Defining the territory size of a Geographical Indication: A systematic mapping study

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Abstract

*The objective of this study is to map articles that present models for determining the territory size of Geographical Indications (GIs), a relevant factor for the management of GIs that is poorly explored in studies on the subject. The study was undertaken as a systematic mapping study (*SMS*), whose main objective is to identify accessible facts about a given research topic, which is also the most suitable approach when aiming to analyze the state of the art of a subject with little evidence available in the literature. Using the Scopus and Web of Science databases, in which 671 results were found, and the StArt tool to select the articles, 652 articles were excluded (30 duplicates and 622 that did not meet the inclusion criteria established in the systematic mapping protocol). Then, after a complete reading of the texts of the 19 remaining articles, 14 were excluded. Thus, this study included only five articles in which GI size models were developed, the oldest of which was published in 2007 and the most recent in 2021. We therefore conclude that few studies are available in the literature on this theme.*

Keywords: geographical indication area; efficiency; quality; model; optimization.

1. Introduction

The growing trend of competition in the globalized market requires countries to develop different strategies to promote their products. For instance, European Union countries have adopted Geographical Indication (GI) as a strategy to promote their wines and increase their participation in this market (KARLÍK et al., 2018). This strategy is also used by other countries and for different products. The GI labels granted to a product are important tools to ensure the connection between the geographic location and the characteristic combination of natural and human factors existing in the production process (OLMO-GARCIA et al., 2019).

Among other benefits, the protection acquired for a product through GI promotes regional development with economic impacts, especially for producers established in the region to which the sign refers. Thus, delimiting the size of this region is of great importance for the management of a GI. However, this is not an easy task, as some aspects that directly influence this process must be observed, e.g., human factors, such as know-how, tradition and typicality; and natural factors, such as climate, soil, vegetation, relief and hydrography (VALENTE et al., 2013).

These and other factors can affect the size of the territory covered by a GI, which can have consequences for its management if the delimitation of its geographical area results in a territory that is too large or small. If it is too large, quality control of the product will be more difficult. If, on the other hand, the area is too small, then the maintenance of the GI is compromised due to low cost-sharing among producers (DECONNINK; SWINNEN, 2021).

This dilemma is even more difficult to resolve due to peculiarities of GI management, as GIs are organized as a collective decision-making body in which various instruments are implemented to reduce free-riding problems and improve product quality (FERNÁNDEZ-BARCALA; GONZALES-DIAS; RAYNAUD, 2017).

The decision-making process is essential for the successful management of any and all organizations. As such, it must be done carefully and thoughtfully, making use of available resources that help decision makers view the problem from a different angle, gain a broad knowledge of the situation and thus reduce failures at the moment of choice. One of these resources is the use of quantitative models or methods, which describe phenomena in an organized, scientifically based way and usually allow detecting human failures in the decision-making process or even guide managers towards the best decision (FONTANIVE et al., 2017).

The use of models in administration consolidates quantitative questions that facilitate the measurement of efficiency and effectiveness, which are widely debated concepts in administration. Nonetheless, studies of these models are still few and are not as advanced as the investigation of such concepts, which leads to a difficulty in finding the appropriate model for this task (PINTO; CORONEL, 2017).

As regards the management of GI, there are several studies on its economy. However, its ideal size, which helps management to minimize failures in their decisions, has received limited attention. Few models exist on this subject, and the existing ones do not take into consideration the effects of an increase or reduction in the size of a GI on the quality of the product or on the cost-sharing among producers that adhere to this protection certification (DECONNINK; SWINNEN, 2021).

The size of a GI area is an important driver of its effectiveness, which can exert a significant influence not only on product quality but also on the behavior of producers. Nevertheless, it has been overlooked in GI research, which usually focuses on the evaluation of potential restrictive effects of international trade and is not concerned with the factors that contribute to the quality of the actions of a producer who adopts this protection seal (LÓPES-BAYÓN; FERNANDÉZ-BARCALA; GONZÁLEZ-DÍAS, 2020).

Given the above, and seeking to contribute to the direction and organization of research on the size of Geographical Indications and their management, we undertook this study to map the articles available in the literature in which models were developed to determine the size of geographical indications by identifying their number, when they were conducted, and briefly describing the approach of each of them.

2. Methodology

In this study, we chose to conduct a Systematic Mapping Study (SMS) in view of the above-described limited attention to the size of GIs. According to Kitchenham and Charters (2007), systematic mapping should be considered over a systematic review when a study involves topics on which little evidence is

available in the literature.

Next, we conceptualize SMS and the describe the methodological procedures of this study.

2.1 Systematic Mapping Study

2.1.1 Conceptualization

A Systematic Literature Review (SLR) is a review of the scientific literature that has a clearly formulated question; is undertaken through planning; and uses systematic methods to identify, select and evaluate relevant studies on the topic (SOUZA; RIBEIRO, 2009).

According to Kitchenham and Charters (2007), systematic mapping study employs the same methodology as a systematic literature review, but focuses on identifying the facts available on a given topic. The results of systematic mapping become important parts of a systematic review. The research question in systematic mapping is exploratory and requires less depth than that of a systematic review (RANDOLPH, 2009).

2.1.2 Stages of the SMS

As mentioned above, SMS and SLR employ the same methodology and, therefore, the same steps.

As stated by Galvão and Ricarte (2019), the steps that make up the development of a SLR are the definition of the research question, selection of databases, development of the search strategy, selection of documents and systematization of results. Also according to these authors:

a) At the stage of defining the research question, the research objectives and questions are delineated so that the systematic review specifies the population, problem or condition that will be studied;
b) The selection of databases must observe their scope and suitability with the theme to be researched;
c) In developing the search strategy, the specific forms of the database must be followed, always aiming at advanced searches, using appropriate terms and properly applying Boolean operators. The types of documents and languages for the search must also be defined;
d) The selection of documents can be performed with the aid of software, which allows correcting for duplicates as well as an excluding/including criteria that help in the process of systematizing the results. In this process, researchers must carefully read the selected documents and collect the corresponding information from the study.

2.2 Methodological procedures

The Scopus and Web of Science databases were used in this systematic mapping. The documents were selected with the aid of the StArt tool, available at http://www.lapes.dc.ufscar.br. In the protocol of this Systematic Mapping Study, the research question and the inclusion criteria for the selection of documents were filled out. The following box shows the research question as well as the search strings in the databases.

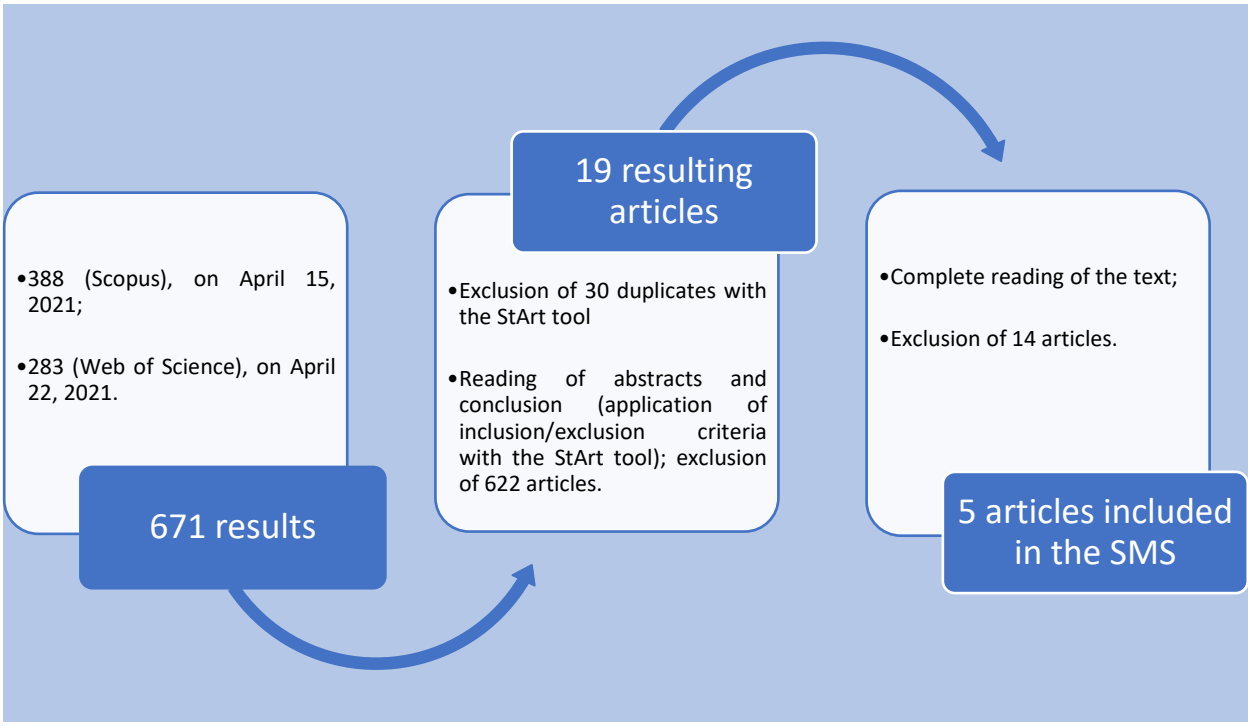
Box 1. Main items contained in the Systematic Mapping Protocol

RESEARCH QUESTION	Which models (mathematical and/or statistical) are applied to define the size of a geographical indication? What are the effects of these models on the products associated with the respective GIs?
SEARCH STRING IN THE BASE DATABASE	("GEOGRAPHICAL INDICATION") AND ("SIZE" OR "AREA MODEL") AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "Spanish") OR LIMIT-TO (LANGUAGE, "Portuguese") OR LIMIT-TO (LANGUAGE, "French"))
SEARCH STRING IN THE WEB OF SCIENCE DATABASE	(TS=(GEOGRAPHICAL INDICATION AND (SIZE OR AREA MODEL))) AND LANGUAGE: (English OR French OR Portuguese OR Spanish) AND DOCUMENT TYPES: (Article OR Review)
INCLUSION CRITERIA	Full text available; mathematical or statistical model that deals with the definition of the size of a geographical indication or its effect on the products associated with it.

Source: research results (2021), developed by the authors.

The inclusion criteria in the above box were defined to comprise as many articles as possible that address GI models to be aggregated in this SMS. For the same reason, a time frame was not established during the searches in the databases. The search thus resulted in 671 articles, of which 388 came from the Scopus database, on April 15, 2021, and 283 from the Web of Science database, on April 22, 2021, the oldest of which was published in 1992. Despite this, after applying the inclusion criteria with the StArt tool, 19 articles remained, the oldest of which was published in 2007. Finally, after these 19 articles were read in full, only five were included in this article mapping. Figure 1 illustrates the steps of the methodological procedures adopted in this study.

Figure 1. Methodological procedures of the study



Source: Research results (2021), developed by the authors.

For Galvão and Ricarte (2019), it is interesting to publish a version of the systematic review in plain language, thus allowing access to the lay public and the general population. Therefore, in this study, we expose and discuss the results in a didactic manner, presenting them in boxes and tables, as can be seen below.

3. Results

3.1 Remaining articles after application of inclusion/exclusion criteria

Box 2 shows the resulting 19 (nineteen) articles after the filters were applied (inclusion/exclusion criteria) as well as their year of publication and the type of model developed.

Box 2. Articles resulting from selection using the StArt tool

Article title	Year	Model type
The Size of Terroir: A Theoretical Note on Economics and Politics of Geographical Indications	2021	Mathematical model of the size of a GI and its effect on product quality.
Participation mode and production efficiency enhancement mechanism of Geographical Indication products in rural areas: A meta-frontier analysis	2021	Model for analyzing the efficiency of farmers in GI-protected and non-protected areas.
Estimating the market share and price	2020	Model for estimating the market share

premium of GI foods – the case of the Hungarian food discounters.		and prices of GI-protected products.
Willingness-to-Pay for Reshuffling Geographical Indications	2020	Theoretical model that estimates consumers' willingness to pay for GI-protected wines through a reshuffling of the GI area.
Explaining regional dynamics of marketing strategies: The experience of the Tuscan wine producers	2019	Model of decision-making by wineries regarding the adoption of Geographical Indication.
Exploring the Capability of LC-MS and GC-MS Multi-Class Methods to Discriminate Virgin Olive Oils from Different Geographical Indications and to Identify Potential Origin Markers	2019	Model of characteristic compositional patterns of GI-protected extra virgin olive oils from six different Mediterranean countries.
Vineyard zonation based on natural terroir factors using multivariate statistics - Case study Burgenland (Austria)	2018	Model of resizing of areas and boundaries of GI-protected vineyards.
The problem of heterogeneity between protected geographical indications: a meta-analysis	2018	Model for evaluating the effect sizes for a GI label based on consumers' overall marginal willingness to pay for the label.
Towards a balanced sustainability vision for the coffee industry	2017	The evolution of VSS (Voluntary Sustainability Standards), a sustainability standard model for GI-protected coffees.
Rent Seeking and Political Economy of Geographical Indication Foods	2015	Political economy model for determining the size of a GI.
A fast chemometric procedure based on NIR data for authentication of honey with protected geographical indication	2013	Quality test models for honeys with protected geographical area.
Collective reputation, social norms, and participation	2012	Model of the size of the group that constitutes a GI.
Quality certification by geographical indications, trademarks and firm reputation	2012	Reputation model for the role of GIs, indicating complementarity of the use of trademarks and GIs.
Determinants of adoption of protected designation of origin label: Evidence from the French brie cheese industry	2010	Regression model that incorporates cost and production structure variables to explain the determinants of GI adoption by French Brie cheese producers.
Embedding local places in global spaces:	2010	GI sustainability model.

Geographical indications as a territorial development strategy		
Discriminant analysis of almond cultivars used in turrón	2010	Mathematical model for classification of turron quality.
Agricultural production clubs: Viability and welfare implications	2008	Model of organization and size of Geographical Indications.
Collective marketing arrangements for geographically differentiated agricultural products: Welfare impacts and policy implications	2007	Model of market size of GI products.
Mathematical quantification of almond content in Jijona turrón	2007	Model of quality of agrifood products made from toasted almonds, honey and sugar.

Source: research results (2021), developed by the authors.

Of the models described in the above box, 14 do not include the definition of GI size and its effect on the products, in the studied themes. Therefore, they were excluded from this mapping.

3.2 Articles included in the present mapping

Table 1 shows the 5 (five) articles that were included in this SMS for effectively meeting the research objective by informing the title, authors, year of publication and journals of publication and briefly commenting on the model described.

Table 1. Articles mapped in the study

Article title	**Reference**	**Journal**
The Size of Terroir: A Theoretical Note on Economics and Politics of Geographical Indications	(DECONNINK; SWINNEN, 2021).	Journal of Agricultural Economics
Vineyard zonation based on natural terroir factors using multivariate statistics - Case study Burgenland (Austria)	(KARLIK; GABOR; FALTAN; HAVLICEK, 2018).	OENO One
Rent Seeking and Political Economy of Geographical Indication Foods	(LANDI; STEFANI, 2015).	Agribusiness
Collective reputation, social norms, and participation	(SAAK, 2012).	American Journal of Agricultural Economics
Agricultural production clubs: Viability and welfare implications	(LANGINIER; BABCOCK, 2008).	Journal of Agricultural and Food Industrial Organization

Source: research results (2021), developed by the authors.

As shown in Table 1, the oldest article was published in 2008 and the second oldest four years later (published in 2012). Afterwards, there was a three-year gap before the third article was published (2015). Then, one article was published every three years, the most recent being in 2021. As for journals of publication, each of the mapped articles was published in a different journal, but all of whose focus was mainly on agricultural economics.

3.1.1 About the models in the articles included in this SMS

The types of models developed in each of the articles mapped in this research were already introduced in Box 2. This paper does not aim to describe each of these models in detail; thus, to better understand them, the reader is suggested to consult their full text. Here, we present a brief description of the approaches of each of these models, as shown in Table 2.

Table 2. Approaches of the models included in this SMS

Article title	**Model approach**
The Size of Terroir: A Theoretical Note on Economics and Politics of Geographical Indications	The model developed in this article describes the effects of altering the size of a GI on product quality and also considers cost-sharing, rent and how political lobbying effects can cause the size of a GI to deviate from the optimum.
Vineyard zonation based on natural terroir factors using multivariate statistics - Case study Burgenland (Austria)	In this article, the authors resize areas of vineyards protected by GI using factor analysis. The correctness and accuracy of the clusters were evaluated by multidimensional discriminant analysis. The study results suggest, for the evaluated area, the creation of five production zones instead of four and the inclusion of areas omitted from the zonation.
Rent Seeking and Political Economy of Geographical Indication Foods	Here, the authors build a three-stage political economy model for GI size determination that compares the resulting optimal policy area of a GI with the optimal social size. They conclude that

	lobbying strength, quantity supplied and market potential play an important role in deviations from the optimal social size of a GI.
Collective reputation, social norms, and participation	This study analyzes the group size of a GI through game models. It was found that the optimum size of the group that constitutes a GI is larger when: negotiations are more frequent and public information is disseminated more rapidly; and customer information regarding the firms' quality is more precise.
Agricultural production clubs: viability and welfare implications	In this article, GI is modeled as a club. It was concluded that for intermediate values of GI certification costs, the industry and a GI of a given size have divergent incentives, and there is an optimal (GI) club size when club members can control entry.

Source: research results (2021), developed by the authors.

4. Conclusion

The objective of this study was achieved with the mapping of five articles in the scientific literature in which models were developed for determining the size of a geographical indication. The presented findings indicate that there are few scientific studies available in the researched literature on this topic.

For future research, we suggest: (a) a comparative analysis between each of the models mapped in this study; (b) determining the variables involved in the process of delimiting the area of a GI and whether they were considered in the developed models; (c) applying these models empirically in GI deployments or reshuffling of their territories; and (d) an update of this study.

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