

Brazilian Foods and Territories Digital Platform: Conceptual Bases for Development

Plataforma Digital Alimentos e Territórios Brasileiros: Bases Conceituais para o Desenvolvimento

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ABSTRACT

There is limited and segmented access to information regarding the diversity of responsible and sustainable agrifood products in Brazil. There is a growing need to bridge the communication gap between farmers and consumers who wish to consume such differentiated products. This article aims to present the conceptual bases for the development of a Brazilian Digital Platform for Food and Territories involved bibliographic research methodology, analysis of international platforms and technical-scientific discussions between Brazilian and French research groups. The main result obtained was the modeling of the digital platform based on a multiscale view associated with the confluence of six conceptual aspects: Territories, Localized Food Systems, Brazilian Regional Foods, Adding Value, Consumer Empowerment, Technological and Knowledge Convergence. The results contribute to the physical development of the Platform, with literature and insights on digital innovations in agrifood for researchers, developers, public and private managers, creating new development opportunities for Brazilian rural territories.

Keywords: Digital innovation, Agriculture, Territory, Agrifood.

RESUMO

O acesso as informações sobre a diversidade de produtos agroalimentares responsáveis e sustentáveis no Brasil é limitado e segmentado. Há uma necessidade crescente de preencher a lacuna de comunicação entre agricultores e consumidores que desejam esses produtos diferenciados. Este artigo objetiva apresentar as bases conceituais para o desenvolvimento de uma Plataforma Digital Brasileira de Alimentos e Territórios envolvendo metodologia de pesquisa bibliográfica, análise de plataformas internacionais e discussões técnico-científicas entre grupos de pesquisa brasileiros e franceses. O principal resultado obtido foi a modelagem da plataforma considerando uma visão multiescalar associada à confluência de seis aspectos conceituais: Territórios, Sistemas Alimentares Localizados, Alimentos Regionais Brasileiros, Agregação de Valor, Empoderamento do Consumidor, Convergência Tecnológica e de Conhecimento. Os resultados contribuem para o desenvolvimento físico da Plataforma, com literatura e concepções sobre inovações digitais em agroalimentos para pesquisadores, desenvolvedores, gestores públicos e privados, criando novas oportunidades de desenvolvimento para os territórios rurais brasileiros.

Palavras Chaves: Inovação Digital, Agricultura, Territórios, Agroalimentos.

1 INTRODUCTION

The future of sustainable rural and agricultural livelihoods relies on the combination and connection of different resource-based products, processes, and services. The underlying concept is Multifunctional agriculture, which is rooted in the fact that farms and farmed landscapes may produce a large array of products and ecosystem services. Although the primary role of agriculture is to produce food and fiber, many other functions are important, such as land and water conservation, maintenance of landscape structure, sustainable management of natural resources, biodiversity preservation, and contribution to employment and to the socioeconomic viability of rural areas (OECD, 2001; BOODY, 2005).

Brazilian agriculture is highly performing with a production of almost 240 million tons of grain per year on 75 million cultivated hectares (CONAB, 2018). However, it is facing numerous challenges to generate human development in rural populations, and to reduce regional socioeconomic contrasts among territories. The concept of multifunctionality in rural landscape planning, and in the elaboration of public policy entails overcoming a purely pro-growth perspective by integrating ecological and cultural goals, bearing all with equal importance (LOCH *et al.*, 2015).

The country's cultural identity results from the miscegenation of indigenous, African, European, and Asian heritage. In addition, national biomes host about 20% of the world's biodiversity. Some factors, alongside historical and territorial occupation

processes, have made Brazil a complex country with an important food system dynamic, making it one of the leading countries in food production and consumption of agrifood products such - functional foods (BARCELLOS; LIONELLO, 2011); organics foods (ORGANICS BRAZIL, 2016; DONEGÁ et al., 2020); and coffee production (ALMEIDA; ZYLBERSZTAJN, 2017). Studies have indicated that the main world food trends are sensoriality, pleasure, healthiness, wellness, convenience, practicality, reliability, quality, sustainability, and ethics (BRAZIL FOOD TRENDS, 2020). Factors behind this demand, such as growing and aging population, increased average purchasing power, reduced number of children per family, and participation of women in the labor market have intensified the process.

Sundmaeker (2016) indicates that many systems are developed in e-business and marketplaces food solutions in Europe, which facilitates the offer of regional produce as well as establishes short supply chains from producer to end-consumer. Such systems have the overall potentials impacts: i) connecting farmers and producers with local consumer, ii) easy access to a broader range of local and healthy food, iii) dynamic delivery structures matching local offer and demand, iv) less waste by coordinating surplus supplies; v) identifying suppliers to generate trust and avoid middlemen. Raison and Jones (2020) discuss the development, operation, and transition of an online virtual farmer's market in rural Ohio (USA) by model, where customers place orders online and then pick up their fresh local produce at a time and place predetermined. They also highlight questions about the potential of this digital model to become a significant answer to the question of the current COVID-19.

Rao (2003) highlighted those opportunities for e-commerce in agriculture for developing countries considering the improvement of operational efficiency within companies using internet technologies in business back-office operations, and another to provide knowledge and products to farmers. However, it requires the implementation of new generic and economical technologies of internet standards and open protocols, and the use of internet technologies for the strategic positioning of products and services for competitive advantage long-term. One of the first initiatives in Latin America for applications of communication and information technologies started in the beginning of the decade with the use of cell phones technologies affecting traditional means of data collection and allowing more access to information and farmer's market choice for potato in Bolivia (AMAYA; ALWANG, 2011).

A recent review on the future of Brazilian agriculture (EMBRAPA, 2018) identifies megatrends associated with the need for greater value added in agricultural production chains and more consumer empowerment by 2030. Consumer empowerment through e-marketing and digital platforms has further increased the value of safe foods with traceability. Hence, there is an increasing value in differentiated agrifood products in gastronomy and regional cuisine, especially due to the combinations brought forth by the Brazilian socio-biodiversity, which composes a mosaic of flavors and knowledge.

Reuver *et al.* (2018) emphasizes that digital platforms are transforming almost every industry today, they are slowly finding their way into the mainstream information systems literature and are a challenging research object because of their distributed nature and intertwinement with institutions, markets, and technologies. After applying the theory of planned behavior (TPB) the analysis intention of agricultural services professionals to adopt e-marketing of agricultural commodities, Alavion *et al.* (2016), highlight that the information services model as an appropriate in agricultural electronic marketing for local farmers so that agricultural services firms can offer only information services of farmers' products without a direct role in buying and selling. Digital platforms are responsible for the great wave of disruption, initiating a "platform society" (SILVA *et al.*, 2020).

In 2017, the Brazilian National Calendar of Events recorded 1515 events, of which over 200 aimed at gastronomic and rural traditional appreciation (BRAZIL, 2018a). It is worth highlighting that the Northeast region, where rural poverty is highest, is the place where gastronomy has become an attraction as rich and important as beaches, historical cities, and cultural manifestations. However, the information related to regional and quality food remains fragmented and of unequal access.

In this context, key questions arise, such as: i) how to act at a large scale to increase the added value of territorial agrifood products; ii) how to process and spread qualified information on the diversity of territorial agrifood products; iii) how to bridge the gap in communication between farmers and consumers who are willing to buy such differentiated agrifood; and iv) how to improve digital access to spatially explicit agrifood data and information. The hypothesis of this research considers it is possible to develop the conceptual bases for the structure of a digital platform with a spatially explicit database of territorial agrifood products and make it available to support other research, innovations, markets, and consumer society.

The digital platform focuses on three user profiles with different cultural characteristics, knowledge, access, and digital trust: i) Producers, ii) Marketers, and iii)

Consumers. This paper aims to presents the conceptual bases of this digital platform development, which aims to better connect farmers and consumers, and generates a map of opportunities for Brazilian territories.

2 METHODOLOGICAL PROCEDURES

Brazil covers a total area of 8,514,215 km², occupying roughly half of South America. The variety of soil and climate conditions is reflected in the range of its vegetation types. The “Brazilian Foods and Territories Digital Platform” is based on the construction of business intelligence action and the generation of data for the niche markets of differentiated products and natural biodiversity, using the territorial and agrifood aspects as thematic references. Demanding aspects are going to be considered, as well as offer of production, market, and final consumer.

The establishment of the basis for the logical-conceptual architecture of the digital platform considered research on bibliographic references and technical-scientific meetings between Brazilian researchers and French researchers with experience in Localized Agri-Food Systems (LAS) - from the French acronym “Systèmes Agroalimentaires Localisés” – SYAL (CIRAD, 1996). According to Muchnik *et al.* (2007), the starting point to understand LAS emerged from a society crisis context in the 1990s aggravated by environmental problems, and new qualitative and quantitative food challenges in several countries. The definition sought to explain the context of geographic groupings of agribusiness companies that have resisted or innovated using development strategies with local resources and products.

In the logical-conceptual architecture, key attributes indicated by Castellani (2016) were also considered: i) It is a technology-enabled business model; ii) It facilitates exchanges between multiple groups – for example end-users and producers – who do not necessarily know each other; iii) It offers a value that is proportional to the community size; iv) It is a trust enabler: it must generate trust with clear general terms and conditions regarding the intellectual property and data ownership. In addition, it supports mutual trust between consumers and providers within the network, through scoring mechanisms; v) It presents open connectivity by sharing data with third party developers to create new services and extend the ecosystem; vi) It may scale massively to address millions of consumers without performance degradation; vii) It offers compelling user experience: easy to use, no training needs, self-service; and viii) It has innovative business models based on the immediate value.

There will be a prior assessment with initial selection of agrifood products of interest. The partners Embrapa (Brazilian Agricultural Research Corporation), Cirad (Agricultural Research Centre for International Development), and Sebrae (Brazilian Service for Small and Medium Enterprises) will identify producers interested in taking part on the platform, and study the producing region, production system, landscapes, nutritional, cultural, and historical characteristics. Additionally, new non-agricultural activities linked to food are being incorporated into rural territories. They add value to associated services and products, such as landscape and biodiversity conservation, leisure areas, agritourism, hotels, inns, and regional local food.

The concept of multifunctionality in rural landscape planning has expanded the elaboration of public policies and implies overcoming the perspective of productivism through the integration of ecological and cultural objectives (LOCH *et al.*, 2015). The complexity and diversity may be even more valued and recognized in the current conjuncture of the country if organized and made available to consumers by means of labeling as an association with "regional foods". Barham (2002) proposes that "value-based labeling" is a movement motivated by the need to reincorporate the agrifood economy into the wide social economy.

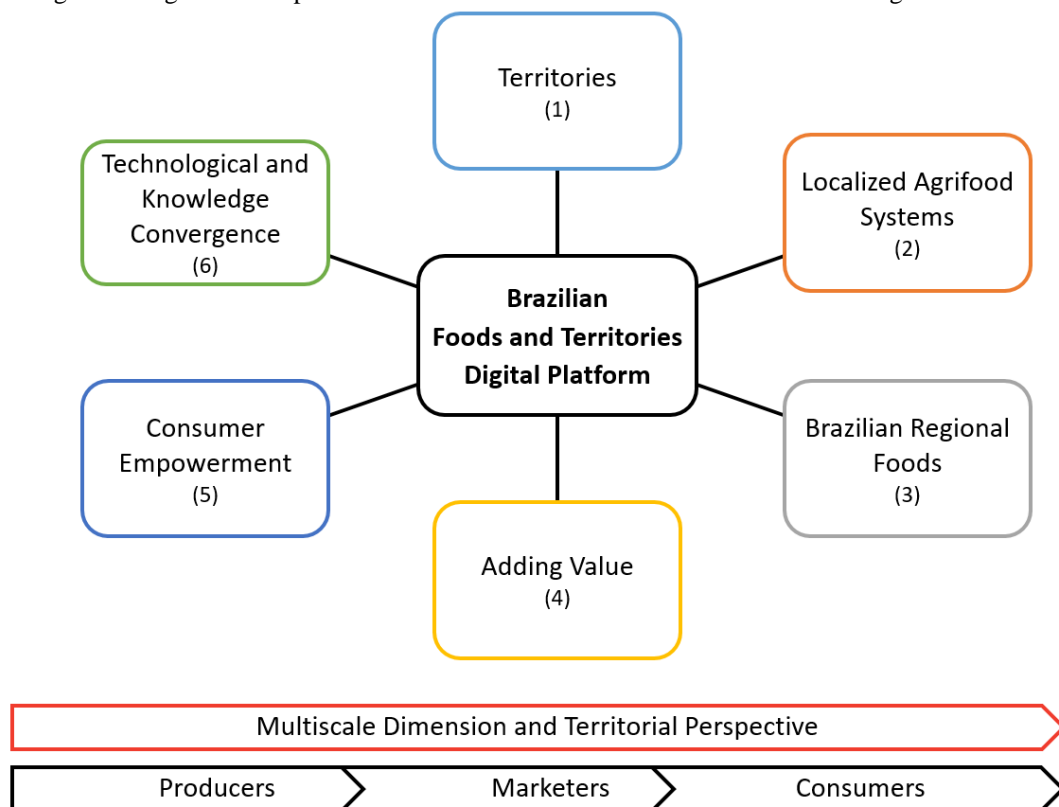
3 RESULTS AND DISCUSSION

The result obtained and presented in this review paper are the logical-conceptual bases for the development of a future digital platform, dealing with the main trends and concepts involving the connection between six conceptual aspects: i) Territories; ii) Localized Food Systems; iii) Brazilian Regional Foods; iv) Adding Value; v) Consumer Empowerment; and vi) Technological and Knowledge Convergence (Figure 1).

The development of digital platforms is increasing with different countries, focuses, scale and structures for disclosure, sharing or sales information about regional agrifoods (BOCAL - BON ET LOCAL, 2020; INAO, 2020; ASEAN GI, 2020; CAPITAL DISTRICT, 2020; REGIONAL FOOD, 2020). The Paris Innovation Review (2016) observed that food industry is quickly entering the era of platform economics and the rapid development of digital interfaces is not exclusively a matter of matching supply and demand. The platforms have emerged alongside different marketplaces and professionals are reinventing older forms of solidarity or commerce. There are specific platforms for agriculture and food, and they can be divided into five major categories: i) new marketplaces; ii) Trade and sharing; iii) Professionals and private individuals; iv)

Crowdfunding; and v) Peer-to-peer: private individuals. Mazzucchelli *et al.* (2021) analyzed the key factors, impacts and the connections between drivers of the success of sharing food platforms using multiple regression and fuzzy-set qualitative comparative analysis. The results reveal the fundamental and interconnected roles of consumer familiarity, perception of environmental and social responsibility, and community social support, in enhancing consumer behavioral response.

Figure 1. Logical-Conceptual Architecture of Brazilian Foods and Territories Digital Platform.



In Brazil there are some initiatives (MAPA, 2020; ORIGENS BRASIL, 2020), however, there are still no consolidated digital platforms with a focus and scope of multiscale dimensions and territorial perspective of production, linking the different levels of production units, farms, places, districts, cities, territories, and national scale. In this proposed modeling, potential stakeholders are considered to be: i) Producers (farmers, associations, cooperative, small and medium enterprises, assistance and rural extension), ii) Marketers (local and extra-local agents of supply, sale retailers and distributors), and iii) Consumers (local short food trade channels, direct sales, gastronomic tours and restaurants) and the connection between conceptual aspects below.

3.1 TERRITORIES

Santos (2006, p. 13) points out that "geography is going to reach its golden age at the end of this century, because geography is imposed as a historical condition, insofar as nothing is considered essential in the world today, other than the knowledge of what is territory." It emphasizes that geographic space is defined as an indivisible set of systems of objects, and systems of actions. It is understood simultaneously with the physical disposition of things, and social and cultural practices that occur in the space. Therefore, space may be conceived as product and producer of the interrelations between man-nature-society at different scales and spatial expressions.

The regional spatial interrelationships may be approached around the concept of territory, which began in the geographical scope associated with the concept of "living space", as a fundamental aspect in the "development" process of Nations, in the context of European expansionism at the end of the 19th century. According to Ratzel (1990), territory is an inseparable link between physical-natural dimension (soil and its natural resources), and political dimension of space (which is confused with the state). In this way, the understanding of territory was based on the physical-natural basis of the Nation-State, with its natural resources, population, borders, etc.

Over the last decades, this concept has been discussed and deepened in important debates in several aspects of knowledge, highlighting the one that involves the areas of human sciences, emphasizing other categories of geographic analysis, particularly in space and region issues. The territory analyzes involve and value social and power relations, circulation, and communication networks, and multiscale. Saquet (2004) emphasizes that territory is the result and condition of social-natural relationship, owned and ordered by economic, political, and cultural relations understood internally and externally in each place. Thus, a territory is produced at the same time by political, cultural, and economic relations. The relations of power are inherent in social relations as a continuous game of domination and submission over geographical space. The territory is historically owned and socially constructed, as a result of the territorial process.

Territory is not only the result of a set of natural systems and things created by man. "Territory is a complex and evolutionary system that associates a set of actors, on the one hand, and the geographic space that these actors use and manage, on the other hand" (MOINE, 2006). The current debate around the concept of territory has assumed other reported concepts, such as territoriality and space. Studying these questions is

essential for understanding the processes of rural planning in its multiple dimensions, especially political, economic, and social. It is known that the concepts between space and territory diverge. "Territory is a historical and social construction based on power relations (concrete and symbolic) that involve society and geographic space (which is somehow nature)" (HAESBAERT, 2007).

According to Saquet (2004), space corresponds to the natural environment and the socially organized environment, while territory is the product of historical actions that take place at distinct and overlapping moments generating different landscapes and, therefore, the result of socio-spatial dynamics. Concomitant to the debate on the physical, biological, social, economic, and cultural complexity of territories, significant research groups intensify the studies on the influence of agrifood production in the territories, and the results of territorial conditions in agrifood production.

Some works study the incorporation and relevance of productive sites in the global scope (BOWEN, 2010). Sanz-Cañada and Muchnik (2016) emphasize that regarding origin, the intense relations between agriculture and food processing, territory, environment and rural societies, and the varied historical paths, determine the multiplicity of territorial resources - natural, cultural, and social.

Haesbaert (2007) presents the conceptual debate of territoriality that assumes multiple dimensions from a broader conception than the territory to the perception of territoriality as something restricted, a simple "dimension" of the territory. Thus, the territory may reproduce a form of agrifood product organization in a given spatial scale, as in the Localized Agrifood Systems (LAS).

3.2 LOCALIZED AGRIFOOD SYSTEMS

In recent decades, aspects on agrifood development have stimulated research groups in several countries to formulate differentiated approaches to interpret and analyze the role of agribusiness clusters in local development. This has evolved into the concept of LAS – Localized Agrifood Systems (CIRAD, 1996), defined as “production and service organizations (agricultural and agrifood production units, marketing, services and gastronomic enterprises, etc.) that are linked by their characteristics and their operations to a specific territory”.

Other analyzes and studies in recent years address different perspectives on how to deal with agrifood production and the territory seeking its development. The approaches highlighted discuss whether the production of a certain agrifood is "local" or

"localized". Bowen and Mutersbaugh (2014) analyzing the empirical and theoretical literature on "Alternative Food Networks - AFN", and Localized Agrifood Systems characterize these perspectives differently.

First, they point out that AFN research tend to understand "local" in terms of spatial positioning, in a sense of distribution (relative to food production or consumption sites or along commodity chains); however, the studies in LAS consider the "localized" foods as the identity bearers of specific territories. The second aspect indicates that LAS research gives a significant emphasis to the collectivity, both in terms of collective institutions and in shared forms of local knowledge and identity. The third aspect highlights that although both perspectives are framed in opposition to the industrialization of the global food system, AFN research focus on alternative and shortened distribution schemes (such as local organic products, fair trade, and direct marketing), while LAS research favor structures anchored in the territory (such as geographical indications), whether the market be close or remote.

However, both approaches consider the importance to adapt to the broader institutional and political context in which food supply chains are embedded. In addition, they point out that the opportunities and constraints faced by producers in developing countries may be different from the experiences of European Geographical Indications producers, who benefit themselves from longer historical protection contexts, and more actively involved and supportive governments in supporting more equitable or sustainable forms of production.

Thus, LAS present functional characteristics strongly associated to a specific territory. It starts from the specificity of the site (such as its ecology, biodiversity, know-how or social organisations) and its interactions with the global, where its relations are not merely geographic, but a space built by collective actions, and marked by cultural and institutionally regulated issues. These characteristics, involving important aspects of short supply chains and alternative systems, allow us to infer that the valorization of regional foods produced in a given territory are important elements to create new opportunities for producers and organizations to act in a growing globalized and competitive environment. Moraes (2016) observed that LAS is an important of socio-economic viability of the family farming and rural development in Brazil.

Localized Agrifoods Systems can be customized for the Brazilian food system in several ways. First, LAS offer a valuable conceptual tool to characterize and understand the relationships between food and territories, given the country's huge environmental

and cultural diversity. LAS point to the singular relationship between human, territory (as a physical and symbolic resource) and identity food products. It apprehends the territorial anchoring of agricultural and agri-food productions by considering the environmental, historical, and cultural specificities of the site and its products, the socio-economic organizations involved in the production process, and the ways in which products are valorized and consumed. Far from being limited to a single pre-established paradigm (short supply chains, vertical integration, search for added value), LAS cover very diverse organizational forms, ranging from organized collective action to fragmented systems, in line with the agrifood territorial arrangements that may be encountered in Brazil.

Second, LAS are a pragmatic approach to local development, relying on the identification and valorization of specific resources (material and immaterial). These territorial resources are not limited to particular or labeled products, but include many other components, such as: endemic biodiversity resources, local know-how, food practices, cultural events, social or productive organizations, collective action. The LAS approach may be used as a tool to differentiate original products within the larger value chain. In this case, the aim is to reveal and enhance the specificities of the product or its production method - which a territorial brand or a Geographical Indication could then protect (PACHOUD *et al.*, 2019). The emphasis here is on the activation of a given territorial resource. The LAS approach can also be customized as a tool for integrated territorial development, to strengthen the links between sectors and territories. In this case, the aim is to enhance the relations between agriculture and other uses of the rural territory: protected areas, processing and marketing activities, provision of services (restaurants, culture, and tourism). The emphasis there is placed on the combination of different territorial resources, articulating the marketing of specific products with the preservation of natural and human resources (CERDAN *et al.*, 2017). This pragmatic approach is of present or future interest for many local governments in Brazil.

3.3 BRAZILIAN REGIONAL FOODS

Brazilian biomes account for about 20% of the world's biodiversity and place the country as main nation among the 17 mega diverse countries (BRAZIL, 2018b). The environmental condition associated with cultural identity, derived from the miscegenation of indigenous, African, European, and Asian traditions, reflect in various aspects of society, such as the way Brazilians dress, their religious manifestations, and culinary. The complex history of territorial occupation has made Brazil a complex, dynamic country

with a wealth of regional foods, among other cultural manifestations. Throughout human history, food has been a fundamental component in the construction and development of societies.

Muchnik (2014) addresses the existence of "food cultures" that pervade the biological issues and occur at different spatial and temporal scales. Each family, kitchen, community, small town, has its particularities. Eating is a shared emotional act that starts at birth, as babies look for security, love, sweetness in the mother's breast. Later in life, we keep sharing other emotions like family celebrations, reunions with friends, New Year's Eve or Christmas dinners. Meals organize and pace social life. Thus, studying the intangible symbolic value of a product brings meaningful material (social, economic, and technical) consequences.

The socioeconomic and cultural motivations have widened the focus of different public and private organizations in order to rescue, recognize and incorporate regional foods in the daily food practices. Government actions can represent an important initiative in improving the food and nutritional standard, and contribute to guarantee the right to adequate, healthy, food and nutritional security of the Brazilian population. The uniqueness of regional foods has incorporated the original culture of indigenous populations, as well as several traditions, such as African, Portuguese, Spanish, Italian, German, Polish, French, Dutch, Lebanese, Japanese, among others (BRAZIL, 2015).

The process is in progress and goes through constant transformations from new products and combinations of socio-biodiversity composing a mosaic of knowledges and flavors. Sanz-Cañada and Muchnik (2016) highlight that new hybrid cultural food identities are being created around the world because the territorial anchorage of food evolves over time and space. In this perspective, labeling it would be based on values resulting from ethical and moral effort, and not from common commercial labels focus only on process and quality. This approach facilitates consumer decision-making, and instances of what is termed as policy of production ethical judgment. The author emphasizes that value-based labeling programs may be expensive and risky for producers. Individual consumers may question the veracity or authenticity of a label, or its effectiveness in achieving goals. In this way, research and innovations like the present platform aim to prevent and clarify these issues to the consuming society.

Fournier and Touzard (2014), when analyzing different models of agrifood production (domestic, proximity, commodities, agro-industrial, and differentiated quality) reinforce how significant differentiated products are, such as origin, natural, and ethical.

The role of food goes beyond the assertion of circuits based on their original values. They corroborate to public awareness regarded to sustainable production. Therefore, strengthening public policies and food governance mechanisms become essential so that they may exercise a kind of "positive discrimination" facing innovations that renew alternative models. According to Muchnik (2014), consumers are more aware and sensitive to the impact of food on their health, and concern about balancing diet, identifying products, buying, diversifying culinary preparations, and strengthening the need to develop alternative agrifood systems. In this sense, different types of relations between producers and consumers with mutual benefit deserve special attention in order to improve value added to local resources.

3.4 ADDING VALUE

In the last decades, the productive chains of Brazilian agriculture have contributed significantly to generate national income correspondent to approximately 20% of the Domestic Product, and 45% of exports. A 23,7% increase in meat production and 26,9% in grains by 2030 is projected (BRAZIL, 2020). On the other hand, studies indicate that the country may have another level of development, if the value of its products increases through the application of knowledge and techniques that promote the increase of value added (sale value of the product minus the cost of raw materials operations).

There are several ways for that, either through the incorporation of characteristics or processes that lead consumers to perceive higher value in agricultural products based on the rational use of inputs, know-how and labor; whether for longer shelf life, differentiated packaging, differentiated product, traceability, certification, among others (ZOCOLO, 2017). Yet, the potential value added via biodiversity richness offers opportunities for improving the concept of national value, strengthening the "country brand" aligned with ecosystem and national culture products, such as agrifood products involved in tourism, gastronomy, and regionalities with social characteristics, sensorial pleasure, and cultural experience. Moreover, a wide range of possibilities may add value to national agriculture as traceability actions and certification of products with origin information, the inputs used, harvesting, slaughtering, processing, conservation, quality, storage, and transport (EMBRAPA, 2018).

Different forms of value added to rural products may benefit rural territories. Marketed products or services increase the income of regional producers even in areas with low technological level. The characteristics of the place of origin attribute a unique

reputation and an intrinsic value that distinguish themselves from similar products available to the consumer. In addition, other associated activities, such as rural tourism and gastronomic routes, project regions beyond their geographical area, and increase the supply of jobs and local income.

Added value may be through sales strategies that construct perceived value in the products offered. A closer approach between the rural producer and the urban consumer encourages them to build the actual value for their products, and increase the perception of product authenticity, an important component to the decommodification of products, such as coffee (PORPINO, 2015).

By studying the main trends in food, Brazil Food Trends (2020) present that: i) 23% of consumer choices reliability and quality guide – safe products and quality are valued, followed by guarantee of origin, informative labeling, traceability and quality seals generated from good manufacturing practices, and risk control; ii) 22% of consumers appreciate sensorially and pleasure, prioritizing taste and sensory characteristics, even at higher prices - gourmet products, regional spices, and innovative foods are part of this trend; iii) 21% of consumers appreciate healthy food, well-being, sustainability and ethics - products with natural ingredients, allergen-free or with reduced levels of salt, sugar and fat are part of this trend; and food produced and associated with the preservation of natural resources, processed and marketed in a more ethical and fair way are valued among the chain links.

The high urbanization process, the increase in purchasing power, and the exponential growth of ICT (Information and Communication Technology) applications and use are some of the factors that explain these trends, and place consumers as protagonists in the demand for differentiated foods.

3.5 CONSUMER EMPOWERMENT

The ICT advances, such as social media and digital platforms/e-marketing have transformed the relationships and interactions between the producer, business, and consumers. The consumer access to computers, tablets, and mobile phones have increased significantly, due to its decreasing cost. Thus, Brazilian consumers present themselves as protagonists in decisions related to productive processes (their empowerment). The transformation driven by these protagonists has generated new business models and opportunities in different sectors, including the agro-industrial (GAZZOLA *et al.*, 2017). Analyzing specifically the agrifood sector, Embrapa (2018) shows that the growing role

of consumers is due to emergence of new business models—the producer direct sale, the launching of food products co-created by consumers, and the upcycling adopted in the agribusiness to develop value-added food products.

Hebinck *et al.* (2015) pointed out that, although market niches are associated with specific characteristics, they are aligned with the broader agrifood commodity markets, as well. The niches present different nature and dynamics with a redistribution of value added and different prices in the relations between producers and consumers. Yet, according to Hebinck *et al.* (2015), the market niches emerge from complex social struggles, and require interrelated step analysis that present methodological implications:

- Instead of facing markets as a "system", which regulates itself according to neoclassical economics, they have to be faced as a place of social interaction, where specific transactions occur among specific buyers and sellers who exchange goods and services following specific rules.
- The concept of market needs to be devoid of normative frameworks a priori. The market is not intrinsically "good" (as stated in the neoliberal discourse), nor "evil" (as presented by the radical left). Market is the result of an empirical and well-founded theoretical research.
- The need to accept that markets may become not only the focus, but also the locus of social struggles is essential. According to orthodox Marxist views, social struggles occur in places of production and not distribution, that is, in markets. In view of the preponderance of distribution chains in the food system, the platform on food and territories aims to provide relevant prominence to the direct interactions between producers and consumers.
- It is important to consider beyond the argument that radical changes in food production and marketing, such as organic production, will inevitably be taken or appropriated by large retailers and food processing industries, thereby neutralizing any potential for further change.
- The literature on "short food" or "alternative food" circuits have to be reconsidered by broadening the concept of marketplaces. The circuits bring products or services from the producer to the consumer through the shortest social and/or geographical distance. Such analysis often neglects the fact that circuits are intrinsically part of a new market.

The links of national production chains require reorganization to meet the growing consumer demand for short circuits and/or e-marketing systems for differentiated agrifood products, improving food quality, and the level of information and confidence. According to Kim and Peterson (2017), the future of e-commerce is tenuous; price is not the determining factor in online shopping, but trust. Brazil is a leading country in the use of communication, information, and purchasing Apps (TECH CRUNCH, 2017), however, the research indicates a 10% plunge in Digital Confidence Indicator (DCI) between the first and second semester of 2018. The index shows the Brazilian perspective regarding technology over time facing political, social, economic, environmental, or technological changes, reaching 3,4 in a scale up to 5 (INFOBASE, 2019). Thus, it is fundamental to generate marketing channels for reliable agrifood products that value the technology associated with agricultural knowledge.

The collaborative economy leads to an intense consumer interaction in the value delivery processes, and it has been expanding worldwide. The Brazilian Ministry of Health (Brazil, 2015) indicates that promoting food through new channels, such as digital platform, involves more than the choice for adequate food. The platform is going to consider exponential application aspects of ICT that lead end-users to have influencing power in territorial agrifood consumption. In Brazil, 61% of rural producers use smartphones and 96% of them access WhatsApp, 67% the Facebook, 24% the Youtube (ABMRA, 2017). Analyzes focused on urban areas show that younger segment uses smartphones, compares prices, values, or devalues brands. In 2017, Brazil had 198 million smartphones in use with an estimated population of 208 million inhabitants (MEIRELLES, 2017).

3.6 KNOWLEDGE AND TECHNOLOGICAL CONVERGENCE

Digital technologies associated with cultural, social, and economic changes raise the possibilities of expanding knowledge and interaction between all the links of the productive chains. The "digitization of agriculture" may be understood as interdisciplinary and transversal, not limited to agricultural crops, regions, or class of producers. In an increasingly dynamic world, agriculture presents the potential to use advances such as ICT, the Internet of Agricultural Things (IoAT), artificial intelligence, precision agriculture, automation, robotics, big data and blockchain. Estimates show that the world market for digital agriculture will reach US\$ 15 billion in 2021, and 80% of companies expect to have competitive advantages in the sector (UNGC, 2017).

Studying the signs and trends for Brazil, Embrapa (2018) emphasizes that agriculture is undergoing new transformations based on technological and knowledge convergence, where joining geotechnologies and precision agriculture may provide new levels of production efficiency and sustainability. Moreover, the study points growth in areas involving digital transformation and use of ICT, cognitive intelligence, digital market, geo-traceability, and data sharing. Brazil owns an innovative role in digital agriculture and its convergence with knowledge.

They intensify the application of environmental certification of properties; contribute to animal welfare management and geo-rastreability, improving food quality and safety. New approaches may be applied in production planning, management, harvesting, market access, marketing and transportation of grains, fruits, vegetables, meat, milk, eggs, fibers, and wood. The instruments are determinant for rural planning, cost reduction, and increase producers' productivity and income. An example of innovative and convergent technology is pointed out by Schahczenski and Schahczenski (2020), with the growing potential of using blockchain and the resurrection of consumer sovereignty in a sustainable food economy.

Spendrup and Fernqvist (2019) developed a systematic study, analyzing research on the topic of sectorial innovation systems related to agriculture and agrifood in OECD countries. They indicated the key elements of agricultural innovation systems identified were organized into eight main themes-topics: i) agents, ii) basic technologies, iii) knowledge and learning processes, iv) mechanisms of interaction, v) institutions, vi) end-users, vii) system transition, and viii) contextual variables. In the category “mechanisms of interaction”, networks as platforms for interaction are most widely studied with almost one-third of the mapped studies in the period 1997-2017. Application platforms are part of innovation ecosystems where interactions between end users and developers self-regulate the growth of the ecosystem itself (GIOVANINI *et al.*, 2020).

4 FINAL CONSIDERATION

The Brazilian scenario has leveraged the digital and collaborative economy, raising level of information, skills, and consumer engagement to know about food systems and their origins. It is related to biodiversity defense of species, recognition and rescue of cultural heritage, food historical value and traditions, as well as developing typical regional cuisine. Thus, we aim to increase the connection between producers and

consumers through instruments of information and communication technologies that may positively impact in different levels of Brazilian society.

The paper contributes to the literature and provides insights for researchers, developers, public and private managers in the development of digital platforms on food. The conceptual model developed in this study will guide the technological infrastructure necessary for a database that will be established containing all relevant information related to the products and producers in Brazil. It will support the formulation of questions for future field surveys to be applied starting in 2021. The organized and structured theoretical foundation will also support the training of the field team responsible for data collection and processing activities covering all differentiated local agrifood products. These are fundamental aspects for collecting information from products and producers, amplifying the central role of trust to the general consumer.

Based on the references analyzed in this article, the agrifoods that will compose the platform were defined as "territorial foods", those that use physical-biotic resources (soil, water, and climate), and socio-cultural resources (tradition, know-how, authenticity, and quality) from the territory where they are produced. That is, the proposed platform is going to include some productive experiences that value the close relation between food and territory.

The digital platform is expected to connect producers and consumers, creating a map of opportunities, and positively influencing Brazilian territories at different levels. At the regional level, the platform will aid in: i) establishing a geospatial database to inventory, catalog, and organize the characteristics, specificities, and specializations of agrifood in Brazilian states. ii) public-private partnerships to broaden the participation of regional agrifood products in tourism and in the increasingly competitive consumer markets, increasing number of jobs on offer, and income for local populations. iii) promoting agrifood through biodiversity and historical-cultural heritage, creating experiences of consumption for pleasure, reliability, and sustainability. At the national level, the platform will: i) outline a logical-conceptual architecture of territorial agrifood intelligence, intensifying sustainability, and competitiveness in Brazilian agriculture; ii) expand digital environment for farmers and consumers to offer social interactions for agrifood market niches, labeling, and certifications; and iii) promote high connectivity and proximity between production, markets, and consumption to diversify and add value to agrifood production.

Finally, the development approach presented on this platform presents important challenges and limitations to be overcome in the next stage of implementation, highlighting technological, institutional aspects, validation with rural producers and use by consumers. Future studies are needed especially in the final development of the mobile application (APP) with Information and Communication Technology (ICT) capable of establishing an online system, that considers aspects of data security, personal privacy, and easy access to different user profiles.

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