Technologies for Freedom: collective agency-oriented technology for development processes.

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ABSTRACT

The concept of Appropriate Technology is not new. It refers to small scale, simple and low cost technology that involves community participation, intensive labour force, use of natural resources, respect to local culture and environment, among other characteristics (Schumacher, 1973; Brandão, 2001). Nevertheless, there is a growing criticism about the use of appropriate technologies in development projects (Dagnino, 1976; United Nations Development Programme, 2001; Herrera, 1983; Shiva, 2009; Leach and Scoones, 2006; Chambers, 1997). The critiques focus in two main groups. On one hand, on the replication of the models or products of appropriate technologies: the specific contexts where appropriate technologies are implemented in developing countries complicate the replications of products or models. On the other hand, it is criticised that the communities are seen as the final stakeholder that benefits from a technology designed in developed countries. In this sense, generation of knowledge is not transferred, and it is suggested that enlarging the technological alternatives offered to developing countries is not sufficient to change the nature of the process of implementing technologies. Adopting the Sen's approach (1999), we assume that the main purpose of the development projects is to expand the real freedom of people, and we believe that it is necessary to re-examine the conceptualization of technology throughout the lens of an approach that focuses primarily on the process instead of stressing the results and products of the interventions. To do that, we explore the Capability Approach, which centres attention on the people's capabilities or real possibilities of leading a life that they have reason to value (Sen 1999; Nussbaum 2003). This approach allows expanding the conceptualization of technology towards a new definition that incorporates, from conceptualization to implementation, an intention to promote human development. In the paper we introduce Technologies for Freedom (T4F) as the technological processes, driven by the community, in order to generate real social transformation. After that, we point out some features of T4F community development projects. Finally, we present two different case studies of technology-oriented development aid projects implemented in rural areas of Guatemala and Bolivia, where effects and results are examined taking into consideration the T4F characteristics.

KEYWORDS: Technology; Collective Agency; Collective Empowerment; Participation.

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INTRODUCTION

‘Chucura’ is an indigenous Aymara community in the Bolivian rural area. National and international donors funded a project for building a micro hydro power plant of 21 kW designed for providing electricity to the 50 families living there. However, the community did not really engage with the project and, after some time, the plant was working only from time to time and nobody seemed to be responsible for its maintenance. The project had little impact on the development process in the community and did not contribute at all to the empowerment of its members.

On the other hand, ‘Nueva Alianza’ is a community of 45 coffee producers’ families in the rural area of Guatemala. An international donor funded a micro hydro power plant requested by this community. Although the final amount of energy delivered did not correspond to the initial forecast, this project represented a considerable advance on the development process of the inhabitants of ‘Nueva Alianza’. Through community participation, the power plant is working properly and has served as a driving force for the community to become involved in other new projects.

Why, if both projects got electrify a rural area, one can be considered successful and the other not?

This paper aims to answer this question exploring the capability approach and focusing into two technology-oriented development aid projects.

To do that, firstly we examine the origin, evolution and definition of appropriate technologies and the limitations of its current conceptualization. Secondly, we present different aspects of the capability approach (CA) that help us to understand *how* and *when* social transformation is achieved in communitarian development projects. Linking technology projects with CA allows us to expand the conceptualization of technology to a new definition towards human development: Technologies for Freedom (T4F). Finally, and in order to exemplify the T4F, we present two different case studies of technology-oriented projects implemented in rural areas of Guatemala and Bolivia.

APPROPRIATE TECHNOLOGIES: CONCEPT AND CRITIQUES

Origin and Definitions

India, at the end of the XIX century, is identified as the place where the Western concept of Appropriate Technology (AT) has its genesis. The thought of the reformers of that society was oriented to the rehabilitation of traditional technologies, used in the villages, as a strategy of fighting against the British domain. Between 1924 and 1927, Gandhi spent many time delivering

and implementing the *Charkha*. This spinning wheel was both a tool and a symbol of the Indian independence movement. The *Charkha*, a small, portable, hand-cranked wheel, is ideal for spinning cotton and it is recognized as the first equipment technologically appropriate, as a way of fighting against social injustice and the caste order established in India. Thus, a political conscience arose in millions of people, especially in rural areas, about the necessity of renewing the Indian native industry. This can be expressed in the famous words of Gandhi: “Production for mass, not mass production” (Kumar, 1993, p. 535).

The Gandhi protection to handcrafters in villages did not represent a static conservation of traditional technologies, but an improvement of local techniques, the adaptation of modern technology to the environment and local conditions of India, and the support to scientific and technological research oriented to identify and solve the problems of people. The final objective was the transformation of the Indian society throughout an endogenous process, and not by an external imposition. Therefore, in the social doctrine of Gandhi “the concept of appropriate technology is clearly defined, even though he never used it” (Herrera, 1983, p. 11).

The Gandhi ideas were also applied in China and, later, influenced a German economist – E. F. Schumacher – that popularized the term of Intermediate Technology (IT). In order to be appropriate to developing countries, the IT would be a small scale, simple, environmental respect and low cost technology. The Intermediate Technology Developing Group (now Practical Action), created by Schumacher and the publication of *Small is beautiful: economics as if people mattered* (Schumacher, 1973), translated in more than 15 languages, generated a big impact, becoming the author as the responsible of introducing the Appropriate Technology concept into the Western world.

During the 1970 and 1980 decades, there was a proliferation of research groups in northern countries developing appropriate technologies and implementing technological artefacts based in the AT ideas. Although the main purpose of those groups was to reduce poverty in developing countries, there was also a frequent preoccupation with environment and alternative energy issues (Dagnino, 2006).

We can find many definitions of AT: Alternative technology, Intermediate technology, Adequate technology, Social Appropriate technology, Environmental Appropriate technology, Human technology, Help-self technology, Low income technology, etcetera (Brandão, 2001; Pérez-Foguet *et al.*, 2005). Those definitions tried, in their origin, to differentiate AT from convectional technology, typical in developed countries, that uses capital-intensive and reduces labour force.

Embedded in AT ideas, appeared some common characteristics in technology-oriented

development projects: communitarian participation, low cost of incomes and services, small scale, simplicity, intensive in labour force, intensive in natural resources, respect to local culture, respect to environment, etcetera. In other words, a technology “able to avoid social and environmental problems derived from convectional technology transfer processes and, additionally, able to decrease the technological dependence” (Dagnino, 1976, p. 86).

The preoccupation with unemployment around the world meant a stimulus to the AT movement. The most significant example was the involvement of the International Labour Organization (ILO), at least in a theoretical level, supporting many case studies evaluating the utilization and developing of AT, mainly in Asia and Africa (Behari, 1976; Goodman, 1976; White, 1974). The studies demonstrated the better role that intensive labour force can play in terms of social and economic impact. But, at the same time, it supposes that extern support is responsible of the scarcity of technological and scientific research developed by researchers from developing countries.

Critiques

Most of critiques to AT are formulated from the view that science and technology are not neutral, and that technology-oriented projects involve decisions that incorporate values. Those values can generate justice or injustice, safety or insecurity, etc, depending on the rules adopted designing and transferring technologies. In most of AT projects, the communities are only the final stakeholder that benefits from a technology designed in developed countries (Leach and Scoones, 2006; Chambers, 1997). Deepening on this disapproval, detractors focus on the view that AT is more a movement of retired researchers of developed countries than a real initiative able to make a significant change in the South (Dagnino, 2006). In fact, most of the research groups in AT are located in developed countries (Engineers Without Borders in many developed countries; Practical Action or Tearfund in UK; Village Earth, AIDG or Whitman Direct Action in USA; Centre for Appropriate Technology in Australia; among others). The underlying of this critique suggests that enlarging the technological alternatives offered to developing countries is not sufficient to change the nature of the process of adopting technologies. Consequently, if there are not processes of alternative generation and diffusion of knowledge, it would be just a down grading of the convectional technologies (Herrera, 1983; Shiva, 2009; Leach and Scoones, 2006).

One more critique is centred on the replication of AT models. The specific context where the AT artefacts are implemented in developing countries complicates the replications of products or models. In this way, it is difficult to produce *ex-ante* models or products either if you know the specifications *a priori* of the final product because you do not know *who* (person) is going to use it (Chambers, 1997).

EVOLUTION OF THE CONCEPTUALIZATION OF TECHNOLOGY FOR HUMAN DEVELOPMENT

In 2001, after eleven *Human Development Report (HDR)* editions, the UNDP published the *HDR 2001: Making new technologies work for human development*, which supposed the first attempt to link technology and development under the approach of Human Development. At the beginning, in the foreword, we find: "[…] technology is used to empower people, allowing them to harness technology to expand the choices in their daily lives" and "[…] research and development addressing specific problems facing poor people – from combating disease to developing distance education – have proved time and again how technology can be not just a reward of successful development but a critical tool for achieving it" (United Nations Development Programme, 2001).

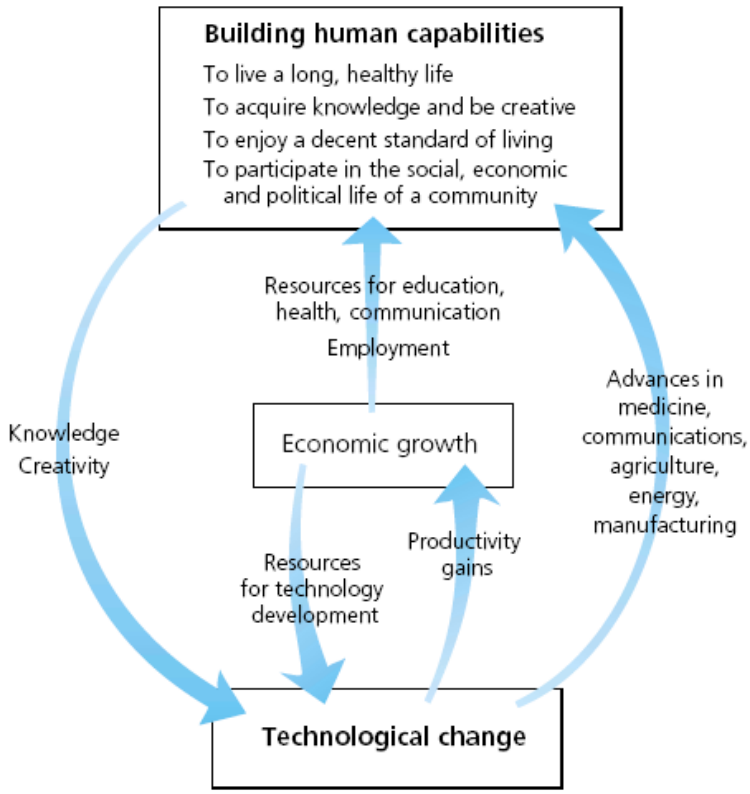

Figure 1: Links between technology and human development

Source: UNDP (2001, p. 28)

This figure, created by UNDP, shows how technological innovation affects human development in two different ways. First, directly, because products –vaccines, access to Internet, etc.- improve people's health, nutrition, knowledge and living standards, and increase people's ability to participate more actively in the social, economic and political life of a community. And secondly, because of its impact on economic growth through the productivity gains it generates. In addition, human development is a means to technology development, so "human development and technology advance can be mutually reinforcing, creating a virtuous circle" (United Nations Development Programme, 2001).

Thus, analysing the UNDP approach, the ways to achieve human development are two-fold. On the one hand, through technological innovation; drought-tolerant plant varieties for farmers in uncertain climates, vaccines for infectious diseases, clean energy sources for cooking, Internet access for information and communications, etc. directly enhance human development. On the other hand, economic growth stands for human development: it raises the crop yields of farmers, the output of factory workers and the efficiency of service providers and small businesses. It also creates new activities and industries – such as the information and communications technology sector – contributing to economic growth and employment creation.

But, as we argue in this paper, and according to other authors (Herrera, 1983; Shiva, 2009; Leach and Scoones, 2006), if there are not processes of alternative generation and diffusion of knowledge, there is not a real social transformation. In the 2001 HDR, it is not clear what "technological change" means. It is only a *black box* where knowledge, creativity and economic resources are supposed to be transformed in productivity gains and advances in medicine, communications, agricultures, energy and so on. But, do these processes always involve a true community development? Is there a real social transformation?

There is no doubt that medical breakthroughs such as immunizations and antibiotics resulted in faster gains in the last century. But most of the technological innovations were produced in developed countries, and diffused and adapted to developing countries. Thus, the technological divide was maintained and the dependence increased.

In the next chapter we present different aspects of the capability approach (CA), the theoretical framework that help us to understand *how* and *when* social transformation is achieved in community development projects.

AGENCY AND EMPOWERMENT IN THE CAPABILITY APPROACH

Defining Agency

Agency can be defined as the ability to act according to what one values or –in Sen's words- "what a person is free to do and achieve in pursuit of whatever goals or values he or she regards as important" (Sen 1985, p. 203).

An agent is "someone who acts and brings about change, and whose achievements can be judged in terms of her own values and objectives" (Sen, 1999).

Agency differs from well-being in the aspect that agency does not concern only the goals conducting to a person's wellness or personal welfare, but to the totality of her considered goals (Crocker, 2008a). This distinction is important as one can pursue objectives that may reduce one's welfare, for example when parents starve in order to give their children enough food.

Functionings and capabilities refer to two different dimensions of well-being: achievements and opportunities. Analogously, we have agency achievement and agency freedom. The first refers to the realization of the goals and values a person has reasons to pursue. The second is a kind of process freedom leading to achieve those goals (Crocker, 2008a).

Locating Agency in the Capability Approach

People's agency plays a central role in the capability approach, where development is seen as the "process of expanding the real freedoms that people enjoy" (Sen, 1999). The focus on freedom covers the process aspect of freedom (agency freedom), not only the opportunity aspect of freedom (capability) (Des Gasper, 2007), and both processes and opportunities have normative importance on their own and each aspect relates to seeing development as freedom (Sen, 1999). This focus on both aspects of freedom has been used by some authors to question the 'capability' label that Sen chose for his approach (Crocker, 2008a; Des Gasper, 2007).

Sen itself recognizes the centrality and intrinsic value of agency freedom when he states that "greater freedom enhances the ability of people to help themselves, and also to influence the world, and these matters are central to the process of development" (Sen, 1999) and that "the procedure of free decision by the person himself (no matter how successful the person is in getting what he would like to achieve) is an important requirement of freedom" (Sen, 2002). Thus, development is not only about expanding capabilities, but also about expanding agency freedom.

Expansion of Agency and Empowerment

Power and Agency are related concepts with diffuse frontiers (Drydyk, 2008). Sen's ideal of agency is related to an "ideal of empowerment as the acquisition of this kind of agency" (Crocker, 2008a). Sometimes, empowerment and expansion of agency freedom are used as synonyms. However, there are some subtle differences that have to be taken into account. Empowerment is a subset of agency; empowerment entails agency expansion, but not necessarily vice versa (Alkire, 2005).

There are different views around the specific features that differentiate empowerment from 'common' agency freedom expansion. We are going to put the focus on *who* drives this expansion

and on its result on the agent.

The first feature is brilliantly explained by Drydyk:

> "Empowerment has to do with shaping one's own life by one's own choices. It occurs not just when people's lives get better, but when people make their lives better. It is not just about becoming more free, but about making oneself more free. As applied to agency: empowerment is not about merely gaining greater scope for action, but about pushing back the limits of what one can achieve." (Drydyk 2008, p. 83).

The emphasis is on the protagonist role of the agent in the expansion of agency freedom. This idea has been partially integrated in the concept of agency by some scholars, with some reflexions on the degree of personal involvement and autonomy- see Sen's idea of 'instrumental agency success' or Crocker's 'direct agency' (Crocker, 2008a).

The second feature is about the result of this expansion on the agent. For labelling the agency expansion as empowerment, the agent has to become better able to shape his own life and pursue his goals (Drydyk, 2008). Through the empowerment process, a person not only enlarges his opportunity to act on behalf of his goals, but also enhances his ability of making changes happen and gains control over the processes which affect the goals valued. Thus, the aspects of learning and full access to resources (in the broad sense) are crucial (Ibrahim and Alkire, 2007). Therefore, empowerment can sometimes be a source of conflict vis-à-vis the powerful, who might loose part of the power they had over such resources.

Empowerment is an 'especial' agency expansion and we argue that it is important to pay attention to it. Agency is always intrinsically valued, as an end of development. And it should be a means to development, too. But under what conditions can agency be an effective means for expanding people's substantive freedoms? We argue that it is this empowerment -this 'special' agency expansion with the features mentioned above- that can turn agency into an effective means for people's substantive freedoms (Drydyk, 2008). Hence, we think that the concept empowerment should be discussed and researched more deeply in the capability approach and play a substantive role in the development agenda.

Power, Groups and Participation

Talking about empowerment leads us directly to the power analysis. There are many theories and taxonomies of power, but we are going to use Eyben's work (Eyben, 2004) for analysing briefly different kinds of power and how they relate to the capability approach.

- Power 'to' refers to one's ability to choose and act as he or she wishes; to the unique potential of every person to shape his or her life and world and to realise its potential as a

citizen (Gaventa 2006).

- Power ‘over’ takes into account the relational components of power and refers to the ability of the powerful to affect the actions and thoughts of the powerless (power imbalances).
- Power ‘within’ refers to a person’s self-worth and sense of dignity and has to do with self-identity, confidence and awareness.
- Power ‘with’ describes common ground among different interests and the building of collective strength through organization and the development of shared values and strategies.
- Power as knowledge, based on the Foucault writings, is related with how we understand and describe the world. Knowledge is contingent on our time and place and the relations of power that shape our lives. This power is exerted through the discourses (including practices) that frame what is thinkable and doable.
- Power everywhere focuses on the everyday practices of all aspects of social life. Every one of us is implicated in the performance of power, each time we walk into a room or participate in a workshop.
- Power structures are associated to the institutionalized relations of power that repeat themselves continuously, forming a pattern. It’s about the rules of the game.

These different powers can give interesting insights to the capability approach. For example, a person’s agency freedom is defined as the freedom to decide on the basis of what she values and “the **power to** act and be effective” (Crocker, 2008b, p. 5). The concept of power ‘to’ “informs the capability approach of Amartya Sen” (Eyben, 2004, p. 17). But almost every kind of power is important to the capability approach. In fact, it’s obvious that a person’s freedom to choose and bring about the things he or she values –which is related to the individual conversion factors- will be shaped by the power affecting her. Some examples could be the quality of democratic institutions (power structures), oppression (power over), mainstreaming discourses (power as knowledge), self-worth (power within), gender inequality (power everywhere), belonging to a community (power with), etc. Further, power also shapes people’s ability to identify the things they value (adaptative preferences).

Therefore, exerting agency is a process that involves bargaining and negotiation as well as resistance and manipulation. It entails the overcoming of significant institutional and informal obstacles, as the domination of existing elite groups or of unresponsive public programmes (Ibrahim and Alkire, 2007).

Another issue raised by the power analysis is the group. Everyone lives in a particular social, economic and political context that shapes its opportunities and freedoms in many ways (Ibrahim, 2006). In addition, many goals, choices, processes and opportunities take place rather in a group or collective setting than individually. Especially when we talk about the poor -individually with little

economic and political power- the role of the collective for making change happen is central (Stewart, 2005). The capability approach is rather individual-centred, but “groups play a much more dominant role in human life and well-being than appears in much of the analysis of capabilities” (Stewart, 2005, p. 185). There is a tension between the individual and the group, which “can survive at the theoretical level but cannot be maintained when the capability approach becomes a guiding theory for development practice” (Deneulin, 2008, p. 107).

As we want to make some reflections around development practice, we are going to pay attention to the group! We will focus on small groups and leave aside matters like broad governance and citizenship that affect ‘bigger’ groups. Small group refers to a community, an organization or similar groups in which people know each other.

When we look at groups, we talk about collective capabilities and collective agency. Some scholars like Solava Ibrahim have discussed these concepts, so we will only define them briefly. Collective capabilities are “the newly generated functioning bundles a person obtains by virtue of his/her engagement in a collectivity that help her/him achieve the life he/she has reason to value” (Ibrahim 2006, p. 398). The shift from individual to collective agency is very useful, as acts of agency are many times performed collectively (or at least by individuals inserted in social structures that allow their action) and always shaped by intra-group power relations and communal values (Ibrahim, 2006). The concept of collective agency leads us directly to the concept of collective empowerment, which refers to a process of collective agency expansion, when it meets the two features we talked about earlier.

Participation is central to the concept of collective empowerment. Inclusive and fair participation is needed to allow all the points of view to count in the process of choosing which collective goals to pursue. Further common obstacles that hinder empowerment are better removed acting collectively (power with).

It is believed that participation is a very useful tool for empowerment. The UNDP’s argues that to be empowered, people need to participate fully in decisions and processes that shape their lives (United Nations Development Programme 2005). “Quite a few studies indicate that durable poverty reduction or enduring social change occurs when some poor persons, as well as others in their society, participate actively in development processes. Such is the strength of this finding that it has become a truism to advocate the ‘participation’ and ‘empowerment’ of persons in many dimensions” (Alkire, 2005, p. 227).

Participation gained popularity in the 80s and 90s with the spread of Participatory Rural Appraisal, a methodology that draws on "the Freirian theme, that poor and exploited people can and should

be enabled to analyze their own reality" (Chambers, 1997). However, participatory approaches have received critiques for becoming just an empty set of methodologies that doesn't really contribute to empowerment. Participation is empowering when people are motivated and involved in the process (Muñiz and Gasper, 2009).

Types of participation in community technology-oriented projects have been categorized into the following five groups (Sanginga *et al*., 2001):

- The 'informative' type: community is just being kept informed by technicians and extensionists.
- The 'consultative' type: technicians consult community, generally progressing from each of the stages of the process (diagnosis, design, technology development, testing, verification and diffusion), and then make decisions.
- The 'collaborative' type: this involves continuous interaction in all phases of the process. Community is fully involved from the start.
- The 'collegial' type: technicians actively encourage the informal research and development systems in rural areas. Technicians facilitate community's experimentation. Community has influence over the joint programme also in terms of resource allocation.
- The 'autonomous mobilization' type: community relies on their own experimentation and there is no organized communication with technicians and extensionists.

The five groups above represent different degrees of community participation, from low level of participation (informative) to full level of participation (autonomous mobilization).

Therefore, there are many important issues arising around participation at the community level and that have to be taken into account in development practice, as they can determine the 'empowering potential' of participation (Cornwall, 2004). We won't go into them in depth as they exceed the scope of this paper. Some of them have been analysed by capability scholars like Alkire or Crocker, though participation and group choices are rather underdeveloped in the capability approach (Des Gasper, 2007). The ideal of participation we are talking is close to the concept of deliberative participation: all the stakeholders deliberate together in an inclusive space and forge agreements for the common good (Crocker, 2007). This poses a challenge to current development practice –and especially to technological projects- where the concept of participation is weaker and rather instrumental.

TECHNOLOGIES FOR FREEDOM: COLLECTIVE AGENCY-ORIENTED TECHNOLOGY FOR DEVELOPMENT PROCESSES

As seen in the critiques to the Appropriate Technologies (AT) and to the model of technology

proposed by the UNDP, technology-oriented development projects should not be a simple hand-me-down in an appropriate form and cost to developing country users. Rather, it must also be a process of knowledge creation and capacity building in developing countries. As Leach and Scoones (2006, p. 14) explain in 'The Slow Race', there is an alternative pathway to poverty reduction,

> "And it sees science and technology as part of a bottom-up, participatory process of development, where citizens themselves take centre stage. Rather than being viewed as passive beneficiaries of trickle-down development or technology transfer, in this race, citizens are seen as knowledgeable, active and centrally involved in both the 'upstream' choice and design of technologies, and their 'downstream' delivery and regulation"

In this work we arrive at similar conclusions using the capability approach. We argue that the capability approach is useful to understand *how* and *when* social transformation is generated at community-level development projects. As seen in the previous chapter, development is not only about expanding capabilities, but also about expanding agency freedom. In technology-oriented development projects implemented in poor communities, notions as participation and collective empowerment have to be taken into consideration if we really want to expand the collective agency of the community, and consequently, expand the freedom of its members.

In this paper we define Technologies for Freedom (T4F) as the technological processes, driven by the community, in order to generate real social transformation.

Social transformation is achieved in communities when there is expansion of collective agency freedom, or specifically, collective empowerment. This is only possible when inclusive spaces for deliberation and participation are generated and people are motivated and involved in the process of choosing, designing and regulating technology.

Thus, we understand that a community technology-oriented development project can be classified as T4F when the technological processes are carried out in an inclusive and fair participatory way, allowing all the points of view to count in the process of choosing which collective goals to pursue. Under this vision, each technology must be developed or adopted and adapted in interaction with the community or by the community itself. The technological artefacts (products, equipments, etc) and the organizational processes and relationships are *ends* of the community interventions; but they also represent the *means* that allow people to do and achieve whatever goals or values they regard as important (collective capabilities), enhancing the ability of the community to help themselves to make changes happen (collective agency).

For many people, technology is neutral. But it can be used for different objectives, as for military ends or to promote social development. From this vision of technology, the way to reduce poverty

is to appropriate and adapt the current technology, focusing just in the *ends* (products or artefacts) but forgetting the *means* (processes).

And that is the main challenge of developing T4F: re-thinking and developing technological processes that incorporate, from conceptualization to implementation, an intention to promote the expansion of people's collective empowerment.

So the first step to understand T4F is to get away from the instrumental and neutral vision of technology. There is no neutral technology; technology is a social construction that incorporates and is embedded with intentions, interest, power relations, etc. (Bijker *et al.,* 1990). The fact is that in technology oriented projects each choice involves making decisions. Those decisions can benefit or be negative for different groups of people, and are embedded with specific criteria, different interests and values, etc.

In this way, under the perspective of T4F, the technician's role is not to implement a development project, but attend a development process led by the community. Therefore, decisions to be taken should not be presented as purely technical choices. The technician should present and facilitate the technical issues and different options as objectively as possible.

Some of the characteristics of the Appropriate Technologies are shared by T4F, as the community participation, local and intensive labour force, use of natural resources and respect to local culture and environment. It also agrees with the UNDP vision that technological innovation and economic growth are important to build human capabilities.

Nevertheless, T4F differs from both positions in two issues of great importance. First, it focuses mainly on the process instead of stressing the results and products of the interventions. And secondly, people of communities play a central role in the generation and dissemination of knowledge. The type of participation in T4F projects vary from other approaches. While in the AT and UNDP vision of transfer of technology community is just informed or consulted by technicians, under the T4F the community takes centre stage: it is fully involved from the start ('Collaborative' type of participation). Technicians actively encourage the local knowledge, informal research and development systems in rural areas and facilitate community's experimentation ('collegial' type). Even in the best of cases, community relies on their own experimentation and there is no organized communication with technicians and extensionists ('autonomous mobilization' type).

In the next figure we compare T4F with other approaches in community technology-oriented development projects:

	Appropriate Technologies (AT)	Technology for Human Development (UNDP vision)	Technologies for Freedom (T4F)
Focus on	Ends	Ends	Processes
Generation of knowledge in community	Not a target	Not a target	Yes
Technology Transfer Process	Top-down	Top-down	Bottom-up
Community Participation	Yes	Yes	Yes
Type of participation	Informative / consultative	Informative / consultative	Collaborative / collegial / autonomous mobilization
Role of technician	Essential (to adapt technology)	Intermediary (“seller” or offerer of innovations)	Secondary (to present and facilitate options)
People involved and motivated	Not necessary	Not necessary	Necessary
Expansion of capabilities	Not a priority	Yes	Yes
Collective empowerment (FREEDOM)	Not a priority	Not a priority	Yes

Figure 2: Comparison of different approaches in community technology-oriented development projects. Source: the authors.

For an easier understanding of that explained above, in this paper we point out some features in community technology oriented development projects that can generate social transformation by promoting the collective empowerment of people, the Technologies for Freedom (T4F):

- Knowledge creation and capacity building through an inclusive and fair deliberative participatory process.
- Production and sharing of knowledge between the stakeholders.
- Interaction with the community in the decision-making, developing and implementation processes to enable local perspectives and experiences.
- Collective and inclusive processes (ensure participation of men and women, young and old, households affected by the HIV/AIDS pandemic and those that are not, etc).
- People motivated and involved from the beginning.
- Expansion of potentialities and capabilities of people.
- Improving people’s knowledge and power to make technology choices.
- Commitment partnership and participation (at long term).
- Facilitation of spaces for fair and equal between local knowledge and perspectives with

more formal scientific expertise to produce ‘solutions’ that fit the poor people’s concerns and priorities.

- Sustainability: not only environmental. Rather, a sustainable collective empowerment process that persists in time.

In order to exemplify the T4F, we present two different case studies of technology-oriented projects implemented in rural areas of Guatemala and Bolivia.

CASE STUDIES

Chucura (Bolivia)

‘Chucura’ is an indigenous Aymara community in a National Park of La Paz (Bolivia), at an altitude of 3700 meters. It’s known for being one of the ‘biggest’ communities in the pre-incaic Choro Trail, one of the most popular treks in Bolivia. From the nearest road, you have to walk for 3 hours, until you arrive there. It has a population of approximately 50 families, who live from agriculture and tourism.

The community, which benefits for some privileges as it is inside a National Park, demanded to the authorities of the Park the construction of a micro hydro power plant of 21 kW. In 2003, a national and an international donors funded a project for the plant, which was designed and built by a university of La Paz. The community was supposed to participate in the construction, but at the end only few families did. When the project finished, people started to benefit from all the advantages of having the plant: reduction of 50% of household expenditures for energy services, better conditions for studying, access to TV, better health due to elimination of the smoke generated by lighting, public lighting, etc. However, after some time, the plant started having some maintenance problems, as nobody seemed to be responsible for maintaining it. Therefore, the plant started having more and more problems and the electricity service was interrupted very often.

If we represent the participation of the community in the project in the ‘spider diagramm’, we can see that there was participation of the community only in the stages of diagnosis and solutions, but there was little engagement in the rest of the stages of the project.

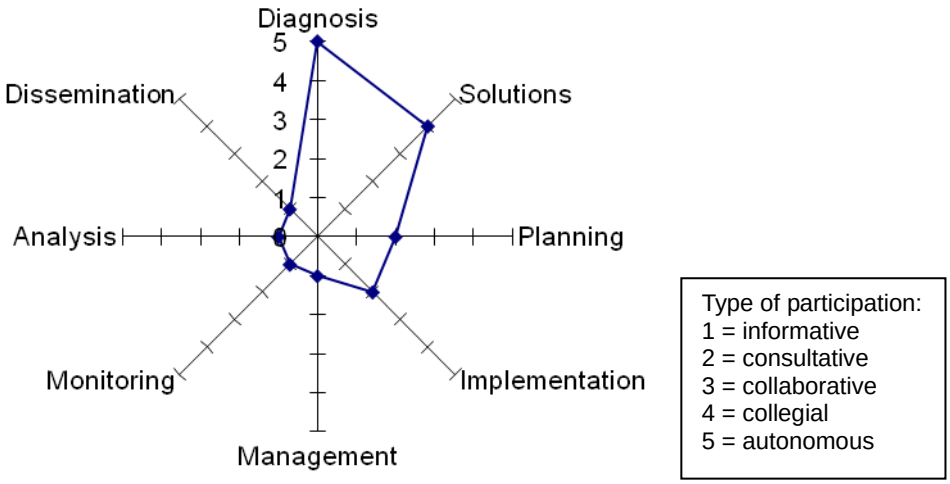

Figure 3: Chucura community. Participation in the phases of the process.

Source: the authors.

One reason of this lack of community engagement can be the fact that the community has some privileges for being inside a National Park, and for this motive it normally benefits from different projects –and it seems that not very empowering projects. This could have generated a kind of paternalist relationship which has killed people's initiative and willingness to work collectively for their own development process.

For understanding better the project, it's interesting to relate it to the features we propose for T4F. We see that the project in Chucura meets very few of them (and only partially):

- Expansion of potentialities and capabilities of people.
- Interaction with the community in the decision-making, developing and implementation processes to enable local perspectives and experiences.

And most of the features proposed don't appear in this case study, for example:

- Creation and sharing of knowledge is not a priority.
- No attention has been paid to the deliberative process that led to the demand of the project (participation, inclusiveness, gender, power imbalances in the community, etc)
- The community is not really engaged with the project.

Thus, the project cannot be considered as a T4F project. We can say that project had little impact on the development process of the community. On one hand, the capabilities' expansion brought by the advantages of the plant has proved to be unsustainable. On the other, there has been no improvement of the collective empowerment of the community.

The project of the power plant was seen as a technological project, but no attention was paid to social and relational issues or local processes. This could be due to a vision of technology only as a technical solution that can be transferred from one place to the other. This has made the project

blind to the issues mentioned above (creation of knowledge, deliberative process, etc.) and to the specific context of the community (with its particular ‘disempowering history’). As a result, the project failed in its goal of enhancing Chucura’s development process.

‘Nueva Alianza’ (Guatemala)

Members of the community ‘Nueva Alianza’ have a recent history as owners of the land. Until 1995 the 45 families that are part of this community were employees for a major coffee producer, living under conditions similar to slavery (low wages, overload of working hours, bosses, verticality, etc.). But, with the collapse of coffee prices in 1990, the owner left the land, owing more than one year’s salaries to the families.

Families were grouped and fought for their rights, getting redeemed the debt for land ownership. Since that date (1999) they got organized to work the land in a cooperative and horizontal manner. Assemblies and committees were set up for making important decisions democratically with the participation of the whole community. Due to the precarious conditions in which they were living (lack of electricity, drinkable water, roads, etc.) they decided to seek aid from an international donor.

After the request of an electrification project by the community, a donor funded a micro hydro power plant. The role of the technician was to present to community the different technological options as objectively as possible, considering not only technical aspects, but environmental and social impacts. The whole community was motivated and involved from the beginning of the project, from identification, formulation, and implementation to monitoring and maintenance.

The next figure shows the relation between the phase of the process and the type of participation of the community.

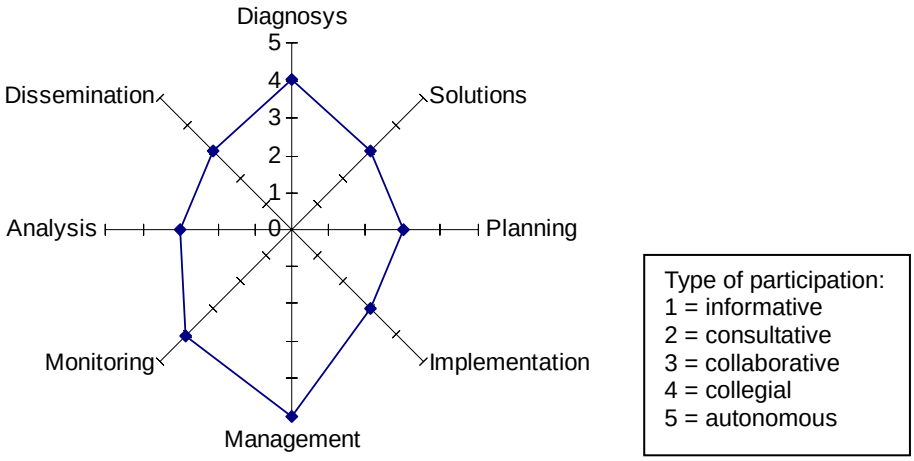

Figure 4: Nueva Alianza community. Participation in the phases of the process.
Source: the authors.

As we can see in the figure above, there was participation of the community in all the stages of the process, confirming the engagement of the community with the electrification project. Some causes of this commitment can be the feeling of being owners of the land and the opportunity to participate democratically in a project, compared with previous periods where they lived in semi-slavery, and his voice was not heard.

Although the final amount of energy delivered did not correspond to the initial forecast, this project represented a considerable advance on the development process of the inhabitants of 'Nueva Alianza'. Through community participation, the power plant is working properly and has served as a driving force for the community to become involved in new projects. After this experience the community expanded its networks and contacts, they associated with other coffee producers and participate actively in forums and meetings.

Relating this case with the features of the T4F, we find that the project in Nueva Alianza meets many of the characteristics we proposed:

- Interaction with the community in the decision-making, developing and implementation processes.
- Knowledge creation and capacity building through an inclusive and fair deliberative participatory process.
- Collective and inclusive processes, ensuring a democratic participation of the community.
- People really motivated and involved from the beginning.
- Expansion of potentialities and capabilities of people.
- Improving people's knowledge and power to make technology choices.
- Commitment partnership and participation.

- A sustainable collective empowerment process that persists in time (actually they are involved in new projects, forums, committees, etc.).

Consequently, the project can be considered as a T4F project. Beyond an electrification project, the micro hydro power plant contributed to an empowerment process by enhancing the ability of people to make changes happen. Through organization and shared values and strategies 'Nueva Alianza' built a collective strength, a collective empowerment.

CONCLUSION

In this work we have presented two technology-oriented development projects implemented in rural areas, funded by similar donors, and obtaining the same results (*ends*) – an amount of energy enough for the communities. Nevertheless, in the first case, the project of the power plant was seen as a technological project, but no attention was paid to social and relational issues or local processes (*means*). The project had little impact on the development process in the community and did not contribute at all to the empowerment of its members. In the second case, the community participated in all the stages of the process, confirming the engagement with the electrification project. Through community participation, the power plant is working properly and has served as a driving force for the community to become involved in other new projects.

This paper has attempted to explain, using the capability approach, why the first case of study failed. Under this approach, development is not only about expanding capabilities, but also about expanding agency freedom. In technology-oriented development projects implemented in poor communities, notions as participation and collective empowerment have to be taken into consideration if we really want to expand the collective agency of the community, and consequently, expand the freedom of its members.

We have also introduced a new conceptualization of technology that incorporates, from conceptualization to implementation, an intention to promote human development. Thus, we have presented the Technologies for Freedom (T4F) as the technological processes, driven by the community, in order to generate real social transformation. Some features of T4F community development projects have been pointed out, stressing the importance of participation and motivation, knowledge creation and capacity building, and the collective empowerment processes of the communities.

We argue that the collective empowerment -this 'special' collective agency expansion - that can turn agency into an effective means for people's substantive freedoms. Hence, we think that

empowerment and participation should be discussed and researched more deeply in the capability approach and play a substantive role in the development agenda.

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