

4. Challenges for a sustainable agriculture in Brazil

Adilson Francelino Alves and Julia Silvia Guivant

1. Introduction

In Brazil, while fertile soils, climate and abundant water have transformed the country into³⁰ one of the world's largest producers of agricultural commodities, on the other, the generation of wealth contrasts with environmental degradation, social exclusion and rural poverty. In a previous article (Alves, Guivant 2010) we analyzed the advances and possibilities that, at that time, were possible to prospect for family farm in Brazil. 2010 was a significant year for the evaluation of more than a decade of changes in the social structures of the Brazilian countryside, with the incorporation of small farmers in the national agenda and the implementation of public policies for this segment. Among those policies we can mention PRONAF (National Program for Strengthening Family Agriculture), the opening of institutional markets for family farmers through PNAE (National School Feeding Program), the PAA (Food Acquisition Program) and, finally the recognition of agroecology and sustainability as part of federal policy. We argued that the new networks created a synergy in which the knowledge generated by conventional agriculture could be incorporated by family farmers, benefiting the whole society from these advances.

³⁰ This article is a revision of the text "Networks and interconnections: challenges for building sustainable agriculture" that we published in 2010 in INTERthesis. Here we make a critical analysis of the changes that have occurred in Brazil in the last ten years. We highlight the changes in the scenario and in the national agenda for the construction of sustainable agriculture.

In this article we will present an overview of the changes in that perspective mainly in the last decade, the challenges to agricultural sustainability.

2. The green revolution and rural development

In the period that followed after World War II, several adjustments were implemented within the scope of rural development paradigms. According to Ellis and Biggs (2001, pp. 441-442) these would be the main changes in the 50 years of the Green Revolution: 1) small farmers are considered rational economic agents; 2) small farmers are addressed as capable, as well as large farmers, of producing vegetable varieties, since the combinations of chemical inputs (pesticides, fertilizers, seeds, irrigation) required for production are neutral agents able to be adopted for any type of farming; 3) an inverse relationship between farm size and economic efficiency, so that small farmers are more efficient than large farmers, due to the intensity of their abundant use of labor; 4) the combination of these three factors lead to an agricultural strategy that favors small family farms; and 5) the growing agricultural production on small properties stimulated the growth of non-agricultural activities in rural areas.

The Green Revolution managed to provide an exponential increase in the global availability of food. However, the intensive use of external inputs and resources such as land and water, have caused numerous environmental problems and impacts, like unequal distribution of benefits, deterioration of the socioeconomic conditions of farmers (especially with the increase in the cost of production and with the consequent decrease in income), large population displacements with consequences of marginalization and significant environmental degradation, among other aspects (Pretty, 1995). Its advance on traditional territories and production systems brought, in addition to the success of scientific rationality, questions about the results achieved. Those criticisms

forced paradigmatic revisions and caused the initial model to undergo several modifications in the period of 50 years (Table 1).

Table 1. Main development models and dominant paradigms 1950 to 2000.

		Characteristics of the main development models	Dominant Paradigms
decades	1950	Double modernization model of economic and community development: idea of lazy peasants.	Modernization and dual economy
	1960	Transformation of the technology transfer approach (extension) and agricultural mechanization growing role of agriculture (beginning of the Green Revolution): rational farmers	1. Modernization, dual economy 2. Increasing yields on small and efficient properties
	1970	Redistribution with growth meeting the basic needs of the rural integrated with the development of the State, credit policies took to the field an innovation bias linked to the urban sector and green revolution (continued).	Increasing yields on small and efficient properties
	1980	Structural adjustment to a liberal perspective of markets “obtaining correct prices. State retreat; Rapid Rural Diagnosis (Focus on food security and hunger analysis. Research and Development as a process not as a product. Focus on women's development and poverty reduction.	1. Increasing yields on small and efficient properties. 2. Participation and empowerment 3. Research on sustainable livelihoods
	1990	Microcredit, Participatory Rural Research (PRP), Actor-oriented Stakeholder; Rural analysis security, gender; environment and sustainability; poverty reduction	1. Increasing yields on small and efficient properties. 2. Participation and empowerment 3. Research on sustainable livelihoods
	2000	Sustainable lifestyle, good governance and critical decentralization to programs with a sector-wide approach as social protection and poverty eradication.	1. Increasing yields on small and efficient properties. 2. Participation and empowerment 3. Research on sustainable livelihoods

Source: Ellis and Biggs (2001). Organized by ALVES, A.F. (2008).

The Green Revolution as a global system can be explained by the construction of the socio-technical networks concept used by the Actor-Network Theory (Callon 1984; Latour 2000). The central aspect of scientific success has to do with the ability of science to build networks that act from a distance. Science and technology are permeated by several types of alliances, allowing the elaboration of complex systems that collaborate for its universalization, since it is presented as knowledge produced and validated, and reproducible everywhere. On the other hand, local knowledge is organized into smaller and more restricted networks, which limits the spread of these experiences. In the specific case of the Green Revolution, one of the rules of the game was the continuation of the attempt to separate the natural world and the social world as discussed by Latour (2000).

With regard to power, it is not possible to determine its exact location, as demonstrated by Norman Long (2002) when discussing the complex relationships that are established in the interfaces of rural development projects and processes or, as stated by Callon (1986), in its contribution to problematize the relations between the actors involved in networks. For Guivant (1997), in the case of the Green Revolution, power includes “a long list of non-social elements, such as technologies, texts and natural entities”, articulating around different resources and building a long network of performance. The longer the list of elements that integrate power relationships with more resources involved, the greater it will be. In this sense, problematizing the connection between science and forms of power allow to visualize an essential explanatory distinction between science and local knowledge. In this sense, power obeys social, cultural and political aspects, in a complex and continuous process of articulation, stabilization and contestation.

With regard to contestation, the Green Revolution generated an increasing dependence on external inputs, as mentioned above, as well as caused the erosion of local knowledge. This process did not take place in a peaceful and uniform manner. If, on the one hand, rural extension was one of the strategic vectors for the diffusion of technological and standardized production packages, it suffered resistance and technologies

were and are re-signified by farmers at the same time as important resistance movements they also took place within the academy, such as with the formulation of the Participatory Action-Research (IAP) proposed by Orlando Fals Borda, which began to take shape in the 1950s (Cichoski & Alves, 2020) or, the decolonial movement (Escobar, 2003; Grosfoguel, 2012; Quijano, 2005) that seeks to highlight the need for a new epistemology for Latin America. These processes are echoed in many rural and indigenous social movements, unions, NGOs, and research centers that were increasingly discussing and adopting IAP. The questioning processes, as well as the negative impacts of the Green Revolution, have brought about a large number of new social actors who have launched themselves into the public arena debating which agriculture is possible, which agriculture is socially and ecologically sustainable, which agriculture offers food security, environmental and social equity standards. From the institutional point of view, one of the major milestones in the debates about models for agricultural development, obviously was the diffusion of the concept of sustainability, especially after the Our Common Future Report called the Brundtland Report of 1987.

From the criticisms arised part of the theoretical framework of endogenous development against the exogeneous model (WARD et al., 2005) anchored on the assumption that specific local resources (natural, human and cultural) are the key to enabling sustainable development. The main challenge that endogenous development face is the evaluation of local differences and specificities in a world scenario where the techniques and productive processes promoted by institutions and capillarized by public policies dominate, despite the increasingly evident environmental and social problems (WARD et al., 2005).

The main objective of this development perspective is to improve local economic and social circumstances through the mobilization of available internal resources, guaranteeing the actors greater participation. Ward et alii (2005) (table 2) point to the differences between the exogenous development models and the endogenous model.

Table 2. Models of rural development.

Characteristics	Exogenous development	Endogenous development
Key Principle	Economies of scale and concentration	Local arrangements (natural, human & cultural). Resources for sustainable development.
Dynamic force	Poles of urban growth. Rural areas are designed as a source of food and primary products for the expansion of urban economies.	Local companies and initiatives.
Role of rural areas	Production of food and primary products for the expansion of the urban economy.	Diversification of economies and services.
Major development problems	Low productivity and marginalization.	Limited ability of social areas / groups to participate in economic activities.
Focus on rural development	Agricultural modernization: stimulating capital and labor mobility.	Capacity building (skills, institutions and infrastructure). Overcoming social exclusion.

Source: Adapted from Ward et alii (2005).

In the conceptual dimensions we can separate technological issues from one another, but in empirical manifestations, this task is much more complex (LATOURE, 2000). There is no such simple separation of these universes. And what we see is an intricate web linking economic, political, cultural, social, scientific and natural issues that intersect. These aspects are strongly intertwined with a scientific and civilization project.

As a way of developing a response to the Green Revolution, some research centers have managed to build small and active networks in opposition to the power of large scientific networks. Such experiences have articulated local communities, actors linked to NGOs, pressure groups and consumers concerned with the quality of food products. In table 3 we highlight five of the most widespread forms of agriculture proposed in contrast to the concepts of the Green Revolution.

Table 3. Main Forms of Sustainable Agriculture: protagonists and principles.

	Main protagonists and followers	Basic principles and scope
Organic agriculture	Albert Howard: research in India (1920s); published <i>An agricultural testament</i> in England (1940). Techniques improved by L. E. Balfour (Howard-Balfour Method). Introduced in the USA by J. I. Rodale (1930s). Others: N. Lampkin (1990).	Principles: Use of compost, deep-rooted plants, performance of mycorrhizae in the health of crops. Widespread in several continents. IFOAM - International Federation of Organic Agriculture Movements - acts in the harmonization of technical standards, product certification and exchange of information and experiences.
Biodynamic Agriculture	Rudolf Steiner develops a series of conferences for farmers in Germany (1920s) and establishes the basic foundations of biodynamics. Practical research carried out in the USA, Germany and Switzerland (e.g. Pfeiffer, 1938; Koepf, Shaumann & Petterson, 1974).	Principles: Anthroposophy (spiritual science), biodynamic preparations, astrological calendar; has registered trademarks (Demeter y Biodyn). Very widespread in Europe. Present in Brazil: Biodynamic Institute for Rural Development, Estância Demétria and Instituto Verde Vida.
Natural Agriculture	Mokiti Okada: Founds the Messianic Church and establishes the foundations of natural agriculture; M. Fukuoka: Similar method, but removed from the religious character (Japan, 1930s). Fukuoka's ideas spread in Australia as Permaculture, through B. Mollison (1978).	Principles: Composed with vegetables (inoculated with "efficient microorganisms"), religious and philosophical-ethical values. Movement organized by MOA-International and WSAA (USA). Shiro Miyasaka directs MOA's activities in Brazil.
Agricultura Biológica	It begins with the Lemaire-Boucher method (France, 1960s). Dissident group founds "Nature et Progrès". Great influence of the French researcher Claude Aubert, who criticizes the conventional model and presents the basic foundations of L'agriculture biologique (1974).	Principles: The health of crops and food depends on the health of soils; emphasis on soil management and crop rotation. Influenced by the ideas of A. Voisin and the Theory of Trophobia (Chaboussou, 1980). Widespread in France, Switzerland, Belgium and Italy.

Organic farming	It appears in the USA (1970s), stimulated by the ecological movement and influenced by works by Rachel Carson, W.A. Albrecht, S.B. Hill, E.F. Schumacher. In Germany, he received an important theoretical-philosophical and practical contribution from Professor H. Vogtmann (University of Kassel): Ökologicshe Landbau (1992).	Principles: Concept of agroecosystem, ecological methods of systems analysis; soft technologies, alternative energy sources. It is widespread in several countries. Its introduction in Brazil is linked to J.A. Lutzenberger, L.C. Pinheiro Machado, A.M. Primavesi, A.D. Paschoal and S. Pinheiro, among others.
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Source: Elaborated by CAPORAL (1998, p. 47) apud. Hes Espanhol, 2008 p. 126.

Morgan and Murdoch (2000) analyzed how the construction of knowledge takes place in the food chains of conventional agriculture and organic agriculture. For this purpose, they present two “ideal types” of networks: A) those of industrialized food production and B) tacit networks, where organic production methods are used. The authors assumed that the food production sector underwent an intense change in the post-war period, marked by the evident intensive application of science, technology and logistics, in what we already described as the Green Revolution.

They start from a proposition of neoclassical economics to understand the centrality of knowledge to economic activities. Among the various aspects discussed, we highlight the analysis that considered knowledge itself, using Lundvall and Johnson (1994), proposing four basic types of knowledge, relevant for analysis: a) knowing what (know-what), concept that would be close to what we identify as "knowledge" or knowledge of "facts"; b) knowing why (know-why), corresponding to scientific knowledge, linked to the principles and propositions of the laws of nature's functioning; c) knowledge (know-how), which refers to the ability to do something. This type of knowledge is usually built within companies and kept carefully as an industrial secret. However, the increasing complexity of this type of knowledge can induce interaction and cooperation between organizations; and d) know-who, considered as a specific type of knowledge that is decisive due to the growing importance that knowledge has been assuming in contemporary

economies, and refers essentially to social skills. To be effective, it involves the other three previous types.

Still according to Morgan and Murdoch (2000), although seductive, the neoclassical approach disregards the unequal capacity of economic agents to produce, access, acquire and manipulate knowledge. In the contemporary model, the production of knowledge is taxed in broad processes of power relations that involve social and political issues. Such themes are disregarded or have a marginal importance in neoclassical economic theory. That is, in the real configuration of the market there is no perfect distribution of knowledge. When we raise the alternatives of access to knowledge by family farmers this becomes more evident.

In this sense, in the networks of endogenous development, although we find contestation and criticism of the exogenous model (as well as the presentation of some alternatives for overcoming and replacing it), we note a complex, uneven asymmetric process of real response capacity. This is because the technical and scientific processes characteristic of globalization and modernity have an undoubtedly greater force. It is important to highlight that globalization develops in its movement two vectors: a process of homogenization and another of differentiation, where several networks intertwine in a process of reflexivity, advances and retreats, that is, they do not have a one-way trajectory.

Local knowledge should not be idealized as better or superior to scientific knowledge or seen as untouchable knowledge ready to be rescued (GUIVANT, 1997) because, from the point of view of agricultural ways of doing things, the process of globalization in the standardization of agriculture, science, companies, governments have played and play their role for more than 40 years, profoundly changing and influencing traditional knowledge. It is possible to assume that what we have today are hybrid types of knowledge.

3. The emergence of sustainability networks

If, on the one hand, the continuous advance of technologies has led to a deepening of the mechanisms for the standardization of agriculture, on the other, an expressive set of experiences and actors focused on the solution of local problems have emerged. Hence, for example, the voices raised in defense of forests and traditional indigenous peoples and the proposition of other economic uses for natural resources.

Aspects of globalization are fragmented and reinterpreted at the local level (Mior and Guivant, 2005). Global phenomena are permanently mediated and reconfigured by the various agents located on the multiple scales of social and economic life. One of the possible issues of this reconfiguration is sustainability diluted in legal, research networks, etc.

In the field of environmentalism, the issue of globalization seems to us to be endogenous, in the sense that the environmental issue is in essence a product of the globalization process. Much of the environmental discourse is only possible if articulated with issues arising from globalization and science itself. In the same line of reasoning, the institutional and scientific discourse of environmentalism weaves its theories and considerations from the local space and reaches the global. This complexes the discourse and requires an analysis that connects global and local aspects.

One analysis, which particularly interests us here, was carried out by Buttel (1994). By focusing the debate on rural sociology, he showed that rural sociology offers two great approaches to agriculture: one centered on globalization and internationalization and the other on the relocation and diversity of agriculture. In the first, national agriculture and its dynamic, organizational and regulatory processes are being replaced by global structures. And here we have our first intersection point of the networks.

The endogenous approach focuses on the influence of systems located outside rural areas, in the formatting and determination of decisions in agriculture, resulting in a growing process of dependence, marginalization and minimization of the social and political importance of rural spaces. With regard to the second approach, the central aspect is the criticism

directed at excessive emphasis on the homogenizing qualities of globalization, that is, what is being questioned would be the limits of the scope of the globalization standardization process on agriculture.

Clark and Lowe (1992) had signaled the limits of some sociological and economic approaches to agriculture. For them, agriculture would differ from production processes due to its intrinsic characteristics of family work and the refractory and multiple nature of biological processes, processes that require individual attention from farmers. The core of this analysis lies in the differentiating character of rural societies in their most varied forms. These characteristics bring together family farming and the questioning movement of globalization, giving rise to aspects related to sustainable agriculture and, consequently, to a concept of sustainable rural development.

Box 1 - Principles of sustainable agriculture

1. Sustainability cannot be defined precisely: it is a highly contested concept and does not represent a closed set of practices or technologies, nor a model to be described or imposed. The question of defining what we are trying to do is part of the problem, because each individual has different values. Sustainable agriculture is thus not so much a strategy as an approach to apprehending the world. 2. Problems are always open to different interpretations: how knowledge and understanding can be considered as socially constructed, what each of us knows and believes is related to our current context and our history. Therefore, there is not only one "correct" interpretation. In this way, it is essential to seek to understand the multiple perspectives on a problem to ensure broad involvement of the actors and groups. 3. The resolution of one problem inevitably leads to the production of another problem because the problems are endemic. There will always be uncertainties. 4. The key feature becomes the actors' ability to learn continuously from these changing situations, so that they can act quickly and transform their practices. Uncertainties must be made explicit and recognized as valid. 5. Learning and interaction systems should seek multiple perspectives from different stakeholders and encourage their involvement. Participation and collaboration are essential components of any research system.

Source: Pretty (1995).

Sustainable agriculture is an integral part of sustainable rural development and can be defined as a process of change in rural production systems, affecting them in a multidimensional way. Sustainable agriculture involves several areas of rural activities, such as:

economic growth, improvement of social conditions, conservation of natural values and cultural values. It also involves the dimensions of work, technology, knowledge, institutional policies, in short, factors that connect to different dimensions of life in the countryside. These factors are not watertight and therefore do not peacefully obey a homogeneous or standardized classification of their definitions. Most of the time, they are complemented by specific demands and historical characteristics of rural communities.

The redefinition of agriculture along the lines proposed by sustainable agriculture implies a redefinition of the role of farmers and consists of a call for the acquisition of new skills and competences, and among these redefinitions is the expansion of farmers' knowledge (Box 1).

4. Brazilian agriculture in a brief historical perspective

Approximately in the last 40 years, a debate on the environmental impacts of agriculture (Guivant, 2010; 2015) has been taking place in Brazil, putting defenders of sustainable agriculture and those of extensive and agro-export agriculture in opposite fields. This debate has its ups and downs and took on new shapes after 2016, when important changes in environmental guidelines occurred under the command of a more conservative government that started to dismantle policies focused on sustainability and environmental preservation. This dismantling mainly affects the policies that had been gradually built since 1992, when Brazil hosted ECO 92, until 2016. In that period, there has been a process of internalization of public environmental policies in the three administrative spheres. Among them, it is worth mentioning the creation of the Ministry of Agrarian Development (MDA) in 1999.

This ministry was responsible for agrarian reform and agrarian reorganization, land regularization of the Legal Amazon and the promotion of sustainable development of family farming. One of the

activities developed by the MDA was the creation of 164³¹ Rural Territories. The Rural Territories (2003-2017) aimed at sustainable development and democratic management of public resources destined to projects, having worked in approximately 2500 municipalities with marked agricultural production. Its creation was an institutional landmark, since until then there was a single body that took care of agriculture in Brazil, the Ministry of Agriculture, Livestock and Supply (MAPA) historically linked to large farmers. Few policies have been implemented by MAPA for sustainability and for family farmers. Starting in 2016 the MDA was initially reduced to a secretariat within the Ministry of Agriculture, Livestock and Supply (MAPA) and in 2018, with the election of an extreme right government, the dismantling process was expanded with the complete extinction of the MDA. Thus, currently there is no structure in the State structure that deals with the specificities of family farming and the sustainability of agriculture.

The results of these changes were not long in coming. In 2019 alone, 475 new pesticides were approved and, in May 2020, another 150 were launched, many with active ingredients banned in many countries. At the same time, the government extinguished the National Commission for Agroecology and Organic Production (Cnapo), responsible for proposing public policies that benefited more than 100,000 agroecological farmers. There was also, according to the National Institute for Space Research (INPE), an 82% increase in burnings in the legal Amazon compared to 2018, which had already increased compared to the previous year. The country has also seen landowners and mines advance over public lands and indigenous demarcations. In mid-2019 the Cacique Raoni, chief of the Kayapo ethnic group was featured in the international press when he decided to go to Europe to denounce the indigenous land occupations by farmer, miners and loggers. Brazilian civil society tries to react to the dismantling of public policies for the environment and agroecology. Among this reaction are hundreds of NGOs and, in the field of

³¹ Source: <http://sit.mda.gov.br/download.php>. Accessed: 05 set 2020.

agroecology, the National Articulation of Agroecology (ANA). Garimpos are a separate chapter, because with the increase in the value of gold in the international market, criminal activity of this type of extraction in the Amazon region has intensified.³² In the wake of these changes, the work of the Ministry of the Environment has generated numerous headlines in newspapers due to their agendas against the environment. Such actions have been the subject of lawsuits from the Federal Public Ministry and judicialized questions about the new mode of action of this Ministry.

In an attempt to contribute to the end of environmental degradation, social policies and institutions, several research centers and graduate programs see pointing out that part of the answer to the degradation caused by extensive agriculture would be family farming. Your relationship with the environment would be less impactful. For these centers, to the reduction of environmental impacts, several social benefits would be added, such as: the generation of jobs, increased production and supply of food consumed by Brazilians, reduced rural exodus and finally the induction of virtuous circles in local economies, especially in small towns. However, these researches do not find an echo in the current structure of Brazilian public policies.

This view has encouraged researchers from universities and research centers that have produced studies that highlight aspects of this form of agricultural production, highlighting their ability to respond to public policies. One of the most studied cases in Brazil is the successful National Program for Strengthening Family Farming - (PRONAF), implemented in 1996.³³

However, even with the success of PRONAF when we analyze the mechanisms of production, commercialization and incentives for small

³² In 2019 the government, through a Interim Measure, transferred the demarcation of indigenous lands to the Ministry of Agriculture. This measure was overturned by the Supreme Federal Court and this task returned to the *Fundação Nacional do Índio* (Funai), an organ linked to the Ministry of Justice, however this does not mean that there will be a better management of this process because the Indians have been denouncing the omission of the Funai in protecting their rights.

³² Since the creation of PRONAF, approximately 26 thousand articles, academic theses and books have been written in this public policy.

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rural industries, we perceive a strong link between family farmers and large companies that operate upstream and downstream of the agricultural production system. Thus, in a significant part of family farming, the same processes are present as commodity production.

In this sense, instead of a “pure type of family production”, we have a mosaic of possibilities that translate into complex networks intertwined in the long chain of production and consumption of agricultural products. Although classified in the singular, Brazilian family farming is plural and has territorial, cultural and economic specificities that fragment it into different types and it also integrates with agro-industrial conglomerates such as the meat and milk chains. Associated with this, there is an irregularity in its political and productive organization that varies widely. There are also evident contrasts between the five regions of the country. However, even when we focus on just one of these regions’ emerges huge typological diversity.

It is commonly accepted the view that the rural development model built from the 1950s, which placed the country among the largest agricultural producers in the world, was built on homogenizing technical assistance system (ATER), which for many years undermined the capacity to farmers' organization, removing them from the decision arenas and placing them as recipients of technologies and public policies.

It is important to bear in mind that the Green Revolution was not peacefully or passively absorbed by farmers (Guivant, 2003). Several resistances processes took place. They often occurred in micro localities and are only visible when closely observed or when they become successful cases. Over the past 20 years we studied some of them (Alves et al., 2004; Alves 2008; 2017; Alves & Guivant, 2010; Alves et al., 2013; Saquet & Alves, 2014; Alves, 2015; Gregolin, Garcia, Alves, Gregolin & Zonin, 2015; Neukirchen, Alves & Plein, 2018; Saggin & Alves, 2019; Zanco, Corbari & Alves, 2019; Soares, Feiden, Saquet & Alves, 2019).

From this scenario, two analytical frameworks are designed: one focused on endogenous development and the other on exogenous. The focus of the Ministry of Agriculture, Livestock and Supply (MAPA) always has been export agriculture. Under the shield of exogenous

development, the subordination of rural areas to urban economies and international markets take place. In this view, the dynamic aspect of the economy (with the development of products, services and research) the rural is seen as a passive receptacle for technology and inputs and as a supplier of food for urban populations and a producer of raw materials for the production chains.

By following this process, we can observe the erosion of local knowledge and its replacement by exogenous and global networks that enabled the emergence of standardized relationships between nature and human beings and the replacement of local production systems, with models built in laboratories managed by large expert systems (Giddens 1991; Latour, 2000), these substitutions are mediated by an instrumental rationality, in this dynamics markets and economic results occupy a large part of the spectrum and the Gross Domestic Product (GDP) is the only unit of measure adopted.

There is no doubt that modern agriculture is a highly profitable system, dependent on external inputs whose inputs and outputs are characterized by high technical and scientific density, high levels of investment and capital that connect global networks of research, production and consumption. By privileging monoculture to enhance the use of economic resources, this logic ignored local environmental and social diversity.

Brazil saw the emergence and strengthening of large industrial conglomerates that took advantage of these changes. In the south of the country, Perdigão founded in 1934 and Sadia in 1944³⁴ stand out, were born and grew up under the model of vertical integration of family farmers. In the center-west of the country, other large groups emerged: JBS, founded in 1953, with important brands in the food sector such as: Friboi, Vigor, Doriana, Seara, Leco and Itambé and Frangosul, in addition to having international brands like Swift in the USA. In the Southeast, Minerva Foods, founded in 1924 in the state of São Paulo, stands out. Currently it is the second largest beef company in Brazil and selling its

³⁴ In 2009, after the 2007/08 financial crisis, the two companies merged and created BR Foods (BRF), a Brazilian multinational in the agri food business. The process was only completed in 2013 after approval by national economic regulation bodies.

products to more than 100 countries. Much of the expansion of these conglomerates was financed with public funds via the National Bank for Economic and Social Development (BNDS) with subsidized interest.

5. An analytical framework for sustainable agriculture

In our previous article (Alves, Guivant 2010) we proposed the adoption of factors that would allow us to analyze the interconnection of rural and environmental development issues. The chosen analytical framework was developed by Pugliese (2001). This proposal comprises four dimensions: Innovation; Conservation; Participation and Integration, which could give us an understanding of what we were observing in the dynamics of family farming at that time. In our field surveys already mentioned, we have observed increasing changes in the form of production of farmers, in participation in decision-making bodies and in debates on issues involving the environment. Thus, now, ten years after the publication of the article and considering the structural changes in Brazilian politics, we observe a strong degradation of three of the four dimensions, mainly with regard to spaces of participation, the processes of conservation and preservation strategies and the integration of family farmers in decision-making spaces.

5.1 Innovation

For Pugliese (2001, 118), “innovation is also identifiable in the reintroduction of elements, spaces and people in different positions, integrated in renewed relational strategies”. The innovation process within the perspective of rural and sustainable development must be translated into the difficult task of revising the current development process. The most successful examples in Brazil are the adoption of territorial development projects, extinguished together with the MDA, and the construction of organic product certifiers. It seems to us that organic food certifiers have the potential to bring academia and final consumers

closer to farmers. In the south of the country, there is a collective / participatory certification experience called Rede Ecovida that introduces aspects of building trust systems into the conflict arena that are linked not only to the dimensions of production and reproduction of the social life of farmers, but also to dialogue with farmers. organic consumers. In addition to articulating a legal, institutional and scientific discourse handled, in the case of the Ecovida Network, family farmers.³⁵

Organic certification can represent an important element of innovation in rural areas, as it requires a high level of information and a high knowledge of natural systems (David, Guivant 2020; Spaargaren et al., 2007). Another important aspect is related to the administration of rural property and its articulation with the construction of social spaces for negotiation, construction of public policies, debate forums, cooperatives and associations. In this sense, there is a vast production in the postgraduate programs already consolidated and in the new masters and doctorates that emerged during the expansion of public universities that occurred between 2002-16; as a Postgraduate Program in Sustainable Development (PPGDRS) of the State University of Western Paraná (UNIOESTE) created in 2013 that has worked in the training of qualified human resources and in the dissemination of innovative practices in the field of social organization or production and commercialization.

5.2 Conservation

Another challenge for sustainable rural development is the simultaneous conciliation between market and regulations aimed at the balance and stability of rural and agricultural systems. From this perspective, there would not necessarily be an opposition between elements of conservation and innovation. Adequate conservationist strategies do not necessarily act as an obstacle to change and growth (Pugliese (2001, p. 120), The conservation of local characteristics makes them more sustainable in the long run. There are possible examples of articulation between conservation and innovation, such as: agroforestry, sustainable

³⁵ <http://ecovida.org.br/> accessed in.15/mai/2020.

management of forests, legal reserve, protection of sources, use of organic pastures and extraction experiences, all alternatives that have shown a relative success in articulating income generation and conservation which implies an increase in knowledge about local systems. This is perhaps the most sensitive point on the Brazilian agriculture agenda, since the exponential growth of a negligent policy by environmental agencies in the country in the period that begins already in 2016 and that is intensely accentuated in 2019 with the inauguration of the Bolsonaro Government, point to a dramatic deregulation of environmental protection. Currently, Brazil needs international public opinion to take a stand, as internally the resilience capacity is greatly weakened.

In recent months, several governments and business companies have expressed concern about the Brazilian situation. Countries such as Germany, Denmark, France, Italy, the Netherlands, Norway, the United Kingdom and Belgium have threatened to boycott the import of agricultural products if the Brazilian government does not avoid deforestation in the Amazon. This pressure has been successful enough to create an unusual alliance between environmental NGOs and exporting agribusiness sectors, which have proposed an environmental conservation agenda to the Brazilian government.³⁶

5.3 Participation

The role of actors in arenas and processes plays a central role in the paradigm of sustainable development. However, it is necessary to consider the concepts carefully. Guivant (1997), when analyzing the proposals for sustainable development, highlights as one of the most expressive tendencies of endogenous rural development projects, what she identifies as participatory populism. In this scenario Robert Chambers (2002) is one of the most important authors. The valorization of local knowledge and the participation of farmers in the processes as the main

³⁶ See: <https://g1.globo.com/natureza/amazonia/noticia/2020/09/15/em-alianca-agronegocio-e-ongs-apresentam-a-bolsonaro-medidas-para-conter-desmatamento-na-amazonia.ghtml> Access in: 05/set/2020.

agents of development as a central axis is obviously not a bad idea. However, these proposals often disregard the rooting of exogenous practices and knowledge. Guivant also addresses another criticism to Chambers when she refers to an idealization that agriculture practiced in developing countries preserves ancient knowledge built and passed on for generations in an almost autonomous process of knowledge. The criticism is addressed not to participation, but to the idealization of popular knowledge. It should be noted that the knowledge produced and reproduced in the Brazilian rural space is the product of interactions between the traditional knowledge of caboclos, Indians, blacks and European settlers, but also (and, today, fundamentally) through vertical networks with little sensitivity or openness to participation. And that such a scenario can only produce hybrids and not pure types (Latour, 2000).

In Brazil, a potentially important space for participation processes are family farming cooperatives organized by the National Union of Solidarity Cooperative Organizations (Unicopas).³⁷ This entity works as a confederation and was founded in 2014 from the initiative of four large national cooperative organizations of solidarity economy: Central of Cooperatives and Solidarity Companies of Brazil (UNISOL Brasil), National Union of Cooperatives of Family Agriculture and Solidarity Economy (Unicafes), Confederation of Agrarian Reform Cooperatives of Brazil (CONCRAB) and National Union of Waste Pickers of Brazil (Unicatadores).

³⁷ Unicopas gathers in 2019 around 2,600 urban and rural cooperatives that have 850 thousand members. Among the agendas are: the General Law on Cooperatives, tax legislation, public policies for the solidarity economy, registration of cooperatives in the commercial boards and regulation of labor cooperatives. Unicopas currently gathers around 2,600 urban and rural cooperatives with 850 thousand members. Among the guidelines are amendment of the General Cooperative Law, tax legislation, public policies, solidarity and intercooperation. The plants that gave rise to Unicopas continue to operate in their respective sectors and territories.

5.4 Integration

Finally, the potential integration process between agriculture and sustainability is proposed by different social movements from the countryside. In this scenario, organic agriculture could, according to Pugliesi (2000, p. 122): “provide interesting opportunities and an intrinsic capacity for integrating the territory and with other sectors of the economy. From a strictly agricultural point of view, organic agriculture represents a strong stimulus for the reorganization of rural properties”. There is also the possibility of horizontal integration of local space. With the induction of new dynamics between the rural property, its articulation and construction of knowledge and production chains.

Until 2019 this aspect seemed possible under the current Brazilian institutional architecture, with the guarantee of representation on the council of entities of family farmers, indigenous people and civil society bodies in National Councils aimed at discussing public policies and State action. In the first 100 days of the Bolsonaro government, approximately 680³⁸ councils were extinguished by decree. However, as we have seen, this process begins earlier, in 2016, when the dismantling of public environmental policies began, which were articulated by the extinct Ministry of Agrarian Development (MDA) and by the Secretariat of Family Agriculture (SAF), which, among its central objectives, there was an explicit attempt to promote the concept of sustainable local development in family farming as a whole. However, it is important to note that even before this process, environmental issues were marginal in the MDA. The focus of sustainable development, in the case of SAF, referred much more to social aspects and the political aspects of social valorization of family farming appeared as an explicit objective, in addition to economic development as an attempt to add value to family farming products as a way to enable farmers to access increasingly restrictive and demanding markets. This focus on social and economic

³⁸ Available at:

http://www.in.gov.br/materia/-/asset_publisher/Kujrw0TZC2Mb/content/id/71137350

valorization is quite understandable given the conditions of the formation of Brazil in its vocation for exporting agribusiness and the large latifundia.

6. Conclusion

If in the country's post-democratization period (started in 1985) it was possible to believe in the processes of integration of the variables innovation, conservation, participation and integration. Between 2002 and 2016, it seemed that the country had finally found a way to improve the balance between development and sustainability in agriculture. But these ideas now seem to be part of a utopia rather than concrete reality. The advance of large farms aimed at exporting commodities, loggers and miners over protected areas, the deregulation of environmental protection, the approval of hundreds of pesticides, the closure of participatory bodies such as the Federal Councils and the dismantling of specific public policies for the family farmers. The current environmental deregulation points to a scenario similar to that experienced by Brazil in the 1970s, where there was an enormous devastation of the six national biomes.

The current scenario shows that there is an unequal capacity for social agents to access decision-making bodies. Thus, of the four analytical categories we use, three of them are strongly affected by the new configuration of power in Brazil. This shows the country's institutional and social fragility, which forces civil society actors to seek new forms of organization to respond to the reduction of decision-making spaces. In this sense, important points of resistance are observed in Brazilian society, such as: Chief Raoni and other indigenous leaders, National Articulation of Agroecology (ANA), hundreds of NGOs linked to the environment, some research centers of public universities, cooperative organizations from family farmers, pressure from organic food consumers, among others. It is too early to say whether it is the emergence of a new stage of civil organization in Brazil. However, we can see that there is a re-articulation of the agendas and the creation of new alliances.