarly, the recognition of the high aesthetic value that the public places on well-managed/neat agricultural landscapes provides policy justification to incentivise farmers to maintain these public goods in future agri-environmental schemes.

The results presented in this paper provide evidence of the preferences of a diverse range of individuals across a number of characteristics that should be of assistance to policy makers attempting to maximise the benefit for society from rural landscapes. The model developed here provides information for decision-makers to examine whether a proposed policy change involving one or more landscape attributes will have a positive or negative impact across the population, while also allowing for more targeted policy formation by disaggregating the population into different preference cohorts.

The approach adopted in this paper facilitates the creation of a formalised model of landscape preferences based on the component attributes. Decomposing complete landscape images into quantifiable attributes is a common feature of preference studies and can help bridge the gap between the GIS literature and landscape analysis. The latter typically takes quantifiable landscape attributes from GIS datasets to create typologies of different types of landscapes. Meanwhile the former assesses societal preferences for holistic images. Our methodology can further allow for the application of societal preferences to quantifiable datasets of landscape attributes, rather than using expert judgement as is currently the case.

The approach developed in this study therefore, has implications for planners for Landscape Character Assessments (LCA) that often utilise a broad expert knowledge approach to developing LCA maps, which may under/over estimate the value of various landscape attributes. Future work will apply this methodology in a GIS landscape database to re-assess LCAs from a societal rather than an expert point of view. Future work should also test for the existence of spatial dependence and use spatial regression methods to examine spatial heterogeneity in more detail.

Acknowledgement

The authors acknowledge research funding received from Department of Agriculture, Food and the Marine (FARM-ECOS project REF 15/S/619), Teagasc Farm Management & Rural Development Department and the EU Interreg Atlantic Area Programme 2014–2020 (EAPA_261/2016 ALICE).

References

Abdi, H., Williams, L.J., 2010. Principal component analysis. Wiley *Interdisciplinary Reviews Computational Statistics 2*: 433–459.

Appleton, J. (1975). *The Experience of Landscape*. Chichester: Wiley.

Arriaza, M., Canas-Ortega, J.F., Canas-Madueno, J.A. and Ruiz-Aviles, P. (2004). Assessing the visual quality of rural landscapes. *Landscape and Urban Planning* 69(1): 115-125.

Bechtold, K.B., Abdulai, A., 2014. Combining attitudinal statements with choice experiments to analyze preference heterogeneity for functional dairy products. *Food Policy* 47: 97–106.

Bernués, A., Alfnes, F., Clemetsen, M., Eik, L.O., Faccioni, G., Ramanzin, M., Ripoll-Bosch, R., Rodríguez-Ortega, T. and Sturaro, E. (2019). Exploring social preferences for ecosystem services of multifunctional agriculture across policy scenarios. *Ecosystem Services* 39: 101002.

Burkhard B, Kroll F. and Müller F. (2010). Landscapes' capacities to provide ecosystem services– a concept for land-cover based assessments. *Landscape Online* 15: 1-22.

Campbell, D., Hutchinson, W.G. and Scarpa, R. (2006). Quantifying the landscape benefits arising from the Rural Environment Protection Scheme: Results from a public survey. *Tearmann: Irish Journal of Agri-environmental Research* 4(1): 14-29.

Dachary-Bernard, J. and Rambonilaza, T. (2012). Choice experiment, multiple programmes contingent valuation and landscape preferences: How can we support the land use decision making process? *Land Use Policy* 29(4): 846-854.

De Ayala, A., Hoyos, D. and Mariel, P. (2012). *Landscape valuation through discrete choice experiments: Current practice and future research reflections*. Documento de Trabajo BILTOKI DT2012.03, Departamento de Economia Aplicada III (Econometria y Estadística), Universidad del País Vasco, Bilbao. Retrieved from https://addi.ehu.es/bitstream/handle/10810/8011/2012.03.pdf?sequence=6&isAllowed=y

Dramstad, W.E., Tveit, M.S., Fjellstad, W.J. and Fry, G.L. (2006). Relationships between visual landscape preferences and map-based indicators of landscape structure. *Landscape and Urban Planning* 78(4): 465-474.

Dupras, J., Laurent-Lucchetti, J., Revéret, J.P. and DaSilva, L. (2018). Using contingent valuation and choice experiment to value the impacts of agri-environmental practices on landscapes aesthetics. *Landscape Research* 43(5): 679-695.

ELC (2000). *European Landscape Convention*. Florence, October 20, 2000.

Fairlie, R.W., Hoffmann, F. and Oreopoulos, P. (2014). A community college instructor like me: Race and ethnicity interactions in the classroom. *American Economic Review* 104(8): 2567-91.

Fotheringham, A.S., Brunsdon, C. and Charlton, M. (2003). *Geographically Weighted Regression: The Analysis of Spatially Varying Relationships*. Wiley.

Frank, S., Fürst, C., Koschke, L., Witt, A. and Makeschin, F. (2013). Assessment of landscape aesthetics - validation of a landscape metrics-based assessment by visual estimation of the scenic beauty. *Ecological Indicators* 32: 222-231.

García-Llorente, M., Martín-López, B., Iniesta-Arandia, I., López-Santiago, C. A., Aguilera, P. A. and Montes, C. (2012). The role of multi-functionality in social preferences

toward semi-arid rural landscapes: An ecosystem service approach. *Environmental Science and Policy* 19: 136-146.

Gill, N., Dun, O., Brennan-Horley, C. and Eriksen, C. (2015). Landscape preferences, amenity, and bushfire risk in New South Wales, Australia. *Environmental Management* 56(3): 738-753.

Gobster, P. H., Nassauer, J. I., Daniel, T. C. and Fry, G. (2007). The shared landscape: What does aesthetics have to do with ecology? *Landscape Ecology* 22(7): 959-972.

Granado-Díaz, R., Gómez-Limón, J.A., Rodríguez-Entrena, M. and Villanueva, A.J. (2020). Spatial analysis of demand for sparsely located ecosystem services using alternative index approaches. *European Review of Agricultural Economics* 47(2): 752-784.

Greene, W. (2001). *Estimating econometric models with fixed effects*. Working Papers 01-10, New York University, Leonard L. Stern School of Business, Department of Economics.

Greene, W. (2004). The behaviour of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects. *Econometrics Journal 7*(1): 98-119.

Häfner, K., Zasada, I., van Zanten, B.T., Ungaro, F., Koetse, M. and Piorr, A. (2018). Assessing landscape preferences: A visual choice experiment in the agricultural region of Märkische Schweiz, Germany. *Landscape Research* 43(6): 846-861.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R.L., 2010. Multivariate Data Analysis, Prentice Hall. Prentice Hall, New Jersey.Appleton, J. (1975). *The Experience of Landscape*. Chichester: Wiley.

Hanley, N., Ready, R., Colombo, S., Watson, F., Stewart, M. and Bergmann, E.A. (2009). The impacts of knowledge of the past on preferences for future landscape change. *Journal of Environmental Management 90*(3): 1404-1412.

Hanley, N., Schläpfer, F. and Spurgeon, J. (2003). Aggregating the benefits of environmental improvements: Distance-decay functions for use and non-use values. *Journal of Environmental Management* 68(3): 297-304.

Hermes, J., Albert, C. and von Haaren, C. (2018). Assessing the aesthetic quality of landscapes in Germany. *Ecosystem Services* 31: 296-307.

Howley, P. (2011). Landscape aesthetics: Assessing the general publics' preferences towards rural landscapes. *Ecological Economics* 72: 161-169.

Howley, P., O'Donoghue, C. and Hynes, S. (2012). Exploring public preferences for traditional farming landscapes. *Landscape and Urban Planning* 104(1): 66-74.

Huber, R. and Finger, R. (2019). A metaanalysis of the willingness to pay for cultural services from grasslands in Europe. *Journal of Agricultural Economics*. doi: 10.1111/1477-9552.12361

Hynes, S. and Campbell, D. (2011). Estimating the welfare impacts of agricultural landscape change in Ireland: A choice experiment approach. *Journal of Environmental Planning and Management 54*(8): 1019-1039.

Hynes, S., Campbell, D. and Howley, P. (2011). A Holistic vs. an attribute-based approach to agri-environmental policy valuation: Do welfare estimates differ? *Journal of Agricultural Economics* 62(2): 305-329.

Hynes, S., Ghermandi, A., Norton, D. and Williams, H. (2018). Marine Recreational Ecosystem Service Value Estimation: A Meta-Analysis with Cultural Considerations. *Ecosystem Services* 31: 410-419.

Ives, C.D. and Kendal, D. (2013). Values and attitudes of the urban public towards peri-urban agricultural land. *Land Use Policy* 34: 80-90.

Jørgensen, S.L., Olsen, S.B., Ladenburg, J., Martinsen, L., Svenningsen, S.R. and Hasler, B. (2013). Spatially induced disparities in users' and non-users' WTP for water quality improvements - Testing the effect of multiple substitutes and distance decay. *Ecological Economics* 92: 58-66.

Kaltenborn, B.P. and Bjerke, T. (2002). Associations between environmental value orientations and landscape preferences. *Landscape and Urban Planning* 59(1): 1-11.

Kantelhardt, J., Schaller, L. and Viaggi, D. (2015). Do agricultural landscapes provide socio-economic benefits in rural regions? 29th International Association of Agricultural Economists Conference, August 9-14, Milan, Italy.

Kassie, M., Pender, J., Yesuf, M., Kohlin, G., Bluffstone, R. and Mulugeta, E. (2008). Estimating returns to soil conservation adoption in the northern Ethiopian highlands. *Agricultural Economics* 38(2): 213-232.

Kern, M. (2002). Food, Feed, Fibre, Fuel and Industrial Products of the Future: Challenges and Opportunities. Understanding the Strategic Potential of Plant Genetic Engineering. *Journal of Agronomy and Crop Science* 188(5): 291 – 305.

Kienast, F., Bolliger, J., Potschin, M., De Groot, R.S., Verburg, P.H., Heller, I., Wascher, D. and Haines-Young, R. (2009). Assessing landscape functions with broad-scale environmental data: insights gained from a prototype development for Europe. *Environmental Management 44*:1099-1120. Kirillova, K., Fu, X., Lehto, X. and Cai, L. (2014). What makes a destination beautiful? Dimensions of tourist aesthetic judgment. *Tourism Management 42*: 282-293.

Lothian, A. (1999). Landscape and the philosophy of aesthetics: Is landscape quality inherent in the landscape or in the eye of the beholder? *Landscape and Urban Planning* 44(4): 177-198.

Martín-López, B., Iniesta-Arandia, I., García-Llorente, M., Palomo, I., Casado-Arzuaga, I., García del Amo, D., Gómez-Baggethun, E., Oteros-Rozas, E., Palacios-Agundez, I., Willaarts, B., González, JA., Santos-Martín, F., Onaindia, M., López-Santiago, C., Montes, C. (2012). Uncovering ecosystem service bundles through social preferences. PLoS ONE 7(6): e38970.

Moran, D., McVittie, A., Allcroft D.J. and Elston, D.A. (2007). Quantifying public preferences for agri-environmental policy in Scotland: A comparison of methods. *Ecological Economics* 63(1): 42-53.

OECD (2015). *Public Goods and Externalities. Agri-environmental Policy Measures in Selected OECD Countries*. OECD Publishing, Paris.

Pérez-Ramírez, I., García-Llorente, M., Benito, A., & Castro, A. J. (2019). Exploring sense of place across cultivated lands through public participatory mapping. *Landscape Ecology* 34(7): 1675-1692.

Plieninger, T., Dijks, S., Oteros-Rozas, E. and Bieling, C. (2013). Assessing, mapping, and quantifying cultural ecosystem services at community level. *Land Use Policy* 33: 118-129.

Rambonilaza, M. and Dachary-Bernard, J. (2007). Land-use planning and public preferences: What can we learn from choice experiment method? *Landscape and Urban Planning* 83 (4): 318-326.

Rodríguez-Entrena, M., Colombo, S. and Arriaza, M. (2017). The landscape of olive groves as a driver of the rural economy. *Land Use Policy* 65: 164-175.

Santos-Martín, F., Zorrilla-Miras, P., García-Llorente, M., Quintas-Soriano, C., Montes, C., Benayas, J., Gómez Sal, A., Paracchini, M.L. (2019). Identifying win–win situations in agricultural landscapes: an integrated ecosystem services assessment for Spain. Landscape Ecology 34: 1789–1805.

Schaller, L., Targetti, S., Villanueva, A., Zasada, I., Kantelhardt, J., Arriaza, M., Bal, T., Bossi Fedrigotti, V., Handan Giray, F., Hafner, K., Majewski, E., Malak-Rawlikowska, A., Nikolov, D., Paoli, J.C., Piorr, A., Rodríguez-Entrena, M., Ungaro, F., Verburg, P., van Zanten, B. and Viaggi, D. (2018). Agricultural landscapes, ecosystem services and regional competitiveness - Assessing drivers and mechanisms in nine European case study areas. *Land Use Policy* 76: 735-745.

Schirpke, U., Timmermann, F., Tappeiner, U. and Tasser, E. (2016). Cultural ecosystem services of mountain regions: Modelling the aesthetic value. *Ecological Indicators* 69: 78-90.

Sowinska-Swierkosz, B.N. and Swierkosz, T.J. (2016). A new approach to the identification of Landscape Quality Objectives (LQOs) as a set of indicators. *Journal of Environmental Management* 184: 596-608.

Svobodova, K., Sklenicka, P., Molnarova, K. and Salek, M. (2012). Visual preferences for physical attributes of mining and post-mining landscapes with respect to the sociodemographic characteristics of respondents. *Ecological Engineering* 43: 34-44.

Swanwick, C. (2009). Society's attitudes to and preferences for land and landscape. *Land Use Policy 26*: S62-S75.

Tagliafierro, C., Longo, A., Van Eetvelde, V., Antrop, M. and Hutchinson, W.G. (2013). Landscape economic valuation by integrating landscape ecology into landscape economics. *Environmental Science and Policy* 32: 26-36.

Teagasc (2017). *Agriculture in Ireland: The Irish agri-food industry.* https://www.teagasc.ie/rural-economy/rural-economy/agri-food-business/agriculture-in-ireland/

Tscharntke, T., Klein, A.M. and Kruess, A. (2005). Landscape perspectives on agricultural intensification and biodiversity - ecosystem service management. *Ecological Letters* 8: 857-874.

Tveit, M.S. (2009). Indicators of visual scale as predictors of landscape preference; a comparison between groups. *Journal of Environmental Management* 90(9): 2882-88.

Tveit, M., Ode, Å. and Fry, G. (2006). Key concepts in a framework for analysing visual landscape character. *Landscape Research* 31(3): 229-255.

van Berkel, D.B. and Verburg, P.H. (2014). Spatial quantification and valuation of cultural ecosystem services in an agricultural landscape. *Ecological Indicators* 37: 163–174.

van der Jagt, A.P.N., Craig, T., Anable, J., Brewer, M.J. and Pearson, D.G. (2014). Unearthing the picturesque: The validity of the preference matrix as a measure of landscape aesthetics. *Landscape and Urban Planning 124*: 1-13.

van Oudenhoven, A.P.E, Petz, K., Alkemade, R., Hein, L., de Groot, R.S. (2012). Framework for systematic indicator selection to assess effects of land management on ecosystem services. *Ecological Indicators* 21: 110-122.

van Zanten, B.T., Verburg, P.H., Koetse, M.J. and van Beukering, P.J. (2014). Preferences for European agrarian landscapes: A meta-analysis of case studies. *Landscape and Urban Planning* 132: 89-101.

Vanni, F. (2014). *Agriculture and Public Goods: The Role of Collective Action*. Netherlands: Springer.

Vannier, C., Bierry, A., Longaretti, P. Y., Nettier, B., Cordonnier, T., Chauvin, C., Lavorel, S. (2019). Co-constructing future land-use scenarios for the Grenoble region, France. *Landscape and Urban Planning* 190: 103614.

Vidal-Legaz, B., Martínez-Fernández, J., Picón, A. S. and Pugnaire, F. I. (2013). Trade-offs between maintenance of ecosystem services and socio-economic development in rural mountainous communities in southern Spain: A dynamic simulation approach. *Journal of Environmental Management* 131: 280-297.

Villanueva, A.J., Targetti, S., Schaller, L., Arriaza, M., Kantelhardt, J., Rodriguez-Entrena, M., Bossi-Fedrigotti, V. and Viaggi, D. (2015). Assessing the role of economic actors in the production of private and public goods in three EU agricultural landscapes. *Journal of Environmental Planning and Management* 58(12): 2113-2136.

Wartmann, F. M., & Purves, R. S. (2018). Investigating sense of place as a cultural ecosystem service in different landscapes through the lens of language. *Landscape and Urban Planning* 175: 169-183.

Zhang, W., Ricketts, T.H., Kremen, C., Carney, K. and Swinton, S.M. (2007). Ecosystem services and dis-services to agriculture. *Ecological Economics 64*(2): 253-260.

Zoderer, B.M., Tasser, E., Erb, K-H., Stanghellini, P. S.L. and Tappeiner, U. (2016). Identifying and mapping the tourists' perception of cultural ecosystem services: A case study from an Alpine region. *Land Use Policy* 56: 251–261.

Data Annex: Assessing population landscape characteristic preferences using disaggregated attributes for rural landscapes

Table A1. Ranking of Photos by Survey Participants.

Rank	Photo Description
1	Coastal image of sea and headland
2	Aerial photo of a river estuary
3	Coastal cliffs
4	Lake in rural setting
5	Horses in field
6	Large tree next to castle ruin in field
7	Rolling hills, with conifers and well-kept fields
8	Copper beech tree in parkland
9	Sandy Beach
10	Stream flowing through Deciduous forest
11	Patchwork quilt of fields and river
12	The Rock of Cashel Historic Monument
13	Rich farmland and hillside in background
14	Remote hillside, with trees
15	Large rock in field on hillside
16	Field of sheep in lowland good grass and stone walls
17	Hillside of bluebells and deciduous trees
18	Remote (Connemara) mountainous landscape
19	Traditional farm building
20	Forest track in deciduous trees
21	Stonewalls with neat field of sheep
22	Stonewall with cows in field and trees on hillside
23	Dairy cows in field
24	Large field after silage cut
25	Stonewalls with neat field of oil seed rape
26	Sheep in front of traditional farmhouse
27	Statue of harpist in rural village
28	Hilly Woodland and Trees
29	Large field of cereal crops
30	Wildflower in field of ferns
31	Hillside of conifer trees
32	Trees and field of rushes
33	Mature forest
34	Rows of horticulture crops in field
35	Neat rows of cereal crops
36	Rocky mountain with extensive agriculture
37	Tillage field after harvest with blue sky
38	Mechanical cutting of turf from bog
39	Hillside of conifer

Rank	Photo Description
40	Reeds and scrubland
41	Marginal land with trees in background
42	Large horticulture field
43	Barren bogland
44	Heather in bogland
45	Trees and scrubland with blue horizon
46	Landscape of industrial bogland
47	Barren hillside with wind turbine
48	Scrubland next to woodland
49	New motorway cutting through landscape
50	Flooded farmland

Table A2. Principal Component Analysis.

Principal Component	Eigenvalue	Cumulative Proportion of Variance
P. Component 1	8.79458	0.0977
P. Component 2	6.75435	0.1728
P. Component 3	5.62239	0.2352
P. Component 4	4.78296	0.2884
P. Component 5	4.50848	0.3385
P. Component 6	3.63383	0.3789
P. Component 7	3.32083	0.4157
P. Component 8	2.9566	0.4486
P. Component 9	2.75087	0.4792
P. Component 10	2.55781	0.5076
P. Component 11	2.43572	0.5346
P. Component 12	2.2716	0.5599
P. Component 13	1.72736	0.5791
P. Component 14	1.71575	0.5981
P. Component 15	1.64843	0.6165
P. Component 16	1.49928	0.6331
P. Component 17	1.44856	0.6492
P. Component 18	1.39257	0.6647
P. Component 19	1.34819	0.6797
P. Component 20	1.27425	0.6938
P. Component 21	1.15625	0.7067
P. Component 22	1.09155	0.7188
P. Component 23	1.08972	0.7309
P. Component 24	1.07077	0.7428
P. Component 25	1.03101	0.7543

Table A3. Rotated components (orthogonal varimax) with loading < 0.3.

Correlations	Type	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Comp10	Comp11	Comp12
Environmental Apathy	pn												
Multifunctional	pn											0.4372	
Productivist	pn												
Child	pn												
Age	pn												
University Educated	pn												
Social Class	pn												
City	pn												
Town	pn												
Farming Background	pn										0.5274		
Importance of Landscape in choosing where to live	pn									0.5221			
Satisfaction of Area	pn							0.5158					
Quality of Surrounding Landscape	pn												
Concerned about the environment	pn												0.5444
Care about Conservation	pn												
Environmental Apathy	ph												
Multifunctional	ph											0.5415	
Productivist	ph												
Child	ph												
Age	ph												
University Educated	ph												
Social Class	ph												
City	ph					0.5363							
Town	ph		0.5323										
Farming Background	ph										0.3401		
Importance of Landscape in choosing where to live	ph									0.3549			

Correlations	Type	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Comp10	Comp11	Comp12
Satisfaction of Area	ph							0.3808					
Quality of Surrounding Landscape	ph												
Concerned about the environment	ph												0.3469
Care about Conservation	ph												
Environmental Apathy	pa												
Multifunctional	pa											0.4315	
Productivist	pa												
Child	pa												
Age	pa												
University Educated	pa												
Social Class	pa												
City	pa					0.3594							
Town	pa		0.3358				0.3134						
Farming Background	pa										0.4866		
Importance of Landscape in choosing where to live	pa									0.4983			
Satisfaction of Area	pa							0.4935					
Quality of Surrounding Landscape	pa												
Concerned about the environment	pa												0.4943
Care about Conservation	pa												
Environmental Apathy	nn												
Multifunctional	nn											0.4412	
Productivist	nn												
Child	nn												
Age	nn			0.4426									
University Educated	nn												
Social Class	nn			0.3384									
City	nn												
Town	nn			0.3778									

Correlations	Type	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Comp10	Comp11	Comp12
Farming Background	nn										0.3769		
Importance of Landscape in choosing where to live	nn									0.3979			
Satisfaction of Area	nn							0.4121					
Quality of Surrounding Landscape	nn			0.3442									
Concerned about the environment	nn												0.401
Care about Conservation	nn												
Environmental Apathy	nh								-0.3381				
Multifunctional	nh								0.37				
Productivist	nh												
Child	nh				0.3044								
Age	nh				0.3886								
University Educated	nh				0.3016								
Social Class	nh				0.4032								
City	nh				0.4638								
Town	nh						0.3459						
Farming Background	nh												
Importance of Landscape in choosing where to live	nh								0.4122				
Satisfaction of Area	nh												
Quality of Surrounding Landscape	nh												
Concerned about the environment	nh								0.4373				
Care about Conservation	nh								0.3908				
Environmental Apathy	na												
Multifunctional	na												
Productivist	na												
Child	na												
Age	na												
University Educated	na												

Correlations	Type	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Comp10	Comp11	Comp12
Social Class	na	0.3004											
City	na	0.4851											
Town	na						0.56						
Farming Background	na												
Importance of Landscape in choosing where to live	na												
Satisfaction of Area	na												
Quality of Surrounding Landscape	na												
Concerned about the environment	na												0.3044
Care about Conservation	na												

Note: pn – natural attributes (positive sign); ph – human attributes (positive sign) ; pa – agricultural attributes (positive sign); nn – natural attributes (negative sign); nh – human attributes (negative sign); na – agricultural attributes (negative sign);

Bio-based and Applied Economics 9(2): 201-221, 2020
DOI: 10.13128/bae-8242

Full Research Article

Exploring governance mechanisms, collaborative processes and main challenges in short food supply chains: the case of Turkey

Yaprak Kurtsal*, Emel Karakaya Ayalp, Davide Viaggi

University of Bologna (Italy)

Abstract. There is a growing scientific interest and public debate on the potential contributions that Local Food Systems (LFS) and Short Food Supply Chains (SFSCs) can make towards overcoming sustainability challenges and creating societal impact. In the case of Turkey, where local agricultural systems are particularly vulnerable, lacking of resilience and innovative capacity, understanding the governance mechanisms of SFSCs would have strong implications for policy making. To this end, our aim in this study is to explore the mechanisms through which civil society driven SFSCs are governed in the city of Izmir (Turkey), referring to the actors involved in the process, institutional frameworks that are adopted and challenges experienced, that could inform policy discussions towards establishing more sustainable local food systems. In this direction, the questions we aim to answer are: (1) what are the mechanisms through which community level SFSCs are initiated and governed, (2) how collaboration takes place within these groups and through which processes, and finally (3) what the outcomes of these processes are, with respect to individual, community and local impacts experienced on the ground, and challenges associated with them. We use a descriptive case study methodology, to study seven SFSC initiatives (four food community networks, two farmers' markets and a local shop) in the city of Izmir; and collect data through qualitative semi-structured in-depth interviews (41 with producers, 32 with consumers, 11 with coordinators and 5 with experts). Our findings suggest that different mechanisms are at play within our cases, depending on aspects including their governing structures and their way and purpose of operation. While farmers had difficulties relying solely on their income from these initiatives for their livelihoods, organizational challenges experienced by food communities were mainly related to difficulties associated to managing tasks on a voluntary basis. Moreover, arriving at a shared understanding about mutual goals, in addition to finding a way to include stakeholders in the process, were among the most prevalent challenges of all initiatives.

Keywords. Short food supply chains, local food systems, collaborative governance, alternative food networks, governance challenges.

JEL Codes. Q13, Q12, D71, R12.

*Corresponding author. E-mail: yaprak.kurtsal2@unibo.it

Editor: Severino Romano.

ISSN 2280-6180 (print)
ISSN 2280-6172 (online)

1. Introduction

Over the last few decades, a wide range of grassroots movements have been gaining momentum around the globe, through a range of collective practices that are organized around the idea of promoting more socially just, culturally appropriate, environmentally conscious and healthier ways of food provisioning for communities (Kirwan et al., 2013; Renting et al., 2003). These movements aimed at empowering consumers to shift to proactive actors, and rural producers to become autonomous providers of sustainable goods and services (Matacena, 2016; Lamine et al., 2012). These food networks have been analyzed widely in the literature, not only with regards to their capacity to create societal change (Seyfang and Smith, 2007), but also because they growingly claim new roles in governance mechanisms, through mobilizing new forms of relationships, values, knowledge and skills (Dominguez Garcia et al., 2017; Knickel et al., 2009). In this regard, the concepts of "food democracy", "food citizenship" and "Civic Food Networks (CFNs)" are increasingly being used in public discourse, drawing attention to the role of local actors, citizens and civil society in shaping the new governance mechanisms in the food system (Andrée et al., 2019). Seyfang and Smith, (2007) introduced the term grassroots innovations to describe networks of activists and organizations generating novel bottom-up solutions that involve people at the community level experimenting with social innovations and the capacity to build resilience at a community level.

In this study, our aim is to explore the mechanisms through which civil society driven SFSCs are governed in the city of Izmir (Turkey), referring to the actors involved in the process, institutional frameworks that are adopted and challenges experienced, that could inform policy discussions towards establishing more sustainable local food systems. In this respect, we intend to answer the following questions: (1) what are the mechanisms through which community level SFSCs are initiated and operated, (2) how collaboration takes place within these groups and through which processes, and finally (3) what are the outcomes of these processes, in terms of individual, community and local impacts experienced on the ground, and challenges associated with them.

Numerous studies seek to explore the governance mechanisms of food networks and movements, especially in the European context. Andrée et al. (2019) examine a food movement that is led by the partnership of civil society organizations (CSOs) and local governments, focusing on building relationships, trust, and shared values. Renting and Wiskerke (2010), that study emerging roles of public institutions and civil society in LFS, argue that currently we are lacking an adequate conceptual framework to think through the implications of governance issues. Manganelli et al. (2019) identify the main governance challenges experienced by SFSCs, including pressures in management, access to resources and creation of supportive institutional spaces. Galli et al. (2014) discuss the cultural, organizational and institutional changes needed in the scope of SFSCs. We see that a recurring theme that is common in this line of thought and related theories is collaboration and how relations and networks are shaped around these. In this regard, some studies propose collaborative governance, for dealing with complex problems, without readily available solutions (Andrews and Entwistle, 2010; Emerson et al., 2012). Brink and Wamsler (2018) make use of collaborative governance to conceptualize how shared learning can filter back into participating organizations in addressing climate risk. Other studies, discuss the collaborative

governance processes and their implications from a perspective of local food banks (Meads, 2017), food policy councils (Koski et al., 2018; Siddiki et al., 2015), small holder agriculture and its connection to Sustainable Development Goals (SDGs) (Florini and Pauli, 2018), school meal services (Galli et al., 2014), and local food action planning (Andrée et al., 2019). However, the processes and mechanisms through which local food network actors get collectively organized and govern these systems, especially through collaborative governance structures, are not studied widely. This calls for a need to understand the existing place-based structures, their organization, the facilitating circumstances or challenges, and consider the role of different governance mechanisms that allow such networks to function (Lamine et al., 2012). Moreover, to the best of our knowledge, studies that seek to explore the governance mechanisms and main challenges and outcomes related to SFSCs in Turkey are very rare. For this reason, the experience of such networks and their associated organizational and operational dynamics are unknown.

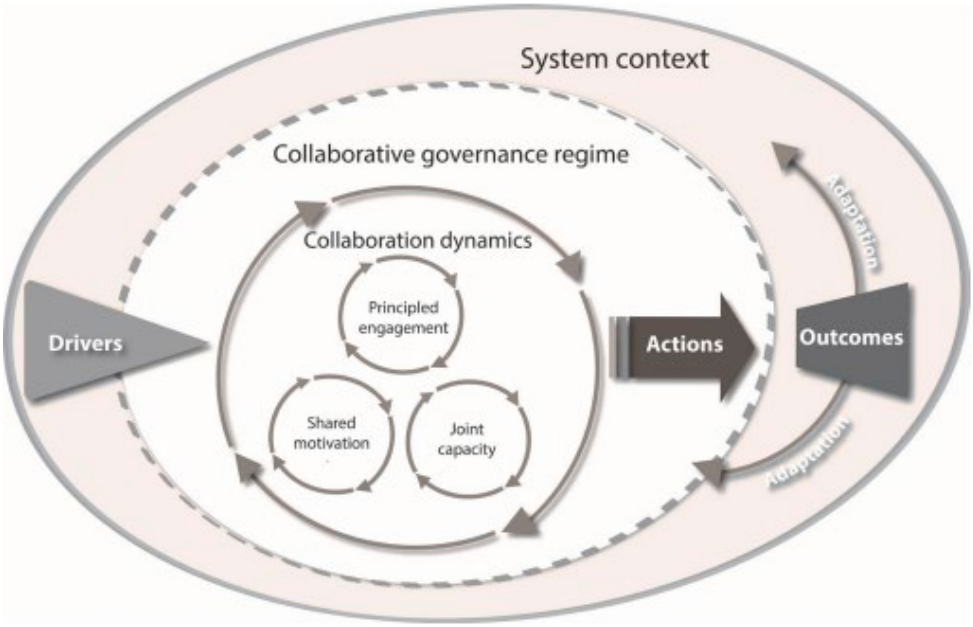
This study contributes to the literature on governance mechanisms of SFSCs through the lens of collaboration, which can shed light on how social innovation practices within LFS can be enhanced and provide important implications for policy making especially on the local level. It can also shed light to the understanding of an emerging country context, where a new and novel local food movement is being shaped, and where local agricultural systems are being criticized in particular for the lack of innovative capacity and for the poor knowledge base, in the face of sustainability challenges. In this context, the city of Izmir provides many opportunities as a city-level case, as it is the leading city in organic agricultural production in Turkey (Vatansever, 2017) and is the rising city of alternative food initiatives, providing a diversity of alternative agro-food practices (Ozatagan and Karakaya Ayalp, 2018). In addition, Izmir, being surrounded by rural areas where agricultural production is persevering, also gives an opportunity to observe the re-organization of urban-rural relations through which SFSCs can flourish. Izmir is also attractive for urban-rooted producers (producers coming from urban families but who started pursuing agricultural production later in life) (Karakaya, 2016), who migrate from other metropolitan cities to Izmir, with a dream to engage with agricultural production and start a new life, which in other cities could not be clearly observed. In Izmir it is also possible to see a sufficient number of civil society-led initiatives that allows us to identify and understand the governance mechanisms that are at play.

This paper is structured as follows. After providing the conceptual framework that we utilize in this study in Section 2, we present our cases and methodology in Section 3, and findings in Section 4. Lastly, we discuss our findings in Section 5 and present our conclusions in Section 6.

2. A multi-perspective collaborative governance framework for short food supply chains

In this study, we make use of Emerson and Nabatchi (2015)'s Integrative Collaborative Governance Framework (ICGF) (see Figure 1), while we integrate a range of studies to further propose an adapted version of the framework (see Figure 2) (Ansell and Gash, 2007; Pascucci et al., 2016; Manganelli et al., 2019; Barbazza and Tello, 2014). According to Emerson and Nabatchi (2015), within a Collaborative Governance Regime (CGR),

Figure 1. Integrated Framework for Collaborative Governance Regime.



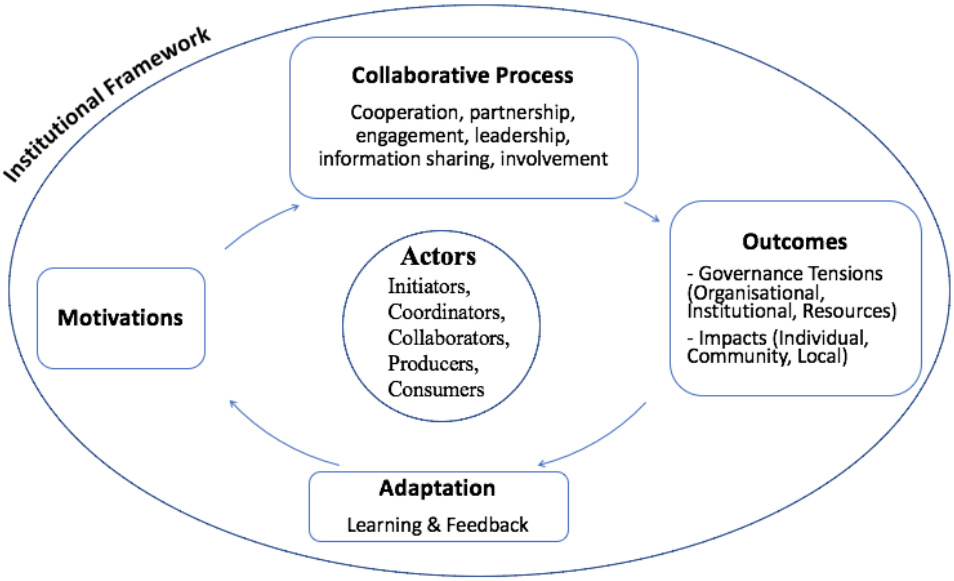
Reference: Emerson and Nabatchi, 2015

"collaborative dynamics" consisting of "principled engagement", "shared motivation", and "capacity for joint action" work together to result in actors to initiate collaborative actions to reach their collaborative goals. Together, collaborative dynamics and actions shape the overall quality and the extent to which a CGR is effective". Actions, then lead to outcomes, which in turn through an adaptation process, feed back into the CGR and the system context. In the framework, departing from Krasner (1983)'s definition, CGR is conceptualized as the "sets of implicit and explicit principles, rules, norms, and decision-making procedures around which actors' expectations converge in a given area".

Below, we present in Figure 2, a multi-perspective collaborative governance framework to assess the governance mechanisms of SFSCs through which collaboration actions take place.

Departing from ICGF, the adapted framework aims to assess the motivations of actors to bring their forces together to organize SFSC initiatives, in which collaborative processes take place. Within these collaborative processes, collaborative actions are taken, including building of partnerships, cooperation and information and experience sharing (Emerson and Nabatchi, 2015; Barbazza and Tello, 2014). The extent to which these occur is influenced by factors such as shared understanding, trust building, face-to-face dialogue and commitment to process (Ansell and Gash, 2007), as well as the institutional frameworks that shape the initiatives (rules, procedural arrangements, norms, inclusion criteria) (Emerson and Nabatchi, 2015). These processes then lead to governance tensions, and individual, community and local impacts within the groups. The governance tensions arise

Figure 2. A Multi-Perspective Collaborative Governance Framework for SFSCs.



Reference: Elaboration of the authors

in the form of organizational, resource and institutional tensions, as these newly emerging initiatives grow, scale-up and out (Manganelli et al., 2019). This iterative cycle is then completed, as these outcomes lead to an adaptation process, through feedback and learning. In this study, we do not make connections between the governance regime (where collaboration dynamics take place) and the system context that shape this regime, the reasons of which are discussed in the Discussion section.

3. Data and Research Methodology

3.1 Methodology

Our study follows a descriptive multiple case study approach based on the framework explained above. We studied seven cases to examine the governance mechanisms, challenges, and collaboration processes and outcomes of SFSCs in Turkey. Each case was examined independently and then a cross-case analysis was made between cases. The case study method is recommended when realities and dynamics of a phenomenon is not clearly explored beforehand (Hollweck, 2016). We believe this methodology could help us unravel the dynamics of SFSCs and outcomes associated with their performance in Turkey, which are almost completely unknown. Our aim was hence to maximize information richness and comparability, rather than to generalize statistically to a broader population of cases (Hollweck, 2016). An additional reason for preferring a multiple case study analy-

sis was to collect as much information as possible from a variety of actors and groups to identify mechanisms at play.

3.2 Selection of the Cases

A preliminary field research has been conducted to have an initial set of in-depth interviews with experts, academicians and local government representatives, followed by informal initial contacts with network coordinators to understand the ecosystem of SFSCs in Izmir. Thus, we have selected our seven cases with special emphasis on how and through which support mechanisms they are initiated, their governance structure, their development processes, organization capacity, innovation capacity and stakeholder variety. In this regard, it was important to include only the cases that have been operational for at least two years, as cases that have been initiated more recently did not have stabilized institutional mechanisms and participant profiles in place. Hence, our selected cases fall under the categories of: (1) A local shop (Doğa's Shop), (2) Farmers' Markets (Foça Earth Market and EcoBazaar[1]) and (3) Food Community Networks (Aegean University Environment and Human Friendly Agriculture Group, West Izmir Community Supported Agriculture Group (BITOT), Gediz Ecology Collective (GETO) and Homeros Food Collective). In this study, we use the term food community networks (FCNs) introduced by Pascucci (2010) to define a governance structure where consumers and producers strongly integrate their functions by organizing a "club", in which resources, decisions, and responsibilities are shared among participants, towards more sustainable, just, and resilient food systems. Hence, we use this term to refer to the four food community cases that we study in this research, which are organized by consumers, where individuals engage in common actions, such as co-producing and distributing food products, or sharing resources or risks, in order to produce and have access to ecological food products (Pascucci, 2010). Table 1 provides a summary of each case.

3.3 Data Collection

The qualitative semi-structured in-depth interviews were the central method used to collect the primary data for this research. We collected qualitative data from 41 producers, 32 consumers, 11 coordinators and 5 experts. Different questionnaires were used for each stakeholder group. The interviews directed at coordinators aimed to understand when, how and why the initiative is established, which stages it has gone through, the profile of consumers and producers, aspects regarding the institutional framework, how activities are organized and managed and the main challenges and needs of the groups. The interviews with producers questioned their motivations for being part of these networks, their selling channels, livelihood aspects, their main challenges and needs, and aspects regarding their sharing and learning behavior. Consumers, on the other hand, were asked what

[1] Although we referred to EcoBazaar as a farmers' market, it should be noted that it is not obligatory to be a farmer selling their own products in order to be able to sell at EcoBazaar. Sellers of intermediary products are also permitted, as long as these products have an organic certificate.

Table 1. Introduction of Cases.

	Initiative	Information about the Initiative
Local Shop	Doğa's Shop	12 rural-rooted producers selling their olive only through this network.
Farmers' Markets	Foça Slow Food Earth Market	The 1st Slow Food (SF) Market in Turkey and 28th in the World. Only targets small-scale producers within a radius of 40 kilometers, 13 producers: 12 rural-rooted and 1 urban-rooted.
	EcoBazaar	1st organic farmers' market in Izmir. 11 producers (10 rural-rooted, 1 urban-rooted) and 2 intermediary sellers (selling organic products such as packaged food or beauty products).
Food Community Networks	Aegean University Group	1 rural-rooted main producer that delivers weekly and numerous supporting ones.
	BİTOT, GETO and Homeros	28 producers in BITOT, GETO and Homeros altogether (12 part-time rural rooted, 10 urban-rooted, 6 full-time rural-rooted producers). This number is presented together, as there are producers that are shared among these 3 groups.

their main motivations for being part of these networks were and to what extent they are involved in the operation of the group.

We first contacted the coordinator of each case and decided on the meeting days that could provide the presence of the highest number of producers and consumers. Following semi-structured in-depth interviews conducted with 11 coordinators, we were directed to producers of the initiatives. In the case of FCNs, consumers and producers were met during organized purchase days, while for the case of the remaining initiatives, the consumers and producers were reached at farmers' markets or other organized events.

3.4 Interpretation of Data

First, all in-depth semi-structured interviews were voice-recorded and the discussions have been categorized and subcategorized under each aspect in relation to our research questions and objective. Then, the re-occurring concepts as well as answers that are falling outside of the repeated concepts have been coded. Here, the triangulation of the data was possible when concepts such as institutional mechanisms, collaborative processes and challenges experienced within SFSCs have been asked to each of the participating actor (coordinators, consumers, producers). In this way, different explanation of the same concept by different actors have made it possible to strengthen our data.

4. Results

The findings related to our study are presented in this section. The cases we investigate consisted of four food community networks (FCNs), two Farmers' Markets (FMs) and one local shop. While, FCNs have been initiated by organized consumers, CSOs played a key role in initiating the rest of the three initiatives.

4.1 Actors and Motivations

The first FCN that has been established in Izmir with the initiative of consumers is the Aegean University "Environment and Human Friendly Agriculture Group", which later inspired the other food community initiatives to be formed in the following years. The group was established in 2013, with the initiation of two academicians at the Aegean University. The Aegean University Group is different than the others in the sense that it is a "workplace" organization and it is both founded and managed by the "employees" of the University. The second group is called BITOT (West Izmir Community Supported Agriculture Group), which has been established in the Urla Province of Izmir in 2014 by a group of consumers. When BITOT reached a certain number of consumers, the decision to scale-out also in other provinces of Izmir has led to the establishment of GETO in 2015 (in the Karşıyaka Province) and Homeros in 2016 (in the Bornova Province). The motivations behind establishment of all of the groups are similar: to support local small-scale producers that conduct environmentally-friendly production and to be able to supply healthy food products to its members.

The first FM of our case study, Foça Slow Food Earth Market, was founded by Slow Food Convivium "Foça Zeytindalı" in 2011, in line with the principles of the International Slow Food Movement. The Foça Municipality also acted as a collaborator and has supported the Convivium, which also provided the space for the market to be held each week on Sundays. Meanwhile, the District Directorate of Agriculture also contributed as a training partner, which helped identify and train the farmers in the initiation phase of the market. Slow Food International representatives were also involved in the process to provide direction and guidance. For the case of the Foça Earth Market, the motivation behind establishing the market was to give smallholders the chance to sell directly, without intermediaries. The second FM of our case study, EcoBazaar, on the other hand, was established in 2010 in the partnership of Ecological Agriculture Organization Association (ETO), Izmir Metropolitan Municipality and Karşıyaka provincial Municipality, as the first organic farmers' market in the city of Izmir. The main motivation behind its establishment was to initiate an all-organic market in Izmir, as part of efforts of the Izmir Municipality to promote organic production.

Finally, Doğa's Shop ("Yavaş Dükkan" which translates to "Slow Shop") was established in 2015, by the School of Nature, a project of the grassroots organization of Doğa (Nature) Foundation. In 2013, Doğa Association founded the School of Nature in the Orhanlı Village of Seferihisar province in partnership with the Seferihisar Municipality, which also donated the School's building to the Doğa Association to perform its activities. Other partners of the School are Orhanlı Village Society and several other local groups in Anatolia. The motivations behind its initiation were to establish a collective, where all steps of production can take into account preservation of biodiversity and traditional olive oil production methods of the Orhanlı village. Preserving the biodiversity in this location carries significant importance, as Orhanlı Valley is one of the final production sites where traditional stone pressed olive oil production continues.

4.2 Institutional Framework

We illustrate in this section, the criteria for inclusion of producers, how these criteria are controlled, and the general manner of operation for each initiative. For producers, the required specifications for being part of FCNs are to be pursuing local production, the production to be conducted by the producers themselves and not by others, organic production, using heirloom seeds or organic seeds, respecting biodiversity and to having a sufficient buffer zone between the producer's land and those others that pursue production using chemicals. These specifications are decided iteratively and may be subject to changes as a result of learning processes. Field visits are made prior to being accepted into the group, and later unannounced visits are held at certain intervals. In the case of the Aegean University Group, members meet for the purchase day each week. Coordinators, that are also academicians of the University, establish and facilitate communication among consumers and producers on a voluntary basis. The group meets in the workplace (the University) and the main producer is making weekly deliveries to the participating consumers. No rent is paid or needed for the meeting place. Normally, the group members only pay for the products that they buy. However, in case of any problems or challenges on the part of the producer (e.g. drought, flooding), practices of solidarity are operationalized in the form of direct donations or upfront payments for overcoming challenges on the farm. Meanwhile, as part of the other three FCN cases, nearly 10 people take part in the coordination of the groups on a voluntary basis, take rotations on different tasks, including communication with producers and consumers, weighing the products and arranging the finances during the purchase days. Orders are collected from consumers through communication via a Facebook Group or a WhatsApp Group.

Within the case of the Foça Earth Market, unlike the other two CSO-organized initiatives, everyone who take part in the coordination do so on a voluntary basis. The producers, on the other hand, are expected to comply with certain rules: firstly, they have to sign a contract each year, and to reveal, every 6 months, the products that they are going to sell in the market. Secondly, they need to be present every Sunday, when the market takes place; thirdly, they are expected to engage in "good agricultural" practices, that are in line with the "good, clean and fair" aspects of the Slow Food Movement. Last but not least, the locality aspect is taken seriously, such that producers that are outside the radius of 40 kilometers are not accepted to take part. These criteria are being controlled by the auditing committee, that consists of the Convivium partner, Provincial Agricultural Organization, Foça Municipality and the Municipal Police. The producers, on the other hand, only pay a symbolic fee of 20 TL (3,14 euros) yearly, to pay for the maintenance costs of their counter, and do not have to pay any other rent or similar fees. As for the EcoBazaar, the aspect that distinguishes this market from all other initiatives is the fact that it is an organic bazaar, where each of the products sold have to have an organic certificate, hence it is subject to very strict auditing processes. The audit is conducted in partnership with ETO, Izmir Metropolitan Municipality, Provincial Directorate of Agriculture and Provincial Police. Producers have to pay for their counters in the market.

As part of Doğa's Shop, the coordinators are either employees of the Doğa Foundation or have strong ties to it (through projects or collaborations). The initiative collaborates with the peasants of the Orhanlı Village, providing them with a higher price than that

of the market price for their olives, and operates by producing olive oil with traditional methods, from the olives collected from peasants. To be part of Doğa's Shop the peasants need to comply with 21 criteria covering 4 areas, that are developed by efforts and research conducted by School of Nature employees: Local products produced by small-scale producers; pursuing traditional production; producing in harmony with nature; not bringing energy or water from farther distances. These criteria are taken very seriously, and if a producer fails to comply with one or more of the criteria, they are excluded from the yearly olive oil production collective, and they are considered again for the following year. The audit is made during the packaging stage by authorities. The initiative, by creating and making visible a "village olive oil brand", helps establishing a selling channel for peasants, and make sure the olives of the village are getting the value that they are worth. To market the products, the initiative uses online selling channels (a website), while the products are also sold during the workshops, local food festivals and educational activities being organized by the Doğa Foundation. Earnings from sales are re-invested in trainings provided by the Foundation.

4.3 Collaboration Dynamics

School of Nature names the process of olive oil production within their initiative as: "collective oil", which signifies that it is a process undertaken "altogether", "as a family" and in "conviviality". The initiators and coordinators of the initiative also moved to live in this village, which have further strengthened their relations with peasants, rurality and the production process. Hence, the coordinators not only stay in contact with the producers to lead the process, but also share a life together. Foça Earth Market, being a part of the Slow Food Movement", adopts principles of the movement. Slow Food uses the term "co-producer" as part of its vocabulary and coins the term as "a consumer who goes beyond their passive role and takes an interest in producers, production processes and associated challenges". Hence, the idea of a community and co-production exits in the movement's culture, yet, to diffuse it among all members of the initiative will need further efforts. For both Foça Market and EcoBazaar, the interviewed consumers did not mention "the idea of a community" or used any terminology or language linking to "co-production". In this direction, events such as trainings, workshops, or food festivals are held when consumers can come together and accustom with each other as well as with producers. One of the "collaborative actions" taken in the context of Foça Earth Market has been establishing the "Foça Earth Kitchen", with funds and donations received from Foça Municipality and citizens, with an aim to bring the actors of the initiative together.

At Aegean University Group, the members, that are employees of the University, share a big part of their days together; hence, communicating and decision-making within the group are easier. Although this is helpful in terms of organizing purchases, it creates difficulties in terms of establishing a shared understanding of a community, "as the reason to be part of these networks for most members of the group is only to have access to healthy food". In all of the FCNs, the initiation phase was aimed to be made participatory through public meetings held and decisions on the general framework and inclusion criteria were decided following ideas and feedback from participants. Meanwhile, some solidarity actions were taken within groups. Some examples are the potato and corn projects,

where producers have been supported financially to install trickle irrigation system and then provided with guarantee of purchase for all their products to be bought (BITOT); the egg project, where farmers were supported to build a poultry house and obtain chickens and paid for the 6-month worth of eggs as an advance payment (GETO). Homeros, on the other hand, has established an urban orchard in order to conduct collective production practices. The Aegean University Group, in order to compensate for the loss of their producer after a serious hail incident, has established a funding system, through which consumers could provide financial support. Moreover, a "solidarity pricing" practice was implemented, which allowed those consumers with a lower purchasing power to pay 25% less for buying eggs, as the remaining amount was compensated by the other consumers.

As part of FMs, the understanding of knowledge sharing and learning from each other are not very common among producers. Producers of these initiatives, being mostly rural-rooted and having learned agricultural practices from their families, noted that they do not feel the necessity to exchange knowledge or information with other farmers. However, although producers did not feel this need, they have underlined the importance of social networks established in these groups. In the FCNs however, our findings suggested that there is a stronger culture of knowledge and experience sharing, which is consistent with the community aspect of these groups. Especially, urban-rooted producers in these groups, which consist of almost half of the total number of producers, have argued to have the need to learn from others, hence engaging in knowledge and experience sharing as much as they could.

4.4 Individual challenges, governance tensions and adaptation

In this section, we illustrate challenges experienced in the investigated cases in four sub-sections. In the first sub-section, we present individual and farm-level challenges put forth by producers, and in the remaining of the section (sub-sections ii-iv), we present governance tensions arising in the groups under three categories: organizational, resource and institutional tensions.

i. Challenges at the individual and farm level

For the case of FMs, setting up and dismantling the counters might require time and effort, as well as to be present in the market and to work on the farms. Especially, for the case of Foça Earth Market, the obligation to be present in the market place every Sunday "even during harsh weather conditions or when there are almost no consumers" is one of the biggest difficulties. As Foça is a province that is a vacation destination and attracting many visitors during summer, the demand is sufficient in summer, yet in winter it is more challenging. Conversely, EcoBazaar, being located in a residential area in central Izmir, experiences a significant fall in consumer demand during summer. Hence, producers that are tied to both FMs are experiencing difficulties related to the amount of time that has to be spent in the market each week, in addition to the seasonal fluctuations of consumer demand that is experienced. For Foça Earth Market, as the profile of producers mostly consists of very small-scale producers, another difficulty is also being able to bring an adequate amount of products to sell to their market counters each week.

Another significant problem raised by producers was that these networks were not sufficient to guarantee their livelihood. Especially most producers of FCNs noted that sell-

ing only in these groups is not sufficient to make a living, as they can only meet their costs. For these producers, being here had more significant effects in terms of networks and social ties established, rather than financial gains. In this regard, a few producers noted: "Small-producers could earn sufficiently, if they could back-up their SFSC activity with other activities such as eco-tourism or gastronomy linked to their agricultural production".

ii. Organizational tensions

For the case of FCNs, which have a governance mechanism that relies on voluntary and informal organizational structures, one of the biggest organizational tensions experienced was regarding the lack of volunteerism and lack of members willing to take responsibility, which leads to the burden and responsibility of all tasks to be loaded on a few people, creating fatigue in the long-term. This challenge is exacerbated especially during the purchase days, which may lead to the meetings to be "chaotic" at times. This lack of workforce also results in some of the events or meetings that are wished to be organized by the groups, to not be realized. In addition, lack of time and active participation also lead to some problems experienced in control and audit mechanisms, which are also undertaken on a voluntary basis. Some of the recommendations to deal with this issue include: raising the efforts to increase the number of volunteers and active participants, switching the tasks and responsibilities of volunteers every 6 months and in a more planned way, and to facilitate the ordering and distribution processes through online applications or through online portals, rather than using excel sheets and similar methods. Other recommendations on the other hand were towards switching the coordination task from voluntary to a professional one, in order to give the worth of efforts, eliminate this fatigue and, in turn, to have a more stable coordination mechanism. Meanwhile, some interviewees noted that the groups are growing more quickly than they can establish a strong organizational structure; hence, slowing down and taking firmer steps were also proposed. Another organizational tension arises from lack of or difficulties related to communication within groups, and especially communication with producers. In many instances, lack of communication with producers leads to disruptions in delivery processes, in addition to not being able to follow-up on the challenges the producers are faced with. Another point, on the other hand, is related to the decision-making processes within the groups. Interviewees noted that while inclusive and democratic decision-making process is favored, this usually leads to a trade-off between members to have their voice in decisions, and actually arriving at a decision. Members argued that most of the time due to lack of communication, the decision-making processes are ineffective. It has been noted that it is a big necessity to learn how to communicate within groups and arrive at decisions as a community. Lastly, lack of a shared understanding and a common purpose was also regarded as a significant challenge. It was argued that "when the members focus only social networks without embracing social awareness, it is hard for groups to be long lasting". In this regard, some consumers of the groups are criticized for "seeing these groups as organic shops or supermarkets", who are "only focused on accessing healthy products, and complain about the products they receive or the time they have to invest".

For the case of EcoBazaar, which is a market where only producers that have an organic certificate can be part of, the biggest organizational challenge is related to the formal processes of certification and regular controls. While, these processes are monitored

by a cooperation of multiple organizations, the coordination among stakeholders is a delicate task, as these processes can be costly and time-consuming, for both producers and the auditing organizations.

On the part of both of the FMs the issue of creating a sense of community and involving consumers to the processes are the biggest challenges. It was noted that "consumers are often only here for healthy food, and to be a community is not one of their motivations". Hence, coordinators try to promote the idea of community through additional activities, such as seminars or workshops (e.g. a kitchen project where consumers and producers come together to cook, and share experiences and recipes).

iii. Resource tensions

The operation, development and upscaling of local food projects require resources: funds, quality agricultural land and physical infrastructure, as well as knowledge and human capital (Manganelli and Moulaert, 2018). One of the challenges that has been mentioned by all groups was the difficulties of finding a place and space for the initiatives. In the case of the three cases initiated and organized by CSOs (2 FMs and the local shop), the place of operation is provided by local authorities, which ensures a stable space to conduct activities. In the case of FCNs, however, finding a space to perform their activities is more challenging. In the case of Aegean University Group, which is a work-place organization, the premises of the University provide the members with a comfortable space. With the rest of the other FCN cases, however, while the spaces where the purchase days take place are provided free of charge by some municipalities and organizations, these spaces often cannot be kept for a long time, which results in a continuous search for new places to operate and conduct activities. Apart from purchase days, the FCNs do not have a stable space or area to undertake other activities, such as meetings or seminars, as well as to store food products or to use as a base for logistical arrangements.

Another challenge that has been noted by all of the producers and coordinators of the group has been lack of consumer demand, especially in certain periods of the year. Consumer demand is regarded as a resource challenge mainly because this aspect influences all groups in the way of not having access to sufficient financial resources and creating difficulties for producers regarding their livelihoods. This difficulty was pointed out mostly by the two FMs. In the case of EcoBazaar the coordinator argued that the main challenge of the initiative is to reach a sufficient number of consumers. "The number of consumers are decreasing; especially during summer when citizens escape from city center to go to vacation destinations, the demand decreases significantly, putting the market in hardship". It is believed that the lack of consumer demand is due to two main reasons: Firstly, lack of information about EcoBazaar ("not even some people living across the street know about the market"); and secondly "low level of awareness about organic production, and skepticism towards organic products". In the case of FCNs, however, all coordinators and most members believe that there is sufficient amount of consumer demand around the city of Izmir, yet the problem is linked more to these groups not having a strong base and structure, to be able to accept more consumers. In addition, for FCNs, another challenge is finding producers to include in their groups. "Almost all small-scale producers have given up, especially those that produce ecologically".

iv. Institutional Tensions

Our findings show that FMs and the local shop, as being civil society organized initiatives, have a more formal structure and already established formalized relationship and links to other organizations, including CSOs, local authorities and municipalities. As a consequence, they collaborate often with these organizations in the context of some activities or projects, which also provides them with visibility. FCNs, on the other hand, do not have ties to other FCNs, as well as to formal organizations, such as local municipalities. In this regard, FCN coordinators, while acknowledging that these ties are either insufficient or missing completely, also noted that the steps need to be taken carefully and meticulously towards building strong relationships with other organizations.

Meanwhile, all producers and coordinators, regardless of the type of initiative they belong, have touched upon lack of government policies, support mechanisms and underlying laws in place, which results in financial uncertainty and lack of trust. Underlining that agriculture has long been a neglected sector in Turkey, producers noted that they were feeling "left alone". They further noted that they were in need of support from the government both in the form of direct (i.e. subsidies) and indirect support (i.e. training) to be provided to organic producers; and awareness raising programs for consumers. Producers further noted that they tried convincing other peasants to switch to organic or ecological production, but they were regarded as "crazy" for pursuing organic production. "If this proposition comes from the official authorities, then other producers would consider listening".

4.5 Local, community and individual outcomes

Regarding actual outcomes, our findings suggest that experience of farmers differed in terms of well-being and livelihoods, mainly in relation to whether the farmers were from urban or rural backgrounds. In the case of the two FMs and Doğa's Shop, where all farmers were rural-rooted, with an exception of a few, and very small-scale, the farmers' livelihoods have been reported to have changed notably as a result of being part of these SFSCs, as a result of receiving a more "just" price for their products and to have a new selling channel. As well, they gain more visibility and respectability. Producers noted to have gained autonomy and are able to bring an income to the household. In the case of FCNs, a big proportion of producers' only occupation was not in agriculture and they earn money also from other channels, and around half of the farmers are urban-rooted and started pursuing ecological production, as a "way of living" and to "find a way out of the dominant system". Hence, a big proportion of farmers engaged in these networks do not mention "a big change" in their lives financially; however, "being here had significant effects in terms of networks, social ties, being part of a community and obtaining new selling channels". Finally, regarding local outcomes, in the case of Doğa's Shop, as the initiative is located in a village, it is also possible to distinguish village-scale local impacts. It has been noted by the villagers that, before the initiative, the two out of three traditional olive oil factories in the village have been already shut down. It is argued by coordinators and the villagers that the final remaining factory could keep functioning and has been revitalized thanks to the olive oil village brand established and marketed in collaboration with Doğa's Shop and the Association of Orhanlı Village. Foça Earth Market, on the

other hand, has contributed to the reinvention of local cuisine to preserve local tastes in a 40-kilometre radius of rural, semi urban and urban geography through "the Kitchen" established in the commercial center of Foça.

5. Discussion

Our findings reveal that there are differences of governance structures, institutional frameworks, as well as differing levels of shared goals and understanding among different initiatives studied as part of this research, which also lead to numerous governance challenges. In addition, the outcomes and farm-level challenges for farmers also differ, including but not limited to factors such as whether or not farmers are urban or rural-rooted and if their livelihood depends only on these initiatives or not.

To begin with, one significant difference was among the formality of organizational structures and leadership mechanisms, in addition to the level of formality of criteria for inclusion of producers, and the extent to which they are enforced. The initiatives that have been organized and governed by CSOs have adopted stricter criteria and auditing mechanisms, which are implemented with the collaboration of multiple organizations, including other CSOs and local municipalities, which was also in line with other studies in the literature (Skog et al., 2018; Yacamán Ochoa et al., 2019; van der Jagt et al., 2017; Jones, 2018). In the case of FCNs, however, the governance structures were less defined and were implemented by volunteers (Yacamán Ochoa et al., 2019; Manganelli and Moulaert, 2018; Bellante, 2017). Furthermore, aspects of a shared sense of identity and community, were also being perceived differently among actors, which motivated initiatives to organize additional events such as workshops, seminars, or culinary events to bring the participants together. This was also in line with experiences discussed in other studies, where similar efforts were put in place to establish trust and embeddedness, such as farmers sharing their personal information with consumers in organized workshops (Bui et al., 2019; Skog et al., 2018; Petrakou et al., 2011; Papaoikonomou and Ginieis, 2017).

Our study also revealed different governance tensions (Manganelli et al., 2019) arising as a result of different governance mechanisms at play. The tensions experienced by FCNs have been more on the organizational side, including tensions to manage tasks on a voluntary basis and challenges related to keeping up with the scaling up of initiatives. One of the most significant organizational challenges associated with the informal structure of FCNs, has been regarding the insufficient number of volunteers taking responsibility and this in turn, resulting in difficulties to complete tasks in time and creation of fatigue within the volunteers. This finding is also in line with other studies that report governance challenges that are experienced by food communities, which are governed by informal mechanisms, mostly reliant on voluntarism (Yacamán Ochoa et al., 2019; Manganelli et al., 2019b; Mount et al., 2014). These studies also find that challenges are experienced as SFSCs develop and increase the quantity and quality of the food they deliver, when the initiatives lack capacity in terms of efficient logistical delivery (Yacamán Ochoa et al., 2019), or the capacity and time to include more farmers or other actors into the network (Skog et al., 2018); hence propelling them to search for more efficient logistics as well as decision-making structures. In this direction, the operation and upscaling of local food projects require further resources, including funds, a bigger space to conduct activi-

ties in addition to knowledge, skills and human capital. Emerson (2018) in this regard, draws attention to the importance of leadership in collaborative governance arrangements, noting that multiple skills are needed for the sustainment of such organizations, and if leadership is lacking at various scales, there may be need for sustained investment in leadership training, mentoring and awareness building before moving forward. As a response to such challenges, while our findings reveal some suggestions of group members towards switching to a more formal structure (e.g. cooperative), or to professionalize the system by lifting the voluntary aspect of coordination (e.g. providing a salary to those that take responsibility), others argued that this leads to bureaucratization of these initiatives, compromising the autonomy of their structures. Other studies also mentioned the trade-offs that SFSCs had to experience, between governance tensions caused by the informal structures and the risk of losing the "alternative" quality of these networks, as well as dissociating them from its local rootedness and community connectedness (Yacamán Ochoa et al., 2019; Nchanji, 2017; Renting et al., 2012; Manganelli et al., 2019b). Nchanji (2017) further argues that in the case of LFS, neither formal or informal systems are always successful in resolving governance issues, hence underlining the importance of including multiple stakeholders in the processes.

On the side of the initiatives that were governed by CSOs, which had a more formal structure, the organizational tensions were less mentioned, while, the main challenge that was mentioned by all members and coordinators were regarding the lack of consumer demand and interest, or the seasonal aspect of this demand, that is causing mainly resource challenges within the initiatives (Manganelli and Moulaert, 2018). Initiatives in this regard, noted the necessity of public administrations and local municipalities to step in to increase awareness among citizens regarding ecological and ethical food, and the need of a policy framework to support these initiatives to survive and to develop. Other studies in the literature also highlighted lack of consumer demand being experienced by local food networks, and the importance of participatory governance mechanisms, in which multiple actors from different levels and sectors need to work together to achieve these common goals (Yacamán Ochoa et al., 2019; Nchanji, 2017; Reis, 2019; Manganelli and Moulaert, 2018; Dedeurwaerdere et al., 2017; Jones, 2018). Some policy recommendations mentioned in these studies included governments to pursue awareness campaigns, or local municipalities to promote initiatives aimed at public procurement of local products for canteens, or facilitating direct sale by means of public aid through fairs, events and dissemination, and finally, adapting the legislation and regulations to facilitate the process (Yacamán Ochoa et al., 2019).

In terms of individual impacts and challenges on the part of the farmers, our findings showed that the farmers in all groups mentioned having received support one way or another, yet the type of support mentioned was differed among farmers. Rural-rooted and very small-scale farmers, which were mostly attached to more formal networks, mentioned a bigger change in their livelihoods. This was also supported by the fact that these networks were their sole source of income. Skog et al. (2018) also find that small-scale farmers that are part of local food networks experienced better income, also mentioning additional impacts of an increased respect in the community. On the other hand, among FCNs, the majority of these producers have other occupations and do not rely solely on the income from these networks. It was mostly mentioned that SFSCs do not provide

them with profits (and only meet their transportation costs), but rather, social networks, learning and experience sharing opportunities, to establish new channels of marketing through word of mouth and a motivation to carry on in the agricultural sector. Other studies of SFSCs also mentioned low levels of financial gains attained by farmers, while the associated gains were more on the side of sharing experiences, social learning as a result of established networks, or having found a "safe space" to share new ideas and create partnerships (Skog et al., 2018; Yacamán Ochoa et al., 2019; Bellante, 2017).

The study has some limitations. One of the limitations was the relatively small sample size, mainly due to the limited number of producers that are part of these initiatives. Besides, the willingness of consumers to take part in the research has varied significantly, depending on which initiatives they were part of. Those consumers that purchased products from FCNs were more willing to invest time in the interview process, while the ones who are contacted through FMs were less inclined to do so. Another limitation was to conduct a multiple case study with cases that are each particular and peculiar, having different profiles and ways of functioning. Hence, comparing them with respect to some aspects had the risk of providing biased results. For example, FCNs, in line with being "communities", naturally had a higher level of shared understanding and collaboration among participants, in comparison to FMs. Another challenge was to link the motives, governance mechanisms and outcomes of these initiatives to the system context and conditions. Due to limitations of time, we could not explore and discuss the political, legal, socioeconomical, environmental or other influences that may affect the governance dynamics and performance of collaboration within and across our studied cases, which Emerson and Nabatchi (2015) depict as the system context. Local food networks or SFSCs do not exist in isolation and are largely shaped by their surrounding context. Hence, we believe that making this connection could provide important implications for policy making. In addition, while we could only focus on SFSC cases that are currently operational, we also know that there are other cases that have failed in the past. To be able to also reach these initiatives would have provided us with very important information towards understanding not only why these initiatives work but also why they fail.

6. Conclusions

This study aimed to explore the governance mechanisms of SFSCs in the city of Izmir (Turkey), by making use of an adapted version of the collaborative governance framework introduced by the seminal work of numerous scholars, and to identify the governance mechanisms, collaboration dynamics and main challenges associated with this process. One of the most relevant findings was the need of a support mechanism or "decent policy framework" expressed by participants of all initiatives that we explored. In other words, actors that have chosen to "remain outside of the mainstream industrial food system" still felt very strongly, "the need of some kind of support from policy makers or local actors", although the type of support needed differed depending on their specific experience. This aspect is of significant relevance to especially local public authorities, as interest in local food extends beyond consumers and producers, and by decentralizing food production and distribution, local food system has a potential to generate wider public benefits. These benefits include economic and social gains for farmers, and social inclusion on a local

scale, through which citizens and communities in remote or less privileged areas can also be reached. Especially, in cases where local food initiatives can collaborate with other local actors such as local municipalities, public schools, or local organizations or community projects, the variety of citizens and geographies reached can be widened. In addition, local food initiatives can also be spaces where collaboration, exchange of knowledge and experience and social learning can take place. While knowledge creation, social learning and exchange of experiences have strong implications for aspects such as agricultural innovation and adaptation to the impacts of climate change on the side of the small-scale local farmers, they also can create a process through which knowledge regarding traditional food, recipes and cultural heritage can be protected. In this direction, policy interventions may include outreach and public awareness building activities in order to enable knowledge sharing about the mid and long-term social, economic, environmental and cultural impacts of local food production systems, and information about specific initiatives on the ground. Besides, local public authorities can establish links to such initiatives and to implement shared social or culinary projects, or establish partnership to enable local, ethical and healthy food to reach schools or canteens. Moreover, local festivals, cultural events or workshops can be conducted, underlining the importance of local food systems in local and rural development, as well as preservation of local tastes and heritage. Last but not least, reviewing of the regulatory framework to make it easier for small-scale farmers to survive and earn a living on their farms would be of great importance. While in Turkey, the agriculture sector is a neglected one, and small farmers are not supported or protected sufficiently, the specific efforts on the local level will have significant contributions. In this respect, further research can focus on current efforts and implementations by local municipalities in Turkey, regarding mutual projects and collaboration with local food initiatives, in order to reveal the outcomes from the perspective of local communities. While this could provide important insights for policy making, these experiences can also guide other municipalities in their future efforts. Best practices from around the world could also provide a reference and guidance for future projects.

References

Andrée, P., Clark, J.K., Levkoe, C.Z. and Lowitt, K. (Eds.) (2019). Civil Society and Social Movements in Food System Governance, 1st ed. Routledge. https://doi.org/10.4324/9780429503597

Andrews, R. and Entwistle, T. (2010). Does Cross-Sectoral Partnership Deliver? An Empirical Exploration of Public Service Effectiveness, Efficiency, and Equity. J. Public Adm. Res. Theory 20: 679–701. https://doi.org/10.1093/jopart/mup045

Ansell, C. and Gash, A. (2007). Collaborative Governance in Theory and Practice. J. Public Adm. Res. Theory 18: 543–571. https://doi.org/10.1093/jopart/mum032

Barbazza, E. and Tello, J. (2014). A Review of Health governance: definition, dimentions and tools to govern. Health Policy Amst. Neth. 116. https://doi.org/10.1016/j.healthpol.2014.01.007

Bellante, L. (2017). Building the local food movement in Chiapas, Mexico: rationales, benefits, and limitations. Agric. Hum. Values 34: 119–134. https://doi.org/10.1007/s10460-016-9700-9

Brink, E. and Wamsler, C. (2018). Collaborative Governance for Climate Change Adaptation: Mapping citizen-municipality interactions: Collaborative governance for climate change adaptation. Environ. Policy Gov. 28: 82–97. https://doi.org/10.1002/eet.1795

Bui, S., Costa, I., De Schutter, O., Dedeurwaerdere, T., Hudon, M. and Feyereisen, M. (2019). Systemic ethics and inclusive governance: two key prerequisites for sustainability transitions of agri-food systems. Agric. Hum. Values 36: 277–288. https://doi.org/10.1007/s10460-019-09917-2

Dedeurwaerdere, T., De Schutter, O., Hudon, M., Mathijs, E., Annaert, B., Avermaete, T., Bleeckx, T., de Callataÿ, C., De Snijder, P., Fernández-Wulff, P., Joachain, H. and Vivero, J.-L. (2017). The Governance Features of Social Enterprise and Social Network Activities of Collective Food Buying Groups. Ecol. Econ. 140: 123–135. https://doi.org/10.1016/j.ecolecon.2017.04.018

Dominguez Garcia, M.D., Swagemakers, P. and Schmid, O. (2017). The Commons Revisited: Revalorizing the Role of in the Redesign of Urban Agro-Food and Agroforestry Systems. ua 2, 0. https://doi.org/10.2134/urbanag2016.05.0001

Emerson, K. (2018). Collaborative governance of public health in low- and middle-income countries: lessons from research in public administration. BMJ Glob. Health 3: e000381. https://doi.org/10.1136/bmjgh-2017-000381

Emerson, K. and Nabatchi, T. (2015). Evaluating the Productivity of Collaborative Governance Regimes: A Performance Matrix. Public Perform. Manag. Rev. 38: 717–747. https://doi.org/10.1080/15309576.2015.1031016

Emerson, K., Nabatchi, T. and Balogh, S. (2012). An Integrative Framework for Collaborative Governance. J. Public Adm. Res. Theory 22: 1–29. https://doi.org/10.1093/jopart/mur011

Florini, A. and Pauli, M. (2018). Collaborative governance for the Sustainable Development Goals. Asia Pac. Policy Stud. 5: 583–598. https://doi.org/10.1002/app5.252

Galli, F., Brunori, G., Di Iacovo, F. and Innocenti, S. (2014). Co-Producing Sustainability: Involving Parents and Civil Society in the Governance of School Meal Services. A Case Study from Pisa, Italy. Sustainability 6: 1643–1666. https://doi.org/10.3390/su6041643

Hollweck, T. (2016). Robert K. Yin. (2014). Case Study Research Design and Methods (5th ed.). Thousand Oaks, CA: Sage. 282 pages. Can. J. Program Eval. https://doi.org/10.3138/cjpe.30.1.108

Jones, J.C. (2018). Urban food entrepreneurship, governance, and economic development in the post-industrial cities of Newark, New Jersey and Dayton, Ohio. Dissertations. 1379.

Karakaya, E. (2016). Agro Food System transitions? Exploring Alternative Agro Food Initiatives in İzmir, Turkey. Unpublished doctoral dissertation, İzmir Institute of Technology, İzmir, Turkey.

Kirwan, J., Ilbery, B., Maye, D. and Carey, J. (2013). Grassroots social innovations and food localisation: An investigation of the Local Food programme in England. Glob. Environ. Change 23: 830–837. https://doi.org/10.1016/j.gloenvcha.2012.12.004

Knickel, K., Brunori, G., Rand, S. and Proost, J. (2009). Towards a Better Conceptual Framework for Innovation Processes in Agriculture and Rural Development: From Linear Models to Systemic Approaches. J. Agric. Educ. Ext. 15: 131–146. https://doi.org/10.1080/13892240902909064

Koski, C., Siddiki, S., Sadiq, A.-A. and Carboni, J. (2018). Representation in Collaborative Governance: A Case Study of a Food Policy Council. Am. Rev. Public Adm. 48: 359–373. https://doi.org/10.1177/0275074016678683

Krasner, S.D. (1983). International Regimes, Cornell paperbacks. Cornell University Press.

Lamine, C., Renting, H., Rossi, A., Wiskerke, J.S.C. and Brunori, G. (2012). Agri-Food systems and territorial development: innovations, new dynamics and changing governance mechanisms, in: Darnhofer, I., Gibbon, D., Dedieu, B. (Eds.), Farming Systems Research into the 21st Century: The New Dynamic. Springer Netherlands, Dordrecht, pp. 229–256. https://doi.org/10.1007/978-94-007-4503-2_11

Manganelli, A. and Moulaert, F. (2018). Hybrid governance tensions fuelling self-reflexivity in Alternative Food Networks: the case of the Brussels GASAP (solidarity purchasing groups for peasant agriculture). Local Environ. 23: 830–845. https://doi.org/10.1080/13549839.2018.1477745

Manganelli, A., van den Broeck, P. and Moulaert, F. (2019). Socio-political dynamics of alternative food networks: a hybrid governance approach. Territ. Polit. Gov. 1–20. https://doi.org/10.1080/21622671.2019.1581081

Matacena, R. (2016). Linking alternative food networks and urban food policy: a step forward in the transition towards a sustainable and equitable food system? Int. Rev. Soc. Res. 6: 49–58. https://doi.org/10.1515/irsr-2016-0007

Meads, G. (2017). From Pastoral Care to Public Health: An Ethnographic Case Study of Collaborative Governance in a Local Food Bank. Open Public Health J. 10: 106–116. https://doi.org/10.2174/1874944501710010106

Mount, P., Hazen, S., Holmes, S., Fraser, E., Winson, A., Knezevic, I., Nelson, E., Ohberg, L., Andree, P. and Landman, K. (2014). Barriers to the Local Food Movement: Ontario's Community Food Projects and the Capacity for Convergence, in: Research in Rural Sociology and Development. pp. 209–228. https://doi.org/10.1108/S1057-192220140000021004

Nchanji, E. (2017). Sustainable Urban Agriculture in Ghana: What Governance System Works? Sustainability 9: 2090. https://doi.org/10.3390/su9112090

Ozatagan, G. and Karakaya Ayalp, E. (2018). Towards a Radically New Agro-Food Regime? Exploring Izmir's Agro-Food Transitions in the Making. Paper presented in the International Symposium on Local Governments, Democracy and Izmir. 15-17 November 2018, Izmir.

Papaoikonomou, E. and Ginieis, M. (2017). Putting the farmer's face on food: governance and the producer–consumer relationship in local food systems. Agric. Hum. Values 34: 53–67. https://doi.org/10.1007/s10460-016-9695-2

Pascucci, S. (2010). Governance structure, perception and innovation in credence food transactions: the role of community networks. Int. J. Food Syst. Dyn. 1 2010 3 1. https://doi.org/10.18461/ijfsd.v1i3.136

Pascucci, S., Dentoni, D., Lombardi, A. and Cembalo, L. (2016). Sharing values or sharing costs? Understanding consumer participation in alternative food networks. NJAS - Wagening. J. Life Sci. 78: 47–60. https://doi.org/10.1016/j.njas.2016.03.006

Petrakou, A., Elm, P., Gustavsson, R. and Jokela, P. (2011). Collaborative e-Marketplaces Containing Clusters of SMEs: Drivers and Barriers in the Local Food Sector, Pro-

ceedings of the Annual Hawaii International Conference on System Sciences. https://doi.org/10.1109/HICSS.2011.111

Reis, K. (2019). Five things government can do to encourage local food contingency plans. J. Environ. Plan. Manag. 62: 2295–2312. https://doi.org/10.1080/09640568.2018.1540772

Renting, H., Marsden, T.K. and Banks, J. (2003). Understanding Alternative Food Networks: Exploring the Role of Short Food Supply Chains in Rural Development. Environ. Plan. A 35: 393–411. https://doi.org/10.1068/a3510

Renting, H., Schermer, M. and Rossi, A. (2012). Building Food Democracy: Exploring Civic Food Networks and Newly Emerging Forms of Food Citizenship. Int. J. Sociol. Agric. Food 19: 289–307.

Renting, H. and Wiskerke, H. (2010). New Emerging Roles for Public Institutions and Civil Society in the Promotion of Sustainable Local Agro-Food Systems. Paper presented at the 9th European International Farming Systems Assocation (IFSA) Symposium, 4-7 July 2010, Vienna.

Seyfang, G. and Smith, A. (2007). Grassroots innovations for sustainable development: Towards a new research and policy agenda. Environ. Polit. 16: 584–603. https://doi.org/10.1080/09644010701419121

Siddiki, S.N., Carboni, J.L., Koski, C. and Sadiq, A.-A. (2015). How Policy Rules Shape the Structure and Performance of Collaborative Governance Arrangements. Public Adm. Rev. 75: 536–547. https://doi.org/10.1111/puar.12352

Skog, K., Eriksen, S., Brekken, C. and Francis, C. (2018). Building Resilience in Social-Ecological Food Systems in Vermont. Sustainability 10: 4813. https://doi.org/10.3390/su10124813

van der Jagt, A.P.N., Szaraz, L.R., Delshammar, T., Cvejić, R., Santos, A. and Goodness, J., Buijs, A. (2017). Cultivating nature-based solutions: The governance of communal urban gardens in the European Union. Environ. Res. 159: 264–275. https://doi.org/10.1016/j.envres.2017.08.013

Vatansever Devïren, N. (2017). Dünya'da ve Türkiye'de Organik Tarımın Ekonomik Açıdan Değerlendirilmesi. J. Int. Soc. Res. 10: 669–678. https://doi.org/10.17719/jisr.2017.1539

Yacamán Ochoa, C., Matarán, A., Mata Olmo, R., López, J. and Fuentes-Guerra, R. (2019). The Potential Role of Short Food Supply Chains in Strengthening Periurban Agriculture in Spain: The Cases of Madrid and Barcelona. Sustainability 11: 2080. https://doi.org/10.3390/su11072080

Stampato da Logo s.r.l. Borgoricco (PD)

Bio-based and Applied Economics Focus and Scope

The journal *Bio-based and Applied Economics* (*BAE*) provides a forum for presentation and discussion of applied research in the field of bio-based sectors and related policies, informing evidence-based decision-making and policy-making. It intends to provide a scholarly source of theoretical and applied studies while remaining widely accessible for non-researchers.

BAE seeks applied contributions on the economics of bio-based industries, such as agriculture, forestry, fishery and food, dealing with any related disciplines, such as resource and environmental economics, consumer studies, regional economics, innovation and development economics. Beside well-established fields of research related to these sectors, *BAE* aims in particular to explore cross-sectoral, recent and emerging themes characterizing the integrated management of biological resources, bio-based industries and sustainable development of rural areas. A special attention is also paid to the linkages between local and international dimensions. *BAE*'s objectives are:

- to stimulate cross-fertilization between the above mentioned research fields;
- to synthesize and integrate lessons learned from current strands of literature in economics;
- to provide a forum for well-established scholars as well as promising young researchers;
- to increase the knowledge about assessment, design and evaluation of public policies;
- to promote the debate on issues relating to the economics profession and its consultancy activities;
- to discuss future research pathways on the above issues.

***BAE* publishes high quality research and review papers, after a timely and rigorous double blind peer review process. *BAE* also publishes book reviews.**

€ 16,00