

**Participatory Guarantee Systems for small farms and local markets:
Involving consumers in the guarantee process**

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Abstract

This paper addresses the development of alternative certification systems, known as Participatory Guarantee Systems (PGS) and intends to rethink schemes of geographical indications (GI) and traditional specialties through a participatory approach. In a context of growing criticism of conventional third-party certification, PGS aim to construct an alternative process of guaranteeing the authenticity of GI with the active participation of producers, consumers and other stakeholders engaged in the production chain.

Using the case study of an existing producer-run PGS for 'Feta' cheese with the PDO label 'Terra Thessalia' (Thessaly, Greece) this paper contextualizes the PGS scheme and explores the future role of consumers by allowing their direct participation in the guarantee process. Based on semi-structured interviews conducted with consumers in rural and urban areas and focus groups with consumers and farmers, the research explores: a) consumer awareness and expectations of the PGS by analyzing their perceived needs, values, preferences and opinions concerning the identity, quality and guarantee process of local food and GI, and b) the effect of various PGS features (material and immaterial) of the territorial resource (e.g. pasture lands, flock, breed, animal feed proximity and welfare, health and quality of products, environmental footprint, traditions, etc.) on consumer purchasing behavior for the product guaranteed by a PGS. In order to better visualize the existing PGS features, the interviews are complemented by the conception of using 3D spatial representations as a way to consult consumers, share information and get their feedback.

In this way we aim to explore how consumer perspective can improve and reinforce the effectiveness and legitimacy of the existing PGS by identifying challenges and influencing factors associated with the guarantee process and PGS recognition. We further intend to portray the consumer's "link" with the place of production, authenticity and specificity of the geographical indication in a clear and understandable manner and support a common vision between consumers and producers by enhancing knowledge exchange, participation, reciprocity, transparency and trust. Thus, we explore the general framework under which this PGS can serve as a social learning tool and an educational platform that visualizes the guarantee schemes through a pedagogical approach that intersects consumer opinion, local producer practices and scientific knowledge.

1. Introduction

New types of food safety risks and uncertainties arise as a result of the modernization of the agricultural and food sector and the internationalization of markets intensifying the public debate on issues related to geographical origin, territorial specificities and good agricultural practices. Consumers are increasingly seeking to know where their food comes from, how it is produced and processed, and how far it is transported before it reaches their tables. At the same time, local producers and small and medium-sized enterprises (SME) in the rural world have to find innovative ways to compete with "global food products" and agribusiness that dominate large food distribution networks. In this context local producers are exploring ways to diversify their production by promoting products with certain characteristics, specific quality and a cultural identity associated with the unique characteristics of the place of origin (natural and cultural environment) (Anthopoulou & Partalidou 2015; Fonte 2013; Renting et al 2003; Campagne & Pecqueur, 2014).

This dynamic of "quality change of consumption" (Goodman 2003) is bestowed by the concept of 'terroir' and geographical indications (GI): the territorial labeling of food -which reflects the unique relationship between product, place of origin and society- acquires particular importance to both producers (improving the competitiveness of products and regions in the globalized market) and consumers (guaranteeing the authenticity and special quality of Geographical Indication (GI) products). However, the high costs, rigidity and bureaucracy of statutory/conventional certification procedures by third parties often create serious barriers and exclusions especially for small family farms and producers in rural areas. In order to overcome such constraints, innovative "bottom-up" networks producing GI products induce the creation of participatory schemes of quality assurance systems with the direct involvement and cooperation of both producers and consumers.

It is now widely accepted that enhancing the position of GI products on the market through participative identification and certification systems of an idiosyncratic quality (linked to the place of origin) creates environmental, social and economic benefits for local communities. At the same time, thanks to the small distribution networks, communication, mutual understanding and trust between producers and consumers are achieved (Dansero, Puttilli 2013), (Grasseni et al 2013, Gordillo, Mendez-Jeronimo 2013).

The design of a quality guarantee system (Fig. 1) with the participation and cooperation of:

- (a) the "producer community",
- (b) the region of origin and
- (c) the "consumer community"

is a strategic objective as it :

- (a) stabilizes and strengthens small-scale productions,
- (b) ensures that the quality standards of the local traditional products are respected (reproduction of resources),
- (c) strengthens the local economy,
- (d) generates local and territorial dynamics, etc.

(Goussios, Anthopoulou 2016).

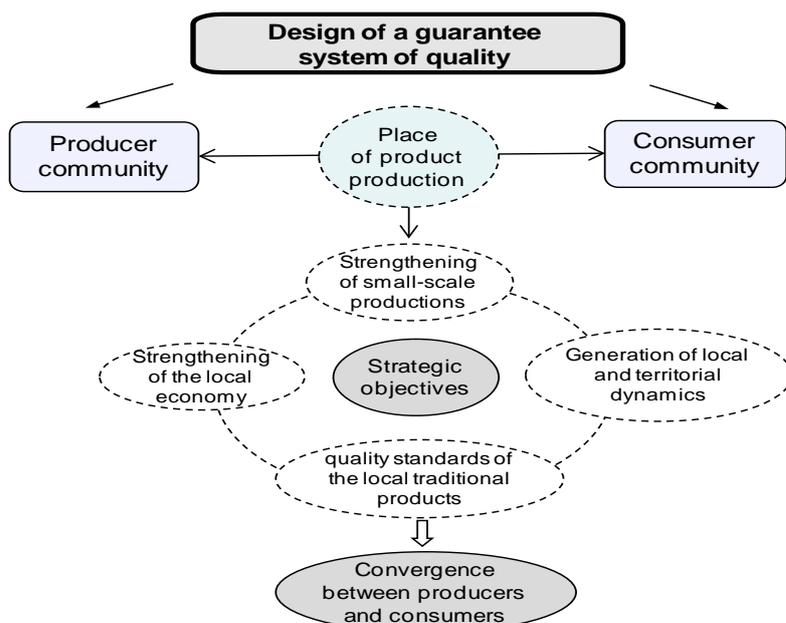


Fig.1. Design of a quality guarantee system with convergence between producers and consumers

2. Participatory Guarantee Systems (PGS)

2.1 General characteristics of PGS and the role of consumers

PGS are an innovative tool based on the principles of participatory democracy that have emerged as an alternative to third-party certification (TPC) which is the dominant regulatory mechanism in the global agri-food system. The common point between PGS and third-party certification schemes lies in the desire to provide consumers with comprehensive and accurate information that guarantees the origin and quality of the production or manufacturing methods. Although TPC labeling systems satisfy the need for quality assurance assessment, such a system seems insufficient to meet all the needs and expectations of producers and consumers, making it necessary to develop complementary guarantee schemes.

In this context, a different approach based on the concept of Participatory Guarantee Systems emerged from producer and consumer communities in response to homogeneous certification standards by third parties. The most common problems related to conventional third-party certification systems can be summarized as below:

- high purchase costs for the producer
- reduced accessibility
- lack of adaptation to the local specificities of production
- risk of standardization and homogenization of production systems
- lack of a support framework for producers
- intense bureaucracy
- ethical issues

Thus, a PGS is differentiated in terms of certification processes and concepts, while at the same time it emphasizes the local context and the role of the social dimension (Nature & Progress). According to the definition of IFOAM (International Federation of Organic Agriculture Movements), PGS certification schemes are defined as "complementary, low-cost, locally-based quality assurance systems of products anchored in a specific local spatial and

social context, that certify producers based on the active participation of stakeholders, mutual trust, social networks and knowledge exchange” (IFOAM 2008). Such schemes not only address the quality assurance of the product, but are also linked to alternative marketing approaches (home deliveries, community supported agriculture groups, farmers’ markets) and can be specially adapted to local markets and short supply chains suitable for smallholdings. Instead of using an external certification body, there is a local quality assurance system that involves citizens and relevant stakeholders in a territorial area (producer groups, consumer groups, associations and other local and territorial actors) in the decision-making process. Participants are therefore at the heart of the certification process, playing a leading role in the joint assessment of producers and the quality of the product produced (Sacchi et al., 2015, Fondation Nicolas Hulot, 2015, Kaufmann and Vogl, 2018).

There are several examples that have been successfully promoted as less expensive and bureaucratic alternatives to third-party certification which promote local markets and small farmers while enhancing food security and food sovereignty (Kaufman and Vogl, 2018, IFOAM, 2005, idem 2006, Grasseni et al., 2013). Although PGS are usually linked to the guarantee of quality in organic products and are related to the high certification costs that entail higher prices in the final product (reduction of access, social exclusion), as well as to the globalized production of organic products, they can also be used with conventional local and other GI products.

According to IFOAM (2015, 2016), PGS schemes have the following characteristics:

- Adaptation to local ecosystems, the regional situation and support for the local economy
- Fighting homogenization and standardization
- Creating links between peers
- Supporting producer groups and encouraging cooperation with a view to improving agricultural practices through the exchange of knowledge and experience between actors in the region, from producers to consumers
- Strengthening links between producers and consumers and increasing incentives for producers to develop their production
- Participation, responsibility and organization
- Learning
- Accessibility: fewer administrative tasks, lower costs
- Trust, transparency and equality of responsibility.

To conclude, PGS are by their nature collective, dynamic and local by bringing together producers and consumers. Thus, a successful participative guarantee system that is created by farmers requires the active participation of consumers. The integration of consumers’ opinions and their participation in the decision-making for the certification process places them at the center of production control. By being in direct contact with producers, through transparent decision-making and collective responsibility, they can participate directly in the assessment of farms and production (Agroecopolis, 2018).

According to IFOAM (2005) such collaboration should allow:

- a common vision of authority shared among all members,
- transparency and trust as the basis of the guarantee system,
- the participation and active involvement of all members,
- a horizontal dimension,
- a proximity criterion,
- a process of learning and sharing know-how and experience among members.

2.2. Case study description: The PGS of 'Terra Thessalia'

This study focuses on 'Terra Thessalia'¹, the first dairy cluster in Greece to be based on an adapted developed Participatory Guarantee System. It is a producer-led cooperation of small dairy territories of Thessaly in Greece (Velesino, Elassona, Kalampaka, Mouzaki, Palamas, Tempí), see fig. 1)(Fig. 3) that was created in 2018 within the framework of the European program 'Lactimed'(2015-2017)² (Lactimed, 2015).

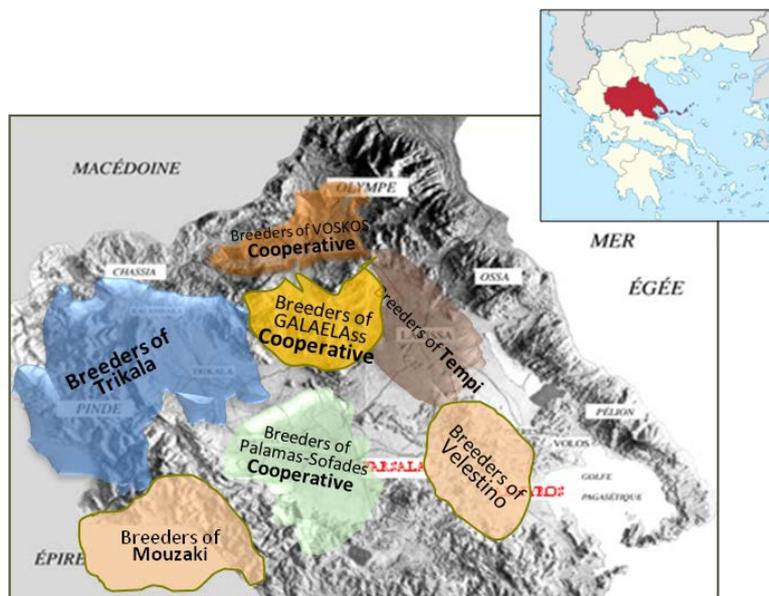


Fig. 3. Seven dairy territories in Thessaly, Greece

These territories have a strong pastoral and Thessalian gastronomic tradition giving prominence to dairy products with a significant competitiveness in livestock (number of farms, local animal breeds, dairy production) and several distribution networks established at different market levels, including short circuits (Goussios et al., 2014). The main objectives of the territorial brand "Terra Thessalia" are to guarantee to consumers the origin-linked quality and authenticity of the products deeply rooted in the territory through a PGS, by revealing and fostering the specific characteristics of the dairy resource, by:

- (a) creating a system of guarantee - certification - traceability (linking the production of sheep-goat milk with the territory),
- (b) establishing a nutrition / ration enhancement system

¹The structure of Terra Thessalia consists of 4 universities and 12 research centers, the Association of Thessalian Enterprises, 7 cheese makers & related farms (400 herds for milk production) representing a potential production of 4 tons of Feta per year, 4 breeder cooperatives, 3 local Development Agencies, 1 entrepreneurship Institute, 2 cooperative banks, 3 professional support organizations and 15 municipalities.

²Lactimed was developed in the framework of IEVP CT MED European portal which promoted sustainable cooperation in the Mediterranean Basin giving the opportunity to many European countries to strengthen the production and distribution of typical and innovative dairy products in the Mediterranean through the organization of local industries. It was coordinated by the University of Thessaly (department of Urban Planning engineering – Rural space laboratory) and the Union of Chambers of Commerce and Industries of Greece.

(c) creating a continuous support system among research centers and specific commodity chains/productions

Among a variety of local traditional dairy products from this cluster (cheeses, yoghurts and desserts) that are made from goat and sheep's milk, our study selected the iconic PDO 'Feta' cheese under the brand of 'Terra Thessalia' (Thessaly, Greece). This cheese is characterized by a strong, Greek and Mediterranean image with local, regional and national market loyalty for Feta.

The objective of this research is to validate and improve this existing producer-run PGS for feta by encouraging the participation of consumers while sharing knowledge, experiences and supporting existing producer groups in working together. This will contribute to an increase in consumer trust, i.e. improvement in quality, and the guarantees provided to consumers. As this specific quality is recognized by consumers, it can lead to the creation of various values – economic, social, environmental and cultural – that are spread along the value chain among producers, processors, middlemen, retailers and other local stakeholders, in particular the tourist sector or the local population (Barjolle, 2006).

Terra Thessalia guarantees, inter alia:

- (a) Animal welfare and quality of milk due to grazing on natural pastures and grasslands
- (b) Proximity of feeds
- (c) Indigenous breeds
- (d) Proximity of cheese production (location) and raw materials
- (e) Small, family and modern dairy businesses
- (f) Milk collection period
- (g) Milk collection at an optimal period in terms of flora quality
- (h) Maturing period
- (i) Governance model
- (j) Solidarity market

The following table summarizes several criteria that according to producers from the cluster are important factors that guarantee their quality claims (Table 1).

Table 1. What does the 'Terra Thessalia' PGS guarantee?

WHAT	HOW
<ul style="list-style-type: none"> • Animal welfare and feeding quality (grazing practices) 	<ul style="list-style-type: none"> • Movement of flocks, analysis of the flora of pastures
<ul style="list-style-type: none"> • Contribution to the reduction of the environmental footprint 	<ul style="list-style-type: none"> • Proximity between stable, cheese units and livestock feed production areas
<ul style="list-style-type: none"> • Autochtone breeds (resistance/resilience) 	<ul style="list-style-type: none"> • Official Public Service Documents, identification, followed by experts from Terra Thessalia (epidemics, antibiotics ...)

<ul style="list-style-type: none"> • Best periods for milk collection (quality of the flora) 	<ul style="list-style-type: none"> • ISO, • Control of transportation
<ul style="list-style-type: none"> • Duration of cheese maturation 	<ul style="list-style-type: none"> • Batch codes/ISO
<ul style="list-style-type: none"> • Territorial quality mark (sustainable management of natural and cultural heritage resources, (natura2000)) 	<ul style="list-style-type: none"> • Evaluation based on spatial, environmental, etc. criteria
<ul style="list-style-type: none"> • Product quality: Milk and cheese characteristics (food, movements, etc.) 	<ul style="list-style-type: none"> • Analysis performed by competent laboratories

Given that the above mentioned certification criteria of the existing Terra Thessalia PGS were based on a multi-stakeholder co-operation between producers and local actors in these small dairy regions in Thessaly that did not take into account the consumers, this research attempted to integrate consumers into this system through a participative method of social learning. This study therefore intends to explore the possible integration of consumers and the role that they could potentially play in the validation, functionality, effectiveness and improvement of the existing PGS for feta.

3. Research Method

Through the use of the existing territorial brand our method was designed to meet the needs of both producers and consumers in order to foster better knowledge and information about the local product (transparency in the guarantee process, fewer asymmetries of information) and contribute to consumer information and education to the fullest with the expansion of new information technologies (Kallander, 2008). From these perspectives, the study combines social research and visualization technologies by exploring innovative learning tools in order to actively involve consumers in the guarantee process, integrate their opinions, motivate them to provide feedback and make them understand the links between the product and the territory.

The proposed method (Fig. 4) is mainly aimed at the:

- (a) Integration of consumers into an existing PGS with bidirectional feedback (consumer opinions and features to be guaranteed) that can be used to improve the quality of products and services.
- (b) General definition of the various material and non-material PGS features of the territorial resource and their role / influence on the proposed PGS,
- (c) Pilot design of a digital web-based visualization platform of material and non-material PGS features of the territorial resource in order to facilitate the cooperation and bidirectional feedback between consumers and PGS guarantee features to be guaranteed,

with the ultimate purpose of :

- (a) the integration and qualitative improvement of the PGS designed to support a common vision between small producers and consumers,
- (b) enhancing the exchange / transfer of knowledge based on the principles of participation, reciprocity, transparency and trustworthiness by developing guarantee instruments that are inserted between official certifications.

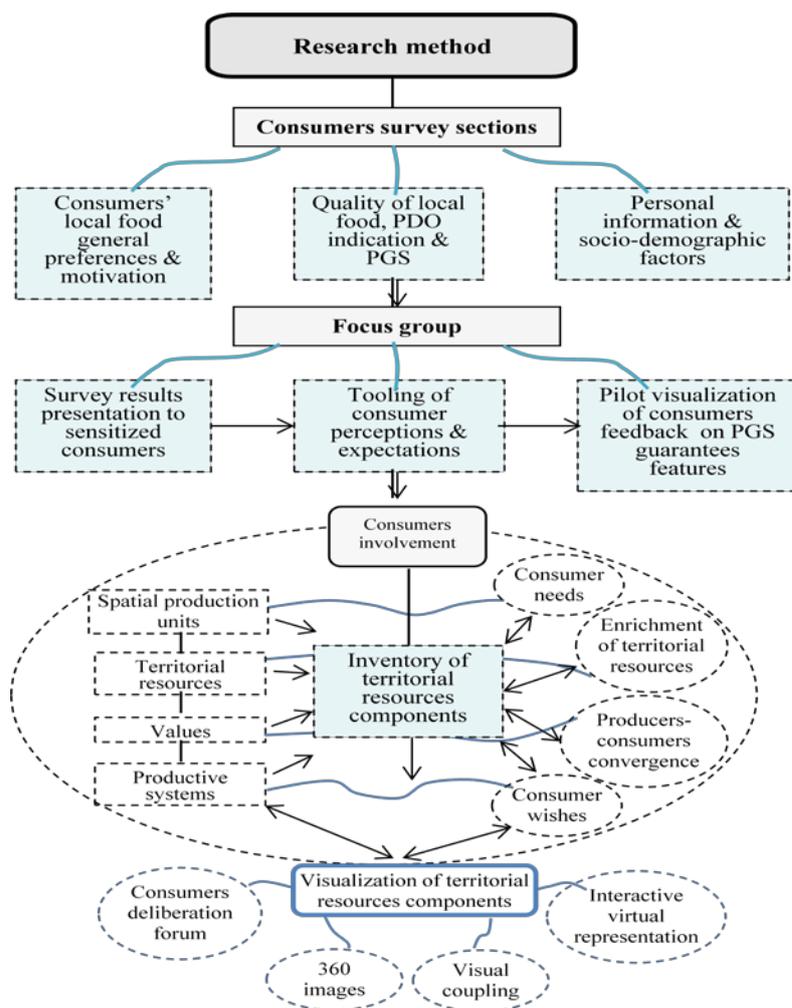


Fig. 4. Schematic representation of the research method

In order to integrate consumers' opinions into the participatory guarantee procedures and the product quality cycle our method consisted of a threefold qualitative analysis (Fig. 5):

a) First, a preliminary consumer survey on local food preferences was conducted between March and May 2019. The survey consisted of online and face-to-face questionnaires mainly addressed to "conscious" consumers connected to extended networks of alternative food initiatives who are looking for locally-sourced produce and are interested in regional foods and tradition as well as "common" consumers representing. A sample of 199 adult consumers was randomly selected mainly in the major metropolitan areas of Athens, Thessaloniki (distant consumers), Larisa and Volos (markets in proximity), as well as in other parts of Greece (diffusion through social media) in order to capture different perspectives of locality (proximity to local food) and to discuss preferences and narratives regarding local food and quality guarantee. The overall sample consisted of:

- consumer cooperatives (15%)
- local grocery, fair trade or small specialized shops and (16%)
- movements without middlemen (6%)
- students and other academic members through university mailing lists (29%)
- and other "common" consumers (snowball method through social media) (38,5%).

This sample was selected so that we could assess differences in the knowledge and awareness levels of the meaning of local food, diverse consumer behaviors and the role of participation in the PGS labeling to the guarantee process. The interest was focused on learning about local

food consumption while addressing the quality assurance of local food and the expectations of consumers that are linked to alternative marketing approaches and participation perspectives.

The questionnaire is divided into three thematic areas of questions (using mainly closed - ended and few open-ended questions):

- The first section refers to the general context, consumers' local food preferences and distribution channels, searches the motivation to buy local food and ways in which local foods are conceptualized as authentic or traditional etc.
- The second section refers to the quality of local food while focusing on PDO FETA and on issues of indication and guarantee systems. The aim was to check the level of awareness and satisfaction concerning the guarantees of the PDO- feta labeling system, the meaning of PGS and consumer willingness to participate in a PGS for feta.
- The third section includes personal information. The socio-demographic factors and their impact on purchasing habits and local food narratives (e.g. gender, age, education, residential area, familial status, professional status, income, rural/urban areas etc).

b) Focus groups with consumers, producers and consumer cooperatives were conducted in the second phase of the fieldwork. This work included group discussions on specialized issues concerning quality, participation and visualization of PGS features of the territorial resource. First we discussed what the artisanal dairies and livestock breeders - PDO cheese of Thessaly under the Terra Thessalia label guarantee. Then we included selected consumers through interactive participation. Group discussions (focus groups) were complemented by the use of 3D spatial representations as a way to consult consumers, share information and get their feedback.

c) The third phase concerns the visualization of PGS territorial resource components. Finally, the pilot tool, through the organization of territorial resource components with the linked group data, can allow the establishment of a governance model of development actions and the ability to assess them through future connection to a smart and flexible SQL database that will allow both data composition in groups and the decomposition of data groups into data components by the users themselves.

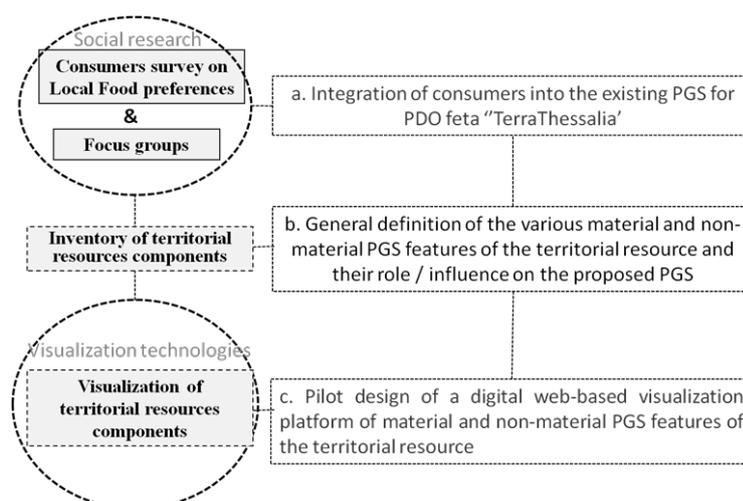


Fig 5. Threefold qualitative analysis of the proposed research method

4. Survey & focus groups: consumers' preferences for locally produced food

What is local? Ambiguity in the definition and attributes of local products and scaling

Most of the people who answered the questionnaire have a positive perception of Local Food (LF) which is formed through non-targeted and general information. In this context, it is interesting to point out that when consumers think about 'local' they are relating it to a shift towards Mediterranean diet products (e.g. pulses) and dairy products. At the same time there is an idealistic picture of the quality and the authenticity of small producers, which is not necessarily based on corresponding elements and existing guarantees.

There is an ambiguity in the definition and attributes of local products even when we deal with more "conscious" and sensitized consumers. According to the average consumer from our sample, the taste and organoleptic characteristics seem the most important criteria for buying LF. To the majority of people, 'local' indicates the ability to get seasonal, freshly picked, nutritious food that tastes better, is healthier and is produced by small farms. While the great majority thinks that eating locally implies short transport distances there is a more multifaceted concept of place. Only a ¼ spontaneously relates LF with the place of production and the physical proximity to the consumer (26%). Locality is therefore connected with a preference for buying locally produced food, while at the same time people are interested in knowing how food is produced, how it affects health, the economy and the environment. A substantial percentage (37%) associates local food with organic production thus erroneously believing it to be of higher quality. Another important aspect is its cultural importance and identity, because people usually buy LF or items under Protected Designation of Origin (PDO) when they visit a place in order to familiarize themselves with special flavors and the gastronomy connected with the local history and tradition (77%).

The following is an itemized list of the most common thoughts expressed spontaneously, containing diverse reasoning and meanings, in descending order of the number of respondents who mentioned them:

Place: includes proximity to where they live (up to 300 km), concerns a certain place of production, a belief that all stages of the production process must take place in the defined geographical area, is associated with the village, the countryside, confusing all scales: regional/national/Greek product, linked with the image of the typical products (Feta, other cheeses, pulses, etc.) and quality associated with geographical origin (Feta Kalavryton or Ladotyri Mytilinis PDO, fava Santorinis etc.).

Quality: is related to freshness/taste/nutritional content, health, good taste, good and locally produced raw materials, knowledge, low production volume, products that have been produced with less processing.

Tradition: local traditional production methods and authenticity, PDO and local identity, local gastronomy, history.

Small scale of the farms: coops, trust-based relations

Support of local economies: elimination of intermediaries, market integration

Environmental footprint: reducing carbon footprint

To summarize, the knowledge and acceptance of attributes associated with LF can be divided into two categories:

a) intrinsic 'ingredients' of the inherent quality of the product (Fresh and Seasonal, Healthy with Nutritional Value, Flavor-Perfume, Organic)

b) the relationship with the place and the heritage that affects both the production of the final product and the surrounding physical and social space (production with local traditional methods, environmentally friendly, better appearance, cultivated at close distances, manually, not industrial).

There is a high acceptance of all these characteristics (apart from the appearance and the relationship with the environment) ranging between 70 and 80% of the respondents.

Lack of consumer knowledge and ineffective labeling on production methods: information, convenience and guarantees

Consumers usually perceive labels as an information umbrella for a variety of ingredients and production practices. However, 25% of respondents admit that they do not trust labels while 28% are indifferent in terms of label trust. This means that there are no strong guarantees covering the 'gap' between production and the consumers who are not fully convinced that they make safe and healthy choices. The logo or labels only cover a part of the production links. This has an impact on the lack of confidence concerning small producers as well as the existing certifications or a lack of labeling on production methods. This indicates a strong need for communicating information to the consumer about certification requirements in an organized and integrated way through a reliable route. Nevertheless, a great majority of respondents (95%) trusts LF because they trust small farming methods regardless of labels or any other guarantee scheme.

These perceptions also influence the price/quality relation that is questioned: consumers seem to need more specific information on the local food chain in terms of health, taste and indirect contribution to local society, the economy and the environment in order to be convinced to pay a higher price. Despite this inconvenience, only 18% choose LF based on its low price while a very high percentage of respondents accept the value of the relationship of LF with the place of production (85%). This probably shows that there is a need to increase transparency and consumer confidence in a way that empowers the consumer as an active receiver of the communicated message (education, understanding, etc.).

Market access for local foods: a gap between producers and end users

The territorial dimension of local food markets is mainly determined by questions of access. 30% of the respondents agree that LF is not easily accessible and a further 37% does not negate this claim. Consumers rarely buy directly from small dairy units and are very often directed to large industrial labels. 55% of respondents claim that they cannot easily find local food products, while 25% neither agrees, nor disagrees with this statement. This is explained by the fact that LF production is limited to small and very small businesses, with low levels of networking and partnerships in order to promote and sell (territorial marketing). Thus, smallholders are somehow disconnected from markets and access is restricted by a limited presence of direct sales networks or rather invisible small "niche" markets, especially in big urban centers (Athens and Thessaloniki).

Labeling and guarantee issues for PDO Feta cheese: Contrasting information, quality and trust

Although 54% of the respondents pay attention to the label information it seems that information is still not sufficient. Regarding quality signals, almost 40% of the sample needs additional information explicitly noted on the packaging even when buying a PDO feta. Quality expectations are highly related to clear indications about antibiotic-free milk, local production,

traditional production methods, locally produced animal feed, the use of fresh milk (within a few days), and all stages of production being in the local area. Moreover, information posters, or phrases such as "free range" and "certified organic" are considered as particularly credible. The research shows that there are different levels of importance that consumers attach to different labeling schemes available in the food and feta-cheese market. The results indicate that consumers clearly value labeling schemes and certification by third parties while information labels and certification logos are regarded as reliable information. However, true images and posters/leaflets that are increasingly being used in mainstream commercial brands highlighting depictions of mountain pastures, pastoral livestock and traditional cheese-making techniques are valued to a lesser extent or are considered unreliable.

When investigating consumers' knowledge of food labels and how this knowledge guides their decisions, the level of recognition of the PDO is low and there is confusion about the meaning and content of these symbols and certifications. Very few answered correctly when asked to explain what the criteria differentiating feta from other types of white cheese are.

When asked to prioritize 6 given criteria that may have an impact on their choice when buying feta, the 'production by small family farms' was ranked first among the most important criteria mentioned (47 responses), the 'area/place of production' had a higher relative importance as the second most important (69) and the existence of 'label – PDO' as the third most important (40).

In terms of certification process, the study found that more transparency is needed which could be recognized through a PGS scheme. Thus, a PGS might have a direct positive impact on consumers' food choices and is a way to gain trust only on the precondition that both producers and local stakeholders and consumers (consumer coops, local organizations, citizens etc) could take part in the certification process. If we take the example of a feta cheese product non-certified by third parties, 63% of respondents would trust a PGS that includes consumers, compared with 30% if it was only guaranteed by producers. The potential participation of consumers would mainly include, in descending order, visits to farms and small dairy units in order to familiarize themselves with the production methods, consumer coops, and direct involvement in the decision making process and the co-formulation of the certification criteria.

5. PGS features and visualization of the territorial resource: the conception of a bi-directional "comprehensive" learning tool

An interactive learning tool that relates the existing PGS with consumers was designed in order to support consumer awareness by:

- Combining PGS and visualization of the specific material and immaterial ingredients of the pastoral-dairy resource
- Allowing consumers to know and understand the links between product, resource and territory and facilitate their direct or indirect involvement in guarantee procedures

Relating features of the agro-pastoral chain with spatial-production units

The general definition of the various material and non-material features of the territorial resource and their role / influence on the proposed PGS are part of productive structures in which the PGS is analyzed. In particular, Spatial Production Units (SPUs) concern the agro-food chain, production structure and process units such as 'farm holdings', 'agricultural exploitation', 'production techniques' and 'marketing promotion'. Each SPU is divided into its

own territorial resource modules. For instance, the SPU "farm holdings" consists of the territorial resource module of: "Breeder", "flock", "breed", "grazing", "place", "milk". Each territorial resource module is linked to material and immaterial features that are surrounded by values and productive systems (Fig. 6). The analysis of the SPU structure concerns the content of future research.

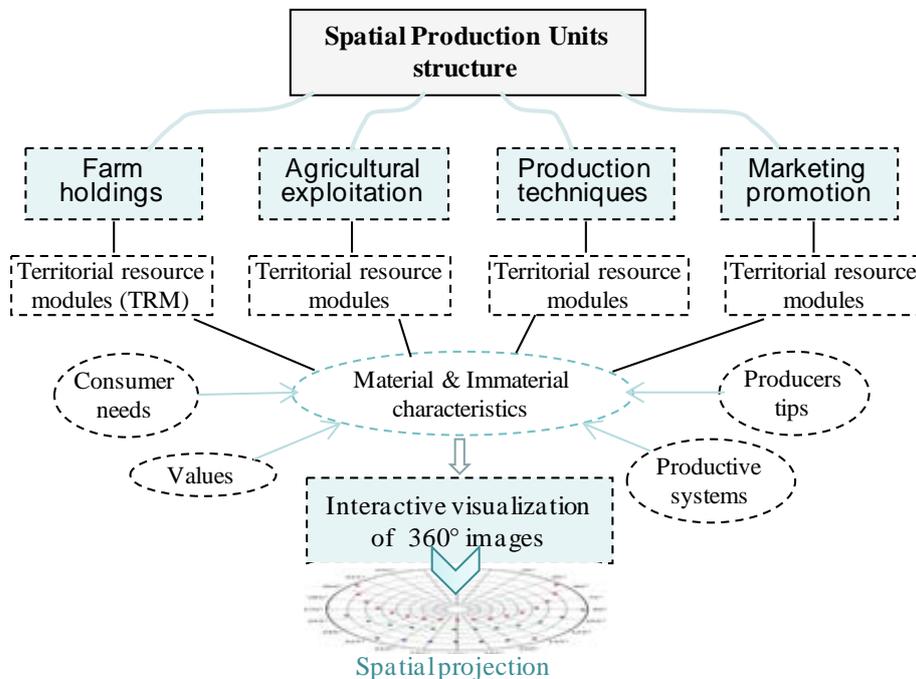


Fig. 6. Spatial Production Units structure of PGS

Theoretical and technical operating context: the need for pilot digital representations and a web-based learning platform

Local actors and the local community need an institutional organization for learning and participating in territorial resource-building and resource management processes in an environment that will help connect the material and immaterial elements of a territorial resource. Meanwhile, this environment can project the above elements into a space so that participants can see and understand the spatial dimension of all these elements, so as to have a more complete picture of the territorial resource components and properties in order to agree on a common perception of the development of specific local products and services. Consequently, there is a need for visualization methods (Maresca 2014) that/in order to display (Kouzeleas 2008) entries in the space of the elements and forms that highlight the anchor in it and the quality and identity characteristics of the resource, as well as the relationship with the final product.

As a result, it is essential to simulate (Kouzeleas 2008), in the space, the entries of elements and forms that enhance (a) the spatial anchorage and the relation to the space, as well as (b) the quality and identity characteristics of the territorial resource, and their relation with the final product, using visualization methods (Maresca 2014).

Theoretical implications: Digital 3D representations of either graphical and descriptive data or small and large data volumes are currently one of the technological challenges (Doleisch et al.,

2003). Many representation systems employ dynamic spatial simulation models (Barkalova et al., 2016) using, inter alia, object-oriented programming solutions for the development of integrated computer models (Lychkina, 2013). Other systems allow the dynamic representation and management of social and environmental features such as Public opinion, Scientific stakeholders, Waste / Transportation / Air Quality / Land Use, etc. (Stave, 2010). Also, participatory system dynamics modeling (PSD) triangulates stakeholder expertise, data and simulation of implementation plans prior to attempting change (Zimmerman et al., 2016).

The modeling and simulation of participatory guarantee systems allow the integration of stakeholder deliberation and incorporate diverse stakeholder knowledge that can accommodate changing information and changing social and environmental conditions (Stave, 2010).

Technical operation: The pilot digital representations of the SPG can be based on (a) the linking and correlating of material and immaterial components of the territorial resource as well as on (b) the spatial projection and simulation of all these elements and correlations. The correlation and projection of the resource links to space creates "anchorage" with spatial references that then add new uses to the resource's components, creating innovative, unique local products and services.

Pilot digital representations through the creation of a web-based platform make it possible to simulate all these relationships and permit consumer deliberation enabling a multimedia environment. Each material and immaterial feature of the territorial resource with a spatial reference is projected through an interactive 360° image in a parallel web and multimedia virtual tour environment of a second server.

The proposed pilot digital tool can support and implement the proposed specific research methodology and attaches great importance to creating an integrated digital spatial simulation environment with the possibility of parallel deliberation around the central core of spatial simulation. The tool's technical operating framework enables full and in some cases dynamic digital spatial simulation, with the representation of interactive multimedia applications, internet links of all multimedia elements (Kouzeleas, 2008) and their organization on an internet platform thus allowing the active participation of local actors and consumers (Fig. 7).

An apache 2.4 webserver with mode rewrite and php 7.1 with extensions enabled can host an html application of virtual tour environment with 360° images simulating the material and immaterial characteristics of the territorial resource. Another server can host a website platform that will simulate all PGS information, allowing the incorporation of the consumer forum tool while connecting and presenting the application of the virtual tour.

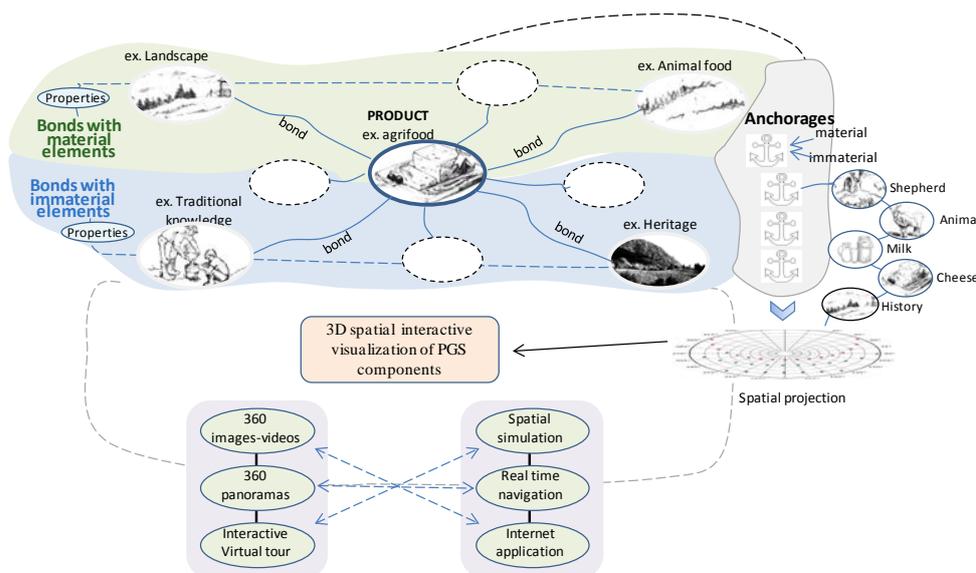


Fig.7: Conception of a 3D spatial representation of PGS features

6. Preliminary results and discussion

The study indicated a low level of consumer awareness on local food as well as limited recognition and understanding of the PDO symbols and guarantees. By analyzing the perceived needs, values, preferences and opinions of consumers concerning the identity, quality and guarantee process of local food we tried to intersect all ingredients of the production chain with potential expectations for the PGS. The fieldwork showed that addressing various PGS features (material and immaterial) of the territorial resource (e.g. pasture lands, flock, breed, animal feed proximity and welfare, health and quality of products, environmental footprint, traditions, etc.) and examining their effect on consumer purchasing behavior would increase consumer awareness of the guarantee scheme and its benefits. The creation of a pilot digital tool will therefore contribute and facilitate, inter alia, feedback processes, participatory planning, deliberation and understanding of the existing PGS. In particular, learning from a digital platform enriched with interactive 3D-views and other types of product guarantees could provide an interactive way of exploring detailed information on the ingredients of the dairy production chain and eliminating consumer confusion.

This study therefore suggests a form of collaborative participatory simulation that will improve learning, increase consumer awareness and reinforce the connection of the dairy product with the cultural heritage and value of the region of production by allowing:

- the involvement of consumers and other stakeholders both in the design and feedback of PGS and in the product quality optimization process through participatory deliberation,
- the complete simulation of all components of the territorial resource by contributing to the common spatial perception and creating a "common language" of communication through the possibility of hyperlinks of all multimedia elements (Kouzeleas, 2011).
- the organization of all components of the territorial resource in such a way that interconnected and interdependent groups of data (linked group data) can be created that will allow the creation of new uses for the components and their integration into production processes.

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