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DESIGN SYSTEMIC APPROACHES FOR SOCIAL COMPLEX SYSTEMS: BRAZILIAN CASE STUDY ON LAND REFORM SETTLEMENTS

Priscilla Ramalho Lepre

Federal University of Alagoas, UFAL. cillaramalho@gmail.com

ABSTRACT

This article aims to discuss sustainability as a wicked problem and propose ways to design in social complex systems on emergent countries. To address these issues, this paper begins with a brief review of the literature on sustainability (ONUBR, 2018), wicked problems (Rittel & Webber, 1973) and complexity (Jones, 2013), followed by a brief presentation of the development of sustainability and complexity in design and new approaches to work on these scenarios (Ceschin & Gaziulusoy, 2016; Ryan, 2013; Bistagnino, 2017). In the sequence, a case of landless settlements of Maragogi city -AL- Brazil and its solutions for socio-ethical development will be presented and evaluated from a perspective of design for wicked problems solutions in complex contexts. It concludes with the presentation of ways to design solutions for wicked problems in complex social systems, such as Brazilians', contributing to the must needed reflection on the flexibility of design in the face of the world diversity.

Key Words: Systemic Design, Social Wicked Problems, Sustainable Development, Land Reform

1. INTRODUCTION

According to UN-HABITAT III Convention 2016: “(...) the persistence of many forms of poverty, growing inequality and environmental degradation remain among the biggest obstacles to sustainable development worldwide, and socio-economic exclusion and segregation space often manifest realities in urban cities and agglomerations” (UN-HABITAT, 2016 p.3). In peripheral countries, such as Brazil, in addition to urban areas, also rural areas exhibit complex social problems, which interact in a systemic, perverse, inseparable and co-emergent manner with environmental, economic, political and cultural problems (ONUBR, 2018) is whose solution is imperative to these balances inherent in sustainable development. To contribute to this process, this article provides an assessment of the potential application of systemic approaches to the design, the solution of highly complex social problems linked to sustainable development. More specifically, the article deals with wide field of possibilities for the design's role in solving the existing wicked problem in the processes of the Brazilian Agrarian Reform. This paper is based on the ideas developed for the on-going research thesis *Design and Gastronomy: the systemic approach of Design in the context of local sustainable development of small Brazilian communities*, developed in the Postgraduate Program in Design of the Federal University of Pernambuco, Brazil.

2. SUSTAINABLE DEVELOPMENT & SOCIAL WICKED PROBLEM

Many social problems, that interfere on sustainable development, are wicked: characterized by uniqueness, non-linearity, dynamics, contradiction, multi-causality and difficulty on its diagnosis (Rittel & Webber, 1973). For cross organizational, sectoral, territorial and professional boundaries, the traditional approaches to wicked problems are not effective (Mota, 2014 p.53) and demands intelligence and collective action to offer proper solutions for these wicked problems (Conklin, 2008). These solutions, in turn, do not obey the right-wrong logic, but the best-worst to face any situation at a given moment. Being highly susceptible to rebound effects, these solutions also tend to result in new problems, requiring constant feedback and other new solutions (Ackoff, 1974; Ritchey, 2011; Rittel & Webber, 1973).

Social wicked problems involve constellations of stakeholders, which may have conflicting interpretations as well as different life experiences, competencies, goals, and values.” (Ibid). In this scenario, the design plays an important role by bringing together skills able to map the systems, articulate the actors and the multiplicity of different points of view and reduce conflict in favour of the best and most feasible solutions. According to Peruccio “design to the complexity is to achieve an inch-perfect objective through the concrete structuration and arrangement of multiple factors, processes and multilevel interactions originated from a context that results from three closely connected spheres: Biosphere, Sociosphere and Technosphere.” (Peruccio, 2017, p.72).

As Germak (2008, p.4), in the past 30 years, the Design has filled this gap with systemic approaches, combining different areas of knowledge, it has proved effective in developing broad themes, working at various levels of depth and complex (ibid, p.5). New systemic approaches in Design are emerging as: product-service system design; service design; human-centred design; design for social innovation; design for territory; systemic design and, finally, design for system innovation and transitions (Ceschin & Gaziulusoy, 2016). This shows the maturity of the design and the tendency to take the complexity as a starting point for solving complex problems that hinder sustainability.

In his systemic approaches, Design comprises that complexity is a natural condition in which living systems and social systems are possible, where they develop and evolve. For its natural condition, Design should not be ignored in any endeavour in which social evolution and the break of a sustainable paradigm are meant to be achieved. From this perspective, systemic approaches takes the design complexity as its basis and principles under the understand that: “Fighting complexity is a lost battle. Designers and managers should assume that complexity is irreducible. They should develop “metacognitive” skills and new ways of thinking, conceptualize and how to intervene in projects, understanding and assuming a greater epistemological solution that this implies.” (Real et al., 2017, p.61). That said, the next section is dedicated to present a Brazilian wicked real social problem, for the Brazilian Agrarian Reform, based on a case study carried out in 2018, in the municipality from Maragogi-Alagoas.

3. LAND REFORM - BRAZILIAN SOCIAL WICKED PROBLEM

The poor distribution of productive land is a complex problem that plagues Brazil since colonization. Its deep roots and branches are intertwined and co-emerging with serious socio-economic and cultural problems, which keeps this country among the world's worst development indicators. Carrying the burden of maximum expression of inequality and wealth concentration, this situation leads to the dissolution of basic social structure and human rights, becoming part of the population outcasts of organized society (OXFAM, 2016). Under the law, the so-called ‘land reform’ is currently coordinated by the National Institute of Colonization and Agrarian Reform -INCRA, an independent federal agency created by Decree No. 1,110 in the 70s, with the “priority mission to carry out land reform, keeping the national register of rural properties and manage the public lands of the Union” (INCRA, 2011).

According to INCRA (Idem), land reform provides: 1) The devolution of democratic and land structure; 2) Production of staple food; 3) Generation of employment and income; 3) Fight against hunger and poverty; 4) Internal-

ization of basic public services; 5) reduction of rural-urban migration; 6) Promotion of citizenship and social justice; 7) diversification of trade and services in rural areas; 8) Democratization of power structures. 7) diversification of trade and services in rural areas; 8) Democratization of power structures. 7) diversification of trade and services in rural areas; 8) Democratization of power structures.

Following the Land Statute - Law No. 4504/64 (Brasil, 1964) establishing principles of social justice, sustainable rural development and increased production, Incra (s/d) seeks the implementation of a rural settlement model based on “economic viability, environmental sustainability and territorial development.” Regarding the beneficiaries, the agency’s activities in the field is guided by “promoting gender equality, and the right to education, culture and social security in the reformed areas. “the rural settlements are to meet the realities and specificities of each territory and each community can be divided into two groups and take the following forms (ibid): *Group 1*) traditional Settlement Projects (PAs); Agro-extractivist Settlement Project (PAE), Sustainable Development Project (PDS), Forest Settlement Project (PAF) and Decentralized Project for Sustainable Settlements (PDAS); *Group 2*) agrarian reform settlements projects recognized by Incra, created by other government institutions for public access to the PNRA policies.

The land to be converted into settlements are acquired through purchase by the federal government, divided into plots which its dimensions respect local laws and distributed by purchase and sale agreement to the settlers. The ultimate ownership is earned only after full payment of debts to the government. Within the land reform program also provides up financial support (access to rural credit) and technical assistance to the families contemplated for the start of their agricultural activities, to the extent of their autonomy (ibid). According to INCRA (2019), between 1971 and 2019, 9,443 settlement projects¹, they conferred ownership of land to 973,580 families throughout the Brazilian territory. This number, however, is greatly reduced across the universe of families awaiting the benefit (Leite et al, 2004) in extremely vulnerable conditions. Popularly called ‘landless’ population, these families live long periods in camps, in tents made out of plastic and without any basic infrastructure such as water, electricity, sanitation, roads, schools, transportation, etc. Built on the edge of roads or private property, invaded in illegal actions of forced appropriation, these (un)human agglomerations are often filled with violent struggles from both sides, where the landowners, as the judicial staff, seek restitution of their land’s ownership.

Regarded as the ultimate expression of inequality, these camps expose the urgent need for integrated solutions that derive not only from land transfer and support to its productive use, but in ethical inclusion and socio-economic-cultural belonging reframing these Brazilians and their future generations as an integral and important part of a broader and more equitable system. In this sense, even if legally supported, Agrarian Reform, in practice, to fulfill their socio-economic and cultural function (re) structuring, requires multidisciplinary teamwork, multi-sector, multi-funds and multi-actors (Ferrão et al, 2015 p.57). The participation of Design, for its recognized skills in coping with wicked problems, can help to reintegrate this population in a sustainable and ethical perspective. However, the inclusion of Design as part of the leading solutions for the Brazilian Agrarian Reform is still not a reality. A preliminary literature search, considering Design in its various approaches, has shown that the existence of studies in this area are incipient when compared to the scale of the problem. Thus, in order to cooperate in the expansion of this theoretical and practical field related to Design and Brazilian Agrarian Reform, and more specifically on the role of gastronomy in the sustainable development of small towns, communities and differentiated societies, a survey was conducted along the rural settlements of Maragogi municipality in the state of Alagoas, whose procedures and results are presented in the following session.

4. CASE STUDY - SETTLEMENTS OF MARAGOGI CITY AND COOPEAGRO

This section describes the empirical data collection performed by the COOPEAGRO - Cooperative of Small Farmers of Organized Maragogi municipality, Alagoas, Brazil. Based on an Exploratory-documentary research and being also part of the doctoral thesis (Design and Gastronomy: systemic approaches of design applied to the sustainable development of small Brazilian communities), this present research had two phases: 1) collection of theoretical data and 2) empirical data collection. In the theoretical phase sources in the areas of Design, Theory of Complex Thought, Wicked Problems, Economics, Social Sciences, Political Science, Public Policy and Food were consulted and the data collected was organized under the Chrocane Method of systematic literature review (Clarke & Horton, 2001). The results of this phase are a theoretical knowledge that supports this article. The empirical phase built on theoretical research had site visits and open interviews that respected the regulations of the Brazilian Ethics Committee using the Survey Method. The selection of settlements studied had as main criteria the time of consolidation of the enterprise and the cuisine as the main product and source of income of the settlers. To measure the level of maturity, we used the metric ‘Implementation Phases’, established by INCRA (2019). To accomplish the goals of this study were selected only ‘Consolidated Settlements’. To meet the criteria of ‘food as a source of income and lo-

¹.The regulations on agrarian reform Rural Settlement define as a set of independent farms each other, installed by Incra where originally there was a rural property belonging to a single owner. (INCRA, 2019)

cal development', it was the type of crops grown and marketed by the settlers.

4.1 Results & Analysis

The application of empirical data collection tools yielded the following overview: the Maragogi municipality had, in 2018, 19 settlements, 11 of which were consolidated and 07 were involved with COOPEAGRO - Cooperative of Small Farmers Organized. Founded in 2003, it has now 135 member-cooperatives, which represent less than 10% of the rural population of Maragogi. The COOPEAGRO provides technical support and seeps local production of fruits and vegetables, balance results between vocation of the territory, such as physical and edaphoclimatic structure and skills and previous knowledge of the settlers. The cooperative, which helped to solve the bottleneck of marketing of fresh products, with incentives, encouragements and projects, now houses a small processing unit of fruit pulps, concentrated juice and ice cream, sold in Alagoas (Figure 3).



[Figure 3] COOPEAGRO. (Font: Author and COOPEAGRO)

Regarding food security, respondents reported that no member fits in organic production because of the difficulties inherent in the certification process, "the properties are small and within a short distance in space. Any movement towards organic certification must be collective. However, in order to reach profit, the production must be intense and with minimal losses. This is not possible for organic production. However, there is an awareness campaign to reduce the use of pesticides." For wastes, according to the respondents, there is a circular feed utilization in creation and composting. As for water, the cooperative demand treatment of waste water from the pulping process, currently fully dumped in the common network collecting water.

In addition to fruits and vegetables, such as diversification of income sources was associated with the introduction of beekeeping, which simultaneously provides honey and contributes to environmental health; creation of flour mills for the processing of cassava product consumed on a large scale in northeastern Brazil and to expand the use of inputs from the banana plantations, aimed at social inclusion and reduction of gender inequality, such as the support of SEBRAE - agency mixed capital, created the Women of fiber Project promotes banana fiber crafts. In 2018, through the Alagoas Secretary of Agriculture, created a project for creation of fingerlings. Recently, also in partnership with the SEBRAE and Secretary of Tourism of Alagoas, established the Rural Tourism - *Visgueiro Trail*, promoting tourism in the settlements, with walks through pristine stretch of Atlantic Forest, visits to family farming, lunch with local cuisine, visit to the flour mill, among others. This route benefits from strong coastal tourism Maragogi and includes a rural area in the social agenda. All these products are exposed and are marketed in COOPEAGRO, open to visitors. Weekly cooperative conducts fair horticultural products from members and offers daily lunch breakfast and lunch made with local produce. Outside the physical space of COOPEAGRO, foodstuff produced in the settlements are sold at fairs in gastronomic establishments and the local hotel chain.

Analyzing the theoretical-empirical data, it can be said that the problems related to the Brazilian Agrarian Reform are from a wicked nature and to fulfill its socio-economic and cultural (re)structuring functionality, it is required a collective, multidisciplinary effort, multi-sector, multi-funds and multi-actors, with investment in the short, medium and long term. The distribution of land, per se, does not represent the dissolution of the previous system, but a turning point for the restructuring of the system through new elements. This restructuring must be accompanied and guided, being desirable that the whole process is preceded by multi-supported systemic planning that equalize objective and subjective questions and is constantly feedback and refocused through these feedbacks.

The process of creation and consolidation of rural settlements creates new structures, putting in the same system people with skills, stories, different knowledge and cultures, who have gone through a serious process of social marginalization, losing the sense of identity and belonging. The physical geographical boundaries provide working conditions, but there is an urge to the application of a belonging process in order to build from scratch their identity, negotiation and balance of the differences and finally, the development of tangible structure and intangible dynamic resulting from other cultural and social boundaries that unites and helps them communicate to the external environment. The territory acts as the backbone of issues related to land reform. The land, as the object of dispute, assumes many roles in relation to the settlers.

The theory predicts that the beneficiaries of it can produce its own economic growth and move upward. The data demonstrate that by joining the vocations of the territory and 'seated' can, yes, promote economic and social development to families which were previously living under vulnerable conditions. But also shows that not everything aligns with this proposal, there is need to diversify income opportunities in settlements to take advantage of all kinds of human vocation assembled. As for the object of research, gastronomy, the data support its alleged potential

as a leading actor for economic growth for small communities and for local social cohesion. It also shows that it is effective as a liaison and open up a dialogue just as the extra-social and cultural spheres, besides it also works as a differential promoter to territory-society-identity dynamics. Products of the studied settlements were in reality a common language among small farmers, as other social factors, preventing isolation and social exclusion.

Today, gastronomy is the main source of income of Maragogi settlements and the activities gastronomy' related complement the income and unemployment related issues by promoting minorities inclusion and gender equality. The COOPEAGRO has a strategic and fundamental role in the improvement and local development process, visualizing problems and demands, proposing and organizing projects, identifying sources and resources of all kinds for the sake of not only its members but of all the settlers of Maragogi-AL-BR. Good management of the cooperative and their sensitivity and openness to the demands of the region, has promoted its steady growth, increasing the return to the cooperative and encouraging new projects, always supported by multiple national and international entities. Lastly, it is stated that the process of land reform is not and cannot be limited to local settlements. It is a systemic process and should be taken over by the Brazilian population, in order to achieve an effective performance of equitable ethics for sustainable development.

6. FINAL CONSIDERATIONS

This article discussed sustainability as a wicked problem and offer ways to design in complex systems, more specifically in social systems on emergent countries, affirming that social problems are way more perverse and complex, representing concrete obstacles to overcoming the sustainability paradigm. In the context of emerging countries, as Brazil, the possible solution must involve all social stakeholders to address a social-ethical development a long-term. The participation of Design for its recognized skills in coping with wicked problems is strategic in the re-integration of the population within a sustainable, fair and ethical perspective. The systemic complexity of the issues involving the Brazilian Agrarian Reform, however, requires systemic approaches to design for the complex, whose methodologies are able to map the system and set to identify its boundaries, its structure and its multi-dimensional interactions, identifying actors and their roles, summon new actors, identify relationships, weaving new relationships, identifying conflicts and creating mechanisms for identifying new conflicts or rebound effects as well as possible ways to solve them.

Using graphic tools, translating their findings into a language that can communicate with participants, evoking and coordinating participatory codesign. Without giving up traditional strategies, systemic approaches to design, may offer theoretical and empirical knowledge appropriate to the complex social issues emerging Brazilian Agrarian Reform and adapt their processes to the guidelines of sustainable development. Like any complex question, the design should provide the short, medium- and long-term actions, based on continuous feedback and readjustments inherited in the dynamics of social processes that are involved.

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