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Systemic Network Around Education and Community Gardens

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Abstract

Recently, the majority of the Brazilian population is living in cities, and the slums are growing within poor living conditions, in a context of enormous social-economic inequality. One of the local challenges is the poor nutrition of its inhabitants, together with the high cost of healthier food. This article presents the results of an urban farming project, developed through the partnership of universities and some communities at Belo Horizonte, Minas Gerais. It represents university research and extension projects on building community gardens, aiming at the constitution of a social-economic innovative process to increase local social cohesion, popular protagonism and food sovereignty. Each garden is facing particular challenges in relation to its social, environmental and economic sustainability, but the initiative is proving to be a significant alternative to humanize those spaces, systemically bringing together approaches as Design, Agroecology and Food Sovereignty and Solidarity Economy, Integral Endeavours and developing cooperative and innovative actions.

Keywords: Systemic Design, Agroecology, Social Economy, Solidarity Economy, Brazilian communities.

1. Introduction

World leaders, in September 2015 at a United Nations Summit, have decided to fight against some global long-lasting problems related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice, proposing the United Nations' Sustainable Development Goals as part of a global agenda with targets for 2030. "Over the next fifteen years, with these new Goals that universally apply to all, countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind." (United Nations, 2018)

It is also important to point out that Brazil is facing many challenges due to social-economic and environmental problems that deeply affect the lives of their inhabitants, and need new theories and methodologies to overcome them.

In order to deal with these chronic problems, it is necessary a different approach from the current traditional emphasis on specialized knowledge that, up to now, has been incapable of tackling these problems efficiently. A systemic approach that embraces the complexity of dealing with many variables at once, despite being a challenge that requires cultural changes, also presents itself as a promising good strategy.

Systemic Design is one of the methodologies available that has tools to structure the work using a holistic mode. Working with this methodology already for some years has provided the opportunity to put some of its theory into practice and to recognize the complementarities and intersections with other known concepts. Its association with values and concepts that are becoming more and more widespread, such as the circular economy, sharing economy, agroecology, social and solidarity economy, shows a potential of producing substantial changes in the contemporary societies.

Those are subjects that are going to be discussed in this article that presents, together with theoretical concepts, cases where communities and academy get together to deal with issues such as nutrition, economic sustainability and social expression.

2. Methodologies and Concepts

2.1 Systemic Design and Integral Endeavours

An *Integral Endeavour* is any organization for productive activity (be it an industry, a household, an individual or the nature) that operates considering its holistic relations and is grounded on integral sustainable values (that is, works aiming at having social, economic and environmental resources to provide indefinite duration of its activities). It defines goals and builds networks, based on Systemic Design principles: 1) generating zero waste, by using the **output** (waste) of a system as the **input** (resource) of another one, optimizing the use of resources and creating an increase of cash flow and also new job opportunities; 2) identifying and fostering **relationships**, since the components of the network have common values and interests, and due to the recognition of the importance of connections of multiple areas of knowledge and performance, making systemic networks; 3) being

self-productive, sustaining itself defining its own paths of action and the joint coevolution of the elements of the system, all of which with equivalent importance; 4) giving special value to the **local** context and resources (human, cultural and material), which contribute to solving local problems and to create new opportunities; 5) placing people in the centre of the projects valuing **people** over products (contributing to the quality of life, with inclusion and accessibility, is considered more important than the production of goods).

Systemic Design is a methodology that makes available some tools to model the context/ business to be qualitative and quantitatively analysed. First, representing it as it actually is, and then creating its systemic ideal model. Its five principles give the guidelines that must be always present at the planning decisions. Depending on the endeavour that is being studied other systemic approaches that have, for instance, the influence of System Dynamics, may be used.

“Systemic thinking” is a way of reasoning that consider the complexity of the whole, a cognitive process that leads to the capacity of perceiving, modelling and evaluating the consequences of actions in an expanded way in terms of time and space (Andrade, 2014). It is related, but different from *“Systems Thinking”* that regards production, and is mainly about delivering to the customer the service he needs instead of just a product with a specific function [...] making products work together seamlessly (Mendonça, 2014). The *“Product Service System”* (PSS) is a methodology that follows this strategy, and is about *“a smart combination of products and services to create a high market value”*, *“function/ value creation for clients”*, *“working modular”* and *“combining sustainable concepts with powerful presence in the marketplace”* (Halen, C., Vezzoli, C., Wimmer, 2005).

The Systemic Thinking, and specifically the Systemic Design, instead of focusing on a central industry and on the objective of each single business, aims at the increase of its production as a means of maximization of its profit and works with *“a network of activities and products focusing on the environmental and cultural protection”*. It involves actors who are equally important and may come even from different biological kingdoms (animals, plants, algae, bacteria and fungi) with no notion of centrality (Mendonça, 2014).

The rationale behind these methodologies, such as optimizing matter and energy, recognizing every output of the system as a resource and stimulating connections, is a source of innovative endeavours that become new productive opportunities.

2.2 Agroecology and Food Sovereignty

Agroecology is an agricultural practice adapted to the productive requirements of the land available, encompassing the multiplicity of farming forms, as far as adopting ecological solutions in tune with the territorial, cultural and social-economic conditions of each agro-system. It is qualified by its principles, that maintain the management forms faithful to the natural environments available, contributing to preserve the biodiversity, the natural resources and the ways of life, building a character of broad sustainability. According to EMBRAPA (2006) agroecology aims at fulfilling the economic level (to boost income, work and market insertion), the ecological level (to preserve or increase the quality of the natural resources and the ecological relations of the ecosystems), the

social level (to include the poorest and promote food security), the cultural level (to respect the traditional expressions), the political level (to organize changes and the participation on the decisions) and ethical level (to adopt transcendental values).

Therefore, agroecology offers a theoretical reference that respects the “place”, decreasing the environmentally harmful agrochemicals and highlighting the importance of the diversity in farming, transforming its principles and practices into reality and valuing the ancestral sources of knowledge, as a product of the popular knowledge (EMBRAPA, 2006). For these reasons, agroecology happens throughout a plurality of formats, as far as encompassing historical gathered knowledge, reinforcing solidarity values and practices and preserving the identity of the local actors.

The propagation and valorization of the agroecology principles rescued initiatives that update and improve it as a science, nurtured by the indigenous and agricultural knowledge from different parts of Brazil (some of those experiences are well presented in the book Fraxe, Castro and Santiago, 2015). Some non-governmental, governmental and academic organizations are proving the fruitful association between agroecology and the improvement of food security, preserving the sovereignty, the conservation of natural resources and the agro-diversity of hundreds of rural communities (Altieri, 2010).

The concept of food sovereignty arised in the 1990s, associated to the agroecology concept, through the social demands of the Via Campesina association, that reunites peasant organizations around the world, mobilized against neo liberal rural politics recommended by the World Bank and by the World Trade Organization and adopted by many governments, affecting the way of occupying the land, to produce and commercialize food (Campos e Campos, 2007). It defends the right of autonomy of the countries to deal with its politics and strategies of production, distribution and consumption of food, protecting the small and medium agriculture, coincidently with the basis of the agroecological principles (Burity et al., 2010).

The connection of Food Sovereignty and Nutritional Sovereignty demands the assurance of the food autonomy of a nation and the implementation of a fair way of production and distribution of food (Burity et al., 2010).

In this sense, the extent of the interventions that intend to be materialized at the format of community gardens, within the principles of solidarity economy and agroecology has the potential to reach a complex list of solutions to face the deprivations suffered by [...] communities that are poorly included at the market economy, by promoting an unpredictable endogenous process [...] in which it is observed the promotion of latent resources and knowledge in favor not only of food sovereignty, but also of the local development (Mello et al, 2018, p.13).

2.3 Social and Solidarity Economy

In Brazil, since the end of the 1970s, communities affected with high levels of shortage began to practice the sharing and reciprocity to fulfill certain needs and improve their quality of life, originating a new economy, with opposite patterns to the hegemonic capitalism, called social and solidarity economy (Singer, 2001).

Within its scope came out associative forms to solve public local problems and the mutualism, product of a disposition to create a collaborative schema of generalized gain and self-management (Alves e Bursztyn, 2009; Ribeiro e Müylder, 2014; Borinelli et al, 2010).

This creates enterprises with shared properties of the productive resources and horizontal productive relations, as well as equal rights, responsibilities and opportunities among the participants (CNES, 2006 apud Singer, 2009). Their production tends to be accomplished at the networks, broadening the exchanges within the same organizational system (Simon, 2013; Mance, 2009).

Therefore, this is a plural new model of economy, encompassing many models of organization (Pinheiro, 2016; Ramos, 2013; França Filho, 2008; França Filho e Cunha, 2009). Despite some variations of the models, there are convergent principles in respect with the valorization of the work produced, the use of technologies to fulfill the needs of all, the recognition of the importance of the feminine concerning solidarity, the respect of the environment and the emphasis on cooperation and solidarity (FBES, 2005, s/p), principles constituting the basis of this project at the community gardens that are being built with real participation of the local residents.

3. The opportunities of the Educational Context

3.1 At ED-UEMG

Motivated by the Brazilian Law n. 9.795, from April 27th, 1999, that establishes the National Environmental Education Policy, the environmental education is considered “an essential and permanent component of national education and must be articulated at all levels and modalities of the educational process, both formal and non-formal”. For this, the graduate course in Visual Arts, offered at the Design School of the State University of Minas Gerais (ED-UEMG), that forms art teachers of basic education, has in its program the discipline “Special Topics in Environmental Education”.

ED-UEMG also offers academic extension activities with short courses on vegetable and flower urban gardens in small spaces that create, within the university, a dialog on different aspects of Design, on product lifecycle, new Economies (such as the Distributed Economy and Sharing Economy), and also promote exchanges between the academic community and the society.

Considering the intertwined nature of the environmental issues to the social and economic aspects and the fundamental goal of increasing integral sustainability, the main purpose of the discipline is to

foster Systemic Networks of Integral Endeavours, applying the Systemic Design principles. As the discipline is very interactive, with students also bringing their experience to the classroom, some very rich opportunities arise.

3.2 At UNA

The University Centre UNA receives research and extension projects at its Extension and Research Board, having as selection criteria projects that are committed to the sustainable development, as those foresee at the The Earth Charter, proposed by the United Nations World Commission on Environment and Development, at 1987, and ratified by UNESCO at 2000. Its principles are the basis for the constitution of the LEIA – “Laboratório Ecológico Interdisciplinar de Aprendizagem” (Ecosystemic Interdisciplinary Laboratory of Learning).

LEIA has a social character that integrates teaching, research and extension, putting together practices and studies of social relations, interdisciplinary knowledge and intersectoral actions. Its objective is to work with people from collective groups, that promote participatory and proactive actions, to “make it happen” and spread the principles of food sovereignty and urban agroecology, promoting the organization of production and consumption according to the principles of the sustainability and solidarity economy.

The LEIA achievements include the constitution of an experimental garden at one of the unities of the University, where workshops on sustainable relations take place. Outside, the Laboratory contributes, by means of actions of research and extension, to the implementation of community gardens, following its core principles.

3.3 At UFMG

At the context of Federal University of Minas Gerais, UFMG, parameters are being established for the institutional inclusion of this work, characterized as a Research and Extension Project that intends to increase the number of students and teachers involved with the community gardens movement. The intention is to involve different areas of study, at the Interdisciplinary Program of Master and Doctoral Degrees of Built Environment and Sustainable Heritage, at the Architectural School.

Also, the LIDEP - “Laboratório Integrado de Design e Engenharia de Produção” (Design and Product Engineering Integrated Laboratory) from the Department of Product Engineering from UFMG, is involved in these projects. LIDEP proposes a multidisciplinary and integrated approach on the Product Project subject, and its members have expertise and experience developing projects focused on product lifecycle, working with Design for Sustainability, Product Ergonomics, Quick Prototyping and Computer Aided Design.

4. Application Opportunities

Very interesting opportunities are evolving, considering the connection among the communities of four slums in different areas of Belo Horizonte (the third most populated and developed city of Brazil), three universities and the urban planning institution from the local administration (URBEL), as experiences aiming to overcome some of the local problems and also to apply those theories and methodologies presented above, creating a continuous circular process by the exchange of ideas and practices. All four ongoing cases have in common the existence of a vacant area within the community, some residents that see it both as a threat if left unused and as an opportunity to make some action for the collectivity, and as the chance of receiving the support of the academy and public administration, having cultural activities as a bond. In some cases, it is also being built opportunities of association with entrepreneurs, generating a new source of income for the group involved.

4.1 “Morro das Pedras”

The first community of the project is the “Morro das Pedras” Agglomerate, which is a neighborhood in the western region of the city of Belo Horizonte, formed by seven villages: Antena, Santa Sofia, São Jorge I, II, III, Leonina and Pantanal, in the place where there were originally several farms and a quarry. Today it is equipped with schools, nursery, public transport, medical and police stations. Nevertheless, the community still claims for basic sanitation, public lighting and security. Still, Morro das Pedras is a place of a significant cultural presence.

A student from the Visual Arts at ED-UEMG, Marcos Paulo de Jesus Horácio (Horacius de Jesus), who lives at Vila Antena, has invited us to give a workshop within the community to produce fertilizer from organic waste in order to enrich the soil of an area where there used to be some sheds, removed by local administration because it was beneath a high voltage powerline.

In this area, as described by Horacius, they have now a community vegetable garden, where 6 persons from the community volunteered to work donating 2 hours a day during working days and 5 hours on Saturdays. Organic waste, some seeds and seedlings are donated by 11 families that participate in the project in exchange for a weekly bag of vegetables distributed to the children of the local school that also participate in this movement.

After about a year of development of the vegetable garden along with artistic and cultural activities, the community has won a contest for a financial support of the Brazil Foundation organization and Horacius has won a photography contest with an image picturing the community. The values of Integral Endeavours have served as guidelines to define activities as well as style of leadership, community engagement, local education and economic sustainability decisions.



Figure 1. A local fair in Vila Antena, where the community offers its own production (including vegetables) and services (left), and the plot where a new community garden is being built, together with other sustainable activities (right).

4.2 “Santa Lúcia” Community

The second community is in the “Santa Lucia”, also involving an area that has been made vacant by local authorities (URBEL), because of its geological risk. Professors from the private university UNA have been asked by locals to give support to make a community garden. From the partnership established among UNA, ED-UEMG and UFMG due to their common interests in research and extension projects, the group is working together with the community in this initiative, making collective actions (“mutirões”) and surveys to understand the culture of the community and their needs. It is being an interdisciplinary effort with the engagement of designers, architects, economists, agronomists, sociologists, engineers, gastronomists, nutritionists, with the support of URBEL, gathering human and material resources.



Figure 2. The site where the community garden of Santa Lúcia is being built. On the left, locals harvesting their initial production. On the right, one of our team's agronomist, facilitating the process of levelling the terrain

Throughout this work, a spontaneous management group has emerged, establishing unprecedented interactions in the community, increasing their social cohesion. From the principles of Integral Endeavours, Agroecology and Solidarity Economy, the group of residents, researchers and students have developed a series of collaborative actions, different from the capitalist traditional market logic. At the same time, rich discussions about the principles of the vegetable gardens, its management and distribution of production are promoted, emphasizing the quality of the local production (healthy food, without pesticides) and the importance of the conscious consumption. It is noticed that some residents extended their autonomy and voice, because before they were reluctant and now are expressing themselves and realizing interventions that are gradually transforming the space.

It is important to highlight the relevance of the adoption of some principles that guide the interventions and are intended to be internalized by the community, in order to create an authentic endogenous local development (Martins, Vaz e Caldas, 2010; Paula, 2008; Oliveira, 2001). The election of a model of social management with its main features (participation, dialogue, respect to the autonomy, shared decision-making, collective implementation) is a requisite to reach this goal (Gohn, 2004; Justen e Neto, 2012; Macke, Carrion e Dilly, 2010; Kleba e Wendausen, 2009; Cançado, Pereira e Tenório, 2013). For that, the methodologies and references adopted to base actions and research include observant participation and field diaries, as well as participatory action-research (Tripp, 2005) as a guiding center line, together with the principles of Systemic Design, Agroecology and Solidarity Economy.

4.3 “Taquaril” Community

The third community is in the neighbourhood of Taquaril. In this case, URBEL has invited the academy (represented by UNA, UEMG and UFMG) to support some families to develop their urban gardens, in a preservation area. There, the growth of dense bushes nearby the residences represented a danger to the families for hiding illicit activities as well as synanthropic animals that are a threat to human health.

In this context one of the residents decided to clean the area in front of his house and began cultivating some vegetables. He is a retired resident with previous expertise on agriculture and is becoming a reference and inspiration for the neighbours.

The first contact was to understand the community needs and, for that, a focus group was made with some residents who lived near this area. Other meetings happened to the exchange of knowledge on how to fight pests and how to build protection against harsh weather. The university team also conducted a practical workshop on composting.

The resident who began this movement is succeeding in developing a very productive space, but the neighbours are not quite engaged yet, although our research group is willing to make activities to involve and foster collaboration within the community.



Figure 3. The site of the community garden of Taquaril. On top left, our team and the residents who participate in the initiative.

4.4 The “Aglomerado da Serra”

The fourth case is at the “Aglomerado da Serra”. There, there is a group that is rather independent, having already a practice of involving the community in the selective collect and organic compost making with and without worms. Some leaders of the community give workshops on this practice and sell boxes for vermiculture. We have participated as students in their workshop and afterwards have invited them to take part in a short extension course on vegetable and flower urban gardens that was promoted in the ED-UEMG. Agroecological practices have been the main focus of this group, as a way of life, along with healthy eating and income generation.



07/05/2016

Figure 4. The “Aglomerado da Serra” region and one of the sites where a community garden is being built.

5. Conclusion

Much has been discussed on the search for solutions to the problems arising from the accelerated process of urbanization, perceived in England in the nineteenth century, in Brazil from the 1950s on, and now in countries such as China and India. In situations like these the previously existing forms of production (such as small agricultural production and handicrafts) collapse, as well as structures of social relations based on tradition. Among the different problems encountered, access to adequate food, culture and leisure can be mentioned, as well as the loss of the principles of social structuring aimed at the cohesion and articulation of groups of neighbors aiming at common improvements (of which the Brazilian tradition of the “mutirão” is a good example).

Taking as reference the food issue, the urbanization, the growing inclusion of women in the labor market, the availability of processed foods at low cost and high costs of the healthy ones have brought about considerable changes in eating habits and serious public health problems due to obesity, affecting also the child population.

In the experiences presented in this article, the problem of food is not considered in isolation, but within its social context, including the necessity (or opportunity) of the generation of work and income. This approach to social innovation through Systemic Design makes an important contribution to the development of appropriate solutions for socially complex contexts as seen in

large brazilian cities and demonstrates how design methodologies (as the Integral Endeavours) can contribute significantly to the solution of human problems.

All these initiatives have as main goal the strengthening of social cohesion within the communities and the widening of their autonomy to be reflected in self-management, broadening of collective identity and health promotion by food sovereignty, strengthening conscious agents, protagonists of relationships and of their living spaces. The theoretical foundations are the principles of Systemic Networks of Integral Endeavours, Agroecology for Food Sovereignty and Social and Solidarity Economy. Social inclusion, valorisation of diversity, exchange of academic and empirical knowledge are also cornerstones of this project that has the potential to promote exponential impacts at people's lives.

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