

THE MOVEMENT FOR SOCIAL TECHNOLOGY IN LATIN-AMERICA (ITS MEANING FOR THE RESEARCH ABOUT DEGROWTH AND ECOLOGICAL SUSTAINABILITY)¹

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INTRODUCTION

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Latin America has part of its population facing chronic sanitation, water supply, energy, food and housing problems. Most of the region's countries show unsettling educational, social and economic indicators, showing diminishing, marginality, unemployment, poverty and social violence in a increase rate to be exacerbated. Large proportions of the population (around 20-50 % in different countries and indicators) live in conditions of exclusion, marked by a large spectrum of deficits.

The solution to these social problems is probably the biggest political and economic challenge for local governments. All these problems are part of the largest chronic and structural social debt of the region, and face them seems to exceed the current local governments' capabilities to response. It would demands the utilization of resources equal to 50 % of the national gross product of these countries. The persistent resilience of social debts shows how inefficient the mechanisms of market and economic growth are to change the socio-economic scenario. It is at stake one strategic dimension related with the technological solutions of the problems as a challenge itself.

To include the excluded people by using conventional technology requires a prohibitive demand of energy, goods and raw materials which would have a huge impact on the environment and would cause social and political imbalances. It seems necessary to produce a strategic switch. It does not seem reasonable to face this challenge by multiplying the available technology without a careful analytical evaluation of other strategies. The importance of the technological dimension has not been properly addressed in the search for solutions of social development of the region. In this context, the study of Social Technology is a priority in order to plan strategies for democratization, socio-economic development and social inclusion in Latin America.

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One of the obstacles associated with the lack of satisfactory theoretical tools is the absence of scientific empirical analyses. Most of the information about Social Technology is source-books, guides of available resources and list of working groups specialized on the subject or, merely, inventories of experiences. There is a need for very few empirical studies based on satisfactory theoretical and methodological grounds. Therefore, this research seeks to contribute on the subject of the meeting as far as I wish to persuade those who are concerned with degrowth and ecological sustainability that democratic institutions have to be engaged in constructive efforts to include technology as a social construction itself. The paper presents a sketch of how to built and deal with empirical, analytical and theoretical tools for researches about Social Technologies in Latin American. It systematizes and analyses the existing reports and creating a special methodology in order to analyze initiatives and policies connected to Social Technology and then, we can make correlations with degrowth and strong sustainability.

1. SOCIOTECHNICAL DIMENSIONS OF SUSTAINABILITY & DEGROWTH

The importance of the technological dimension has not been properly addressed in the search for solutions of social development and degrowth of the region. In this context, the study of Social Technology is a priority in order to plan strategies for democratization, socio-economic development and social inclusion in Latin America (see INFO I).

One of the obstacles associated with the lack of satisfactory theoretical tools is the absence of scientific empirical analyses. Most of the information about Social Technology is source-books, guides of available resources and list of working groups specialized on the subject or, merely, inventories of experiences. There are very few empirical studies based on satisfactory theoretical and methodological grounds. Therefore, the research here described seeks to contribute on this subject, systematizing and analysing the existing reports and creating a special methodology in order to analyse initiatives and policies connected to Social Technology.

“Appropriate technologies” available nowadays show a series of restrictions: they are conceived as mitigating interventions focused on users with low education level. As a result, these technologies create patronizing dynamics. On the one hand, they privilege the utilization of expert know-how, beyond the reach of user-beneficiary’s knowledge. On the other hand, they underused the local and historically accumulated technological knowledge (tacit and codified).

Therefore, “appropriate technologies” normally employ simple technological know-how and mature technologies, leaving aside the possibility of making use of the potential available scientific and technological developments. The engineers and policy makers normally ignore that appropriate technologies become inserted within the process of capital accumulation. Therefore, these technologies sometimes are economically unsustainable. Consequently, it is not strange that, in the long term, “appropriate technologies” generate detached economic dynamics which reproduce new forms of exclusion and social disintegration.

New conceptualizations, in the fields of sociology of technology, policies analysis, philosophy of technology and economics of innovation and technological change, help us to solve some of the limitations of the “appropriate” technologies approach.

Rather than solving specific deficits, Social Technology can be related to the generation of capacities that can sort out problems, to create dynamics of local production, technological change and socio-technically adequate innovation. Thus, this approach help us to overcome the limitations of linear concepts in terms of “transfer and diffusion”.

In the field of Social Technology, S&T push models and demand pull approaches (Thomas and Dagnino, 2005) are as inefficient as in the “neo-Schumpeterian” innovation one. Since the socio-technical translation of Social Technology implies a nonlinear problem-solution approach, it will be necessary to develop new strategic capacities (diagnosis, planning, design, implementation, management and evaluation).

The development of Social Technology implies economic advantages: social inclusion, raise of employment, integration of population to service facilities systems. But at the same time, we need to highlight that generating Social Technology means new possibilities and opportunities in economic and in productive terms. Key questions in this field are: the differentiation of products, the adaptation and the improvement of productive processes, the development of new forms of cooperative organizations, the production of added value, and the intensification of the cognitive content of products and processes. It is important to answer these questions in order to diversify the productive structure of developing economies and to generate structural improvements in the population living conditions.

The design of Social Technology also implies the possibility of generating innovative practices of product and process differentiation. Far from the static invention of an “appropriate” solution, Social Technology development may imply the generation of local innovation dynamics, the opening of new lines of products, new productive enterprises and new opportunities (not only in the local but also in the foreign market), as well as the creation of networks of intermediary users and suppliers.

A variety of technologies that allow access as well as saving on health and transport systems, housing and communications can be linked to the creation of reference prices and the reduction in costs of services logistics and infrastructure. The fitting of Social Technology, locally generated, to specific situations and its compatibility with pre-existing systems also implies a potential expansion in third markets of developing (and even of developed) countries.

A multiplicity of socio-political problems may be resolved through the implementation of Social Technology, many of them among the goals of degrowth and sustainability movements. For example, when the organizational and educational dimensions are incorporated, the use of Social Technology can also solve other problems related to prevention and security, access to human rights and cultural goods. Consequently, to strengthen the social space of decision making brings new perspectives for the action of social movements (NGOs, popular cooperatives, communitarian organizations). These actions may include: new practices of self-management and design of local solutions, and the development of abilities to coordinate the local capacities of Science and Technology R&D with the needs and requirements of the populations.

These dynamics can open a new dimension in democratic relationships: incorporating users and beneficiaries to process of decisions over technological change. Thus, the participation of the users and beneficiaries in the process of design and production of Social Technology creates a new dimension of democratic societies: socio-technological citizenship.

2. MAIN SCOPE OF A SOCIOTECHNICAL RESEARCH ABOUT ST

Researchs about ST may be designed to generate data lined up to these opportunities and needs. Far from the mere deductive speculation, the empirical study and analysis of these experiences can provide the answer to strategic questions:

- How to design and implement technological solutions to social problems?
- How to diminish the risk of malfunctions and undesired effects?
- How to conceive plans of social and economical development based on the production and implementations of Social Technology?
- What are the capacities available in the region in order to develop Social Technology?
- How to integrate ultimate user-beneficiaries (social movements, NGOs, grassroots cooperatives, etc.) to the processes of design and implementation of Social Technology.
- How to integrate the highly qualify Science and Technology human resources available in the region to the design and implementation of Social Technology?
- How to manage and evaluate Social Technology programmes.

3. SOME THEORICAL DISCUSSIONS

It is possible to define Social Technology as a way of developing and implementing technology aimed to generate social and economic dynamics of social inclusion and sustainable development.

The concept of social technology is an actor's category: used by several local organizations in order to name this kind of initiatives. As this research will be based on a social relativism and social constructivist approach (Pinch and Bijker 1997; Bijker, 2005; Thomas and Fressoli, 2008b) we initially have adopted this term.

Social Technology extends to a wide spectrum of productions: food, housing, energy, drinkable water, transport, and communication, among others.

The main actors involved in the development processes of Social Technology in this region are: social movements, popular cooperatives, NGOs, public R&D centres, governmental departments and decentralized institutions, government business enterprises (and, to a lesser extent, private enterprises). This example allows us to illustrate the characteristics and the scope of Social Technology.

INFO. 1

PAIS Project (Integrated and self-sustainable agricultural and ecological production in Brazil)

PAIS is a technology of organization of agricultural production aimed at producing organic food (vegetables, fruit, and poultry) for a five-member family. The production system has been developed for average size farms (5 ha/12.5 acres) and attempts to be self-sustainable and to introduce agro ecological outputs in the organic food market.

It is an innovative experience, not only due to the circular layout of crops around the animal farming zone, but also due to the complementarity and self sustainability of the system, regarding manure and pastures. The programme provides the first basic materials, crop growing training and commercialization of the products. So far, 1080 PAIS experiences have been implemented, which have allowed families to be self sufficient and to obtain some surplus production that goes to the market. This meant an additional income for the beneficiary family.

The pioneers of this experience, the Brazilian Support Service of Micro and Small Enterprises (SEBRAE), the Brazilian Fund Bank, Petrobras and the Ministry of National Integration, consider it a success and it is their intention to install 5000 systems by 2009. The feasibility of this experience is based on the simplicity of the system, the constant training and evaluation provided along its different stages (set-up, training, evaluation, adjustment and marketing)

and the economic support obtained. Besides it, the key intervention of the Social Technologies Network in the set-up of the program has allowed not only to increase the number of experiences but also to integrate other social technologies such as energy systems, water cleaning, etc. (Revista SEBRAE Agronegócios, 2006, 2007).

Around the middle of the 60s, a growing concern for technologies called “appropriate”, “intermediate” (Schumacher, 1973), “alternative” (Dickson, 1980) or, more recently, “social innovations”, or “grassroots innovators” (Gupta, 2008, Gupta *et alli.*, 2003) began to appear in the Western hemisphere. These definitions implied different theoretical approaches and consequently different technologies and strategies of intervention. The explicit aim of these technologies was to answer to the community development problems, service development, and to introduce productive and technological alternatives in socio-economic scenarios characterized by extreme poverty (in several underdeveloped countries of Asia, Africa, and, to a lesser extent, Latin America). Some archetype examples of these technologies are: biomass reactors, some low cost energy systems (based on solar and wind energy), building techniques for social housing and agro ecological crop systems (or, more recently, massive education projects such as “One Laptop Per Child”).

In general, “appropriate technologies” had the following characteristics: reduced (family or community) scale, low-tech complexity, the use of mature technologies, limited use of scientific and technological knowledge, low investment, low cost supplies, and scarce or no relationship at all with the market. Many of these efforts were discontinued; either failed or generated considerable negative effects. (see INFO II).

Two examples show clearly of how, in the construction of well-working, matters either the design of technologies as well as the specific institutional arranges for its implementation.

INFO II

Fog collectors in Chile

The fog collectors project was an experience focussed on drinkable water provision, developed in the locality of Chungungo (in the north of Chile) at the end of the 80s. The original aim was to obtain water for reafforestation by capturing environmental humidity. This project received IDRC funding and was developed by researchers from the Chilean

Catholic University and the Forest National Corporation (CONAF). Taking into account the results obtained and the volume of water collected with this system, the actors involved in the project considered that it could supply drinkable water to an isolated population.

It consisted of a water collector system (four-metre-tall and twelve-metre-long, rectangular frames with a double nylon net and a storing and distribution system), controlled jointly by the CONAF and a local water facility committee. It was simple to build and to operate, it needed little know-how and it was easily understood by users without technological training. These fog collectors were able to gather 237 litres of water per day at an average of 5 litres by square metre.

With an important institutional and financial support, 92 collectors were installed from the end of the 80s until 1996. However, in 2001 only 12 were working, and the remaining nets were in a state of disrepair. Several reasons met in its failing, e.g. the privatization of the sanitation service company, the lack of a permanent structure for decision making and administration, lack of qualified technicians support and people's growing mistrust to what they started to consider an unstable and unreliable technology (Anton, 1998; De la Lastra, 2002).

Biodigestors programme in India

Since the mid 60s, an extensive programme has been developed in India: a gas production programme with biomass reactors. The original idea was to provide families and community groups with an efficient tool to boil up food in order to avoid ailments associated to microbes and infections. Governmental institutions along with several international agencies promoted and funded the construction of biodigestors.

A recent survey showed a severe underutilization of the installed capacity. The 2002 report showed that only 55% of the family equipments and 7,3 % of the community equipments were fully working (India Government-PEO, 2002). Among many other explanations, there are two remarkable ones regarding the cognitive assumptions that guided the design of this programme.

On the one hand, socio-cultural aspects, such as religious taboos associated with forbidden contact with animal excrement and division of labour according to a caste system, made it difficult for the community to set the tasks of collection. On the other hand, economic aspects related to the pricing of raw material needed for the process (until that moment excrement was free and freely available), and therefore it brought about conflicts about property rights of the new "goods" (which had acquired exchange value). This explains not only, the

underutilization phenomenon, but also the differences in utilization between community (subject to more social conflicts) and family biodigestors.

3. SOME EMPIRICAL DIMENSIONS TO BE AVALUATED

To survey and analyse the existing capacities in the region, to produce theoretical and methodological inputs for the reflection on Social Technology, and to building up capabilities for human resources on development and management. The diffusion and debate of these findings will also be an asset to promote the formulation and implementation of public policies on Social Technology aimed at the generation of dynamics of social inclusion

- a) To study and develop a theoretical and methodological framework tailored for research on Social Technology. To propose new concepts and approaches for Social Technology design, research and development, implementation, re-application, management and evaluation.
- b) To survey and map institutional experiences and capacities (governmental, nongovernmental, from R&D public institutes, from popular cooperatives, from international agencies and enterprises) of development of Social Technology in the selected countries in Latin America.
- c) To analyse the initiatives of Social Technology implemented at those countries from a socio-technical perspective.
- d) To analyse socio-politically programmes and governmental agencies involved in Social Technology planning, promotion, production, finance and evaluation.
- e) To promote in social movements and popular cooperatives capacities to participate and intervene in the construction of public policies agenda of science and technology.
- f) To create capacities in governmental and nongovernmental organizations for strategic planning, formulation, implementation, management and evaluation of public policies on Social Technology

4. SOME METHODOLOGICAL APPROACH OF THE MOVEMENT FOR ST

The conceptual and analytical approach for project's like this working with social movements (and inside then, looking for sociotechnical finds) has to be done through the integration of theoretical

tools from different disciplines (sociology of technology, policy analysis, philosophy of technology, economics of innovation and technological change, and history of science) based on its complementation and critical revision and fitting to the local context (Thomas, 1999; Thomas y Kreimer, 2001; Thomas y Dagnino, 2005, Dagnino *et alli.*, 2004). Listed below there are some of the theoretical and conceptual developments meaningful for this research.

- **Social-technical analysis:** dynamics of researcher groups (Shinn, 1982; Latour, 1989); techno-economic networks (Callon, 1992); relevant social groups and interpretative flexibility (Collins, 1985; Pinch and Bijker, 1987); technological framework, socio-technical ensemble (Bijker, 1995); social construction of working, socio-technical dynamics and evolution (Thomas, 1999 y 2001); processes of co-construction (Vercelli and Thomas, 2007); socio-technical adequacy (Dagnino *et alli.*, 2004; Thomas, 1999 y 2008 a and b);
- **Critical analysis of technology:** dialectical approach to technology (Feenberg, 2002); critique of neutrality and determinism of technology (Dagnino, 2008); context of implication (Tula Molina and Giuliano, 2007); instrumentalization theory (Feenberg, 2002)
- **Policy analysis:** decision making processes; processes of agenda conformation and implementation, organizational models, integration of external actors to the decision making process (Knorr-Cetina, 1981; Hogwood and Gunn, 1984; Ham and Hill, 1993; Elzinga and Jamison, 1996);
- **Economics of innovation and technological change:** techno-economic trajectory (Freeman, 1987), technological trajectory (Dosi, 1988), learning processes (Arrow, 1962; Rosenberg, 1982; Lundvall, 1992), user-producer relationships (Von Hippel, 1976), national and local systems of innovation (Nelson, 1988; Lundvall, 1992; Amable *et alli.*, 1997; Freeman, 1998); learning society (Christensen and Lundvall, 2004).

From this perspective, it is not possible to consider artifacts as merely technological or merely social. On the contrary, this approach considers technology as the result of a dynamic process of building “socio-technical ensembles” (Bijker, 1995) and also an outcome from what Feenberg calls *ambiguity* between science and (*techno*)science as far as technology must be seen in a separadly experiential way of living (Feenberg, 2002). The shape of the artifacts but also its own functioning are built as an outcome of disputes, pressures, resistance, negotiations and convergences. All this points are related with degrowth as a social construction of technologies coherent to this context.

The theoretical and methodological effort will be focused on the improvement of the explanatory-analytic capacity of these conceptual tools and its adaptation to local contexts. As a result, a coherent set of concepts will be built and operationalized during the research.

This research is based on surveys, data collection and case study analyses, designed to carry out economic-productive, political-institutional and socio-technical studies of the capacities and initiatives of design, research and development, production, implementation, management, and evaluation of Social Technology in Brazil, Argentina, Uruguay, Chile and Peru.

Case-study analyses may be focused on the following technological sectors: energy, housing, water, food and health. These sectors were selected in our case because they allow to create and improve policies in four levels: a) design of technologies, b) solutions to productive problems, c) solutions to key problems of the region, and d) design of new public policies for social development.

4. SOME SOCIAL MOVEMENTS´S PARTICIPATORY DIMENSIONS

One of the main objectives of projects´ with Social technology should be drive for building up capabilities of actors for the design, implementation, management, and evaluation of tacit technologies in the region. Actually, this implies building up capabilities of three types of users: institutional actors related to the production and implementation of Social Technology, actors involved in the process of building up policies and decision making, and communitarian actors and final users of Social Technology.

The project also, implies the active participation of researchers and Social Technology developers (from R&D institutions, universities, NGOs, enterprises, etc.). Either in the review of actions of local capacities available and in the generation of new capacities, the participation of these users (in the esearch as well as in the different moments of building up capabilities of human resources) is a key operation to reach the objectives of this project. The setting up of a regional network of institutional actors will make the cooperation viable and will also increase the visibility of the initiatives and the consolidation of the current actions.

Appart from it, the inclusion of policy makers, decision makers and policy implementers (from governmental institutions, cooperation international agencies, public agencies and enterprises´ representatives) will facilitate at the same time the enlargement of the political and social space for the development of Social Technology and the generation of capacities for planning, management, and evaluation (both local and regional).

And last but not least, the survey and analysis of initiatives of development and implementation of Social Technology will include the participation of the ultimate user-beneficiary in the processes of design, production and put into practice of the Social Technology. The plan of action (related to object f) will be aimed at reinforcing the role of communities in policy making processes, decision-making and *ex-ante* evaluation but also in development, implementation, management and *ex-post*

evaluation of Social Technology. Representatives of social movements, NGOs and grassroots cooperatives will be specially trained to do mapping and selection of case studies.

In this sense, this project has been planned to achieve a number of activities and products focused on the aforementioned three types of users, ranging from learning on Social Technology strategic planning (workshops and courses) to the building up of networks and the implementation of means of communication (web sites, audio-visual materials, policy papers, etc.).

5. SOME STRATEGIC CONTRIBUTIONS TO THE ADVANCE OF KNOWLEDGE

It is hoped that results of such investigationS should be proved to be good enough to contribute to understand learning processes and productive use of knowledge locally generated for social movements in the field of Social Technology. Simultaneously, it allowed the development of theoretical and conceptual tools suitable to analyse and strategic plan for technological change and innovation in the local context (extending to similar scenarios in the region). At this level we could implement:

- a theoretical and methodological framework suitable for the analysis of processes of production and implementation of Social Technology in developing countries,
- an analysis of the economic-productive, socio-technical and politico-institutional evolution of development and implementation processes of Social Technology. At the same time, an analysis of local processes of socio-construction of Social Technology usefulness and operation,

It is advisable that the results are also useful to analyse **socio-technical dynamics in general**. In this sense, investigations like that may generate a contribution in the fields of sociology of technology and economics of innovation and technological change: from the concepts common to both sub-disciplines in the integrated theoretical and methodological framework, to the exploration of key phenomena (processes of socio-technical construction of “well working” of devices, integration of tacit and codified knowledge, user-producer interaction and learning processes, processes of generation of use value and change value of technologies).

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