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The technology transfer systems in communities, product versus processes.

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Abstract

Based on a case study taken place in the jungle community of Santa Rita-Ecuador, we will refer on the negative and positive impacts of the technology transfer system, acknowledging the differences, seeing this as a product versus a process. The product approach will have an impact in form and shape and the process approach on concept ideas and ideals. What may be better for communities? Taking in consideration that sometimes communities might need immediate product solution for their necessities but in the long run empowerment escorted by the people and collaborative processes lead to successful technology transfer and empowered-independent communities.

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1. Main text

Why should any community want or need technology transfers?

The idea of technology transfer has been present "for most of the pre-history of the human species, technology transfer involved tacit knowledge, which is evolutionarily prior to explicit (Donald, 1991; Mathews and Roussel, 1997). There were no written languages until 3000 BC, and language, supplemented by equations and diagrams, is

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still the major means for explicit transfer of technological knowledge. Spoken languages and gestures certainly could have explicitly transferred technological knowledge in friendly encounters, but much of prehistoric technology 'transfer' between peoples occurred when the people with the superior agricultural technology assimilated or eliminated those who could not reproduce as rapidly (Diamond, 1997). Within groups, apprenticeship was the main vehicle for knowledge transmission across generations." (Gorman 2002) And it means ideally using new or non-existing technology in order to apply this technology for the development of a specific context.

This study will show two application of technology transfer and their impacts on communities, first by understanding the technology transfer ideal and ideal through history and within the Latin American context. Then, based on a site specific case study located in the jungle community of Santa Rita - Ecuador, these two approaches, product vs. process, will be confronted through two projects in the community. This comparison will be also illustrated by the use of construction detailing reflecting on two different ideological approaches, dependences vs. empowerment.

Initially during the seventies the way that technology transfer was applied in Latin American countries was most of the times in order to create never ending debt and neocolonialism based on technology, sometimes based on a false ideal of development being engaged in, usually, useless "sick" projects that lead our countries to endlessly depend on technical support for the imported technology: "Economic hit men (EHMs) are highly paid professionals who cheat countries around the globe out of trillions of dollars. They funnel money from the World Bank, the U.S. Agency for International Development (USAID), and other foreign "aid" organizations into the coffers of huge corporations and the pockets of a few wealthy families who control the planet's natural resources. Their tools in fraudulent financial reports, rigged elections, pays, extortion, sex, and murder. They play a game as old as empire, but one that has taken on new and terrifying dimensions during this time of globalization. I should know; I was an EHM" (Perkins 2004)

Sometimes, and in the past, technology transfer answers not to local requirements but to the owner of the technology´s interests, economic, etc. In present times and based on some catastrophic examples this concept has been evolving to something more responsible for the context in where it should be applied: the appropriate technology[2] transfer:

"The concept of Appropriate Technology (AT) stemmed from the work of British economist Dr. Fritz Schumacher in the 1970s. Appropriate technology is a grass roots approach to technology that builds a strong sense of community and encompasses benefits that span across social, environmental, cultural, economic, and spiritual facets. Appropriate technology is not a one size fits all approach, but rather adapts to best fit the community in which it is developed. Appropriate technology best fits with the community it serves because it is created by the people to meet a need. Therefore, the communities are placed at the center of decision making and create technologies that will best serve their communities in the long term." (Margolus, Nakashima y Orr 2011)

The most contemporary mode of seeing the technology transfer might not try to condemn an entire country but sometimes might have strong negative impacts within the communities in which it is applied. This new ideal deals with the involvement of communities and their development using the proposed technology. This ideal may sound great, but sometimes this technology might create unnecessary needs for the communities, and this will engage them to welfarism in order to maintain certain technology and in dependence rather than development. When a technology transfer comes from necessity it generates a processes rather than products. Necessity: meaning a real need from a community and not a need from the technology producer. It should be a matching of necessities between the actors in order to have a win-win situation that doesn't generate unnecessary dependence.

Process referring to the technology as a role model or a best practice that may be developed, evolved, mutate, transform, etc. in which case we will see the idea of this technology replicated in concept and not necessary in shape or form. Product means, the technology for the technology, in which it creates dependence because this product is something with closed information and systems. When technology transfer comes not from necessity but from external needs, like the need form the technology developer to market its technology, it generates a product which

[2] Term coined in the 70´s by Ernst Friedrich "Fritz" Schumacher an internationally influential economic thinker, statistician and economist in Britain. Founded the Intermediate Technology Development Group (now Practical Action) in 1966

generates dependence from a community. We will see the need of the product creating dependence and we will see it superficially used without any further or previous thought.
In the community of Santa Rita we are able to see these two different types of technology transfer systems: product vs. process.

Santa Rita is a Kichwa[3] community, located in the Ecuadorian Amazon, 15 minutes from Archidona, four hours from the capital, Quito. It has a population of 700 inhabitants. The community is characterized by the ancestral planting of fine aroma cocoa, typical of the amazon basin. The families of the community have been engaged in the planting and harvesting of this fruit for decades, which has allowed them to bring sustenance to their homes (Ecuador Estrategico 2015). This community has a long history of growing fine cocoa. In fact growing *Arriba Nacional fino de aroma* cocoa, designation of origin Cocoa Arriba; the best cocoa in the world which results in the best chocolate in the world.[4] These cocoa characteristics and the ways its being grown called attention to both the government and the private sector.

"Ecuador's production of cocoa cannot match the global cocoa superpowers in West Africa in terms of gross output, but many chocolate connoisseurs feel Ecuador is tops in terms of quality. While many multinational companies turn to Africa for the base of their processed chocolate treats, smaller artisan chocolatiers look to Ecuadorian cocoa to provide the complex tastes they crave." (worldatlas.com 2015). The growing process of the cocoa in this area is mainly based on family own ranches not industrialized and avoiding the idea of a monoculture agronomy. Then from two branches comes the need of acknowledging the value of where this fine product is coming from.

In one hand, the government tries to bring attention to this small community in order to create the image of where the chocolate origin is by building a mega infrastructure project introducing foreign technology hidden behind apparently natural design and construction: see Fig.1. "The Ecuadorian government agency -Strategic Ecuador-, has managed the construction of the "Cocoa Village " , a project that is part of the Bio Route of Cocoa and Chocolate , making the community of Santa Rita the cornerstone of tourism development of Napo Province. The "Cocoa Village" project involves the construction of a tourist infrastructure in areas such as: communal ranches, plazas, roads, trails, community areas, green areas and spaces for cocoa production " (Ecuador Estratégico 2015)

Fig.1. Cocoa Village

[3] ethnic nationality form Ecuador, Amazon Kichwa (Also known as: Kanelo-Kichwa, Napu Runa, Napo Highland Quichua, Canelo Quichua, Bobonaza, Bobonaza Lowland, Quichua Northern, Pastaza Quichua, Pastaza, Northern Tigre, Tigre Quichua, Tena Lowland Kichwa): taken from: http://www.nativeplanet.org/indigenous/ethnicdiversity/latinamerica/ecuador/indigenous_data_ecuador_amazon_kichwa.shtml

[4] International chocolate awards 2015 Gold – Growing Country: Pacari Chocolate (Ecuador) – Raw 70%, Gold – Organic: Pacari Chocolate (Ecuador) – Raw 70%, **Silver**: *Pacari Chocolate* (Ecuador) – **Lacumbia 70%, Silver:** *Pacari Chocolate* (Ecuador) – **Montubia 70%, Silver:** *Pacari Chocolate* (Ecuador) – **Raw 70%, :** taken from http://www.internationalchocolateawards.com/

1. The infrastructure is so big that not even the government knows for sure what to do with the project, the project itself was managed by several government agencies that in the process where closed or absorbed finally by the Ministry of Tourism, in conversations with the strategic planning manager of the Ministry of tourism, it was mentioned that they knew the size of the project in this small town was a mistake and where looking for ways to activate-justify the already build infrastructure.
2. The infrastructure in this case is a huge scale impact in the community behavior because of its oversized scale, introducing shapes, construction technology and materials apparently natural but only in appearance.
3. Since the scale of the project the wood has to be brought from somewhere else, this wood has to be treated and industrially shaped. The amount of wood needed is so big that it may not be harvested in the local area because of environmental policies. All the joints and construction materials for foundation are also "imported" see Fig.1. and Fig.3.
4. The man power is not from the community because the contractor needs to assure the performance of the workers so the building will be on time. The man power form the community is only used as a complement to the main workers, not allowing a technology interchange but an employee – employer relation.
5. This project bring a strong sense of dependence because in order to use grow adapt and repair the structure, the community would necessarily need a contractor since the technology used was not even socialized.

In the other hand Pacari Chocolates[5],collaborates for an extended period of time with the Santa Rita community building a relationship that runs from the familiar to the commercial. "Pacari means "nature" in Quechua; name chosen to evoke everything that chocolate represents: the best products from the earth, 100% natural. Therefore this firm guarantees the well-being of the soil and the consumers of its products by being free from soy, lactose, gluten, chemicals and transgenic. This model places the cacao farmer first. Pacari's quality reflects the work done with every person involved in the continuous innovation, social responsibility, sustainability and direct business trade with small scale farmers…..This process has one principal player: the Ecuadorian cacao fino de aroma known as "Arriba Nacional[6]", but it also includes top ingredients produced in Ecuadorian soil. Pacari works with small scale family farms using carefully selected ingredients to give an unforgettable experience for those that taste our products." (Pacari Premium Organic Chocolate 2015).

For this private company it is important to maintain the original process of growing cocoa in order to keep the best chocolate of the word, and to fulfill international standards it has several certifications[7] included the SPP-Solo Pequeños Productores (Only small producers)[8] Therefore the collaboration in this case came from understanding the way cocoa is produced and commercialized and based on this facts find a way for both, the private sector and the community, to improve their productivity, finding two main necessities: to avoid middle man commerce but giving them some technology so they can dry and ferment their product locally in order to sell it directly to the chocolate producer, and to show and legitimate this process in the cocoa and chocolate world, from tree to bar. The infrastructure in this case comes from the community and its partner necessity: a place to show and teach best practices in the cocoa grow production and commercialization. When the origin of a project is from its base the technology transfer has a different means and end. See Fig.2.

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[5]Pacari chocolates is a family owned business created in 2002 by Santiago Peralta and Carla Barbotó with the goal of changing the history of chocolate in Ecuador. This family business soon became a company that revolutionized the industry, not only in Ecuador, but in all of Latin America.

[6] Arriba Nacional, native Ecuadorian plant that produces a wheat classified as "fino de *aroma*". Theobroma Cacao-greek 'food of the Gods.'

[7] (USDA ORGANIC, KOSHER, EC-BIO-615 AGRICULTURE NON-EU, DEMETER .

[8] The Small Producers' Symbol is an initiative launched in 2006 by the Latin American and Caribbean Network of Small Fair Trade Producers (Coordinadora Latinoamericana y del Caribe de Pequeños Productores de Comercio Justo—CLAC), with support from the Fair Trade and Solidarity Economy movements in a number of continents. To guarantee the appropriate use of the Symbol, small producers' organizations created FUNDEPPO (Foundation of Organized Small Producers), with the aim of ensuring that this Symbol truly benefits small producers, communities and consumers. FUNDEPPO works with skilled professionals and entities to independently and reliably certify compliance with the Symbol's standards. http://home.spp.coop/SPP/index.php?option=com_content&view=article&id=93&Itemid=61&lang=en

Fig.2. Cocoa Cabin-(Cabaña del Cacao)

1. The scale of the infrastructure is adequate for what is needed, and based on this adequate size the community can think on growing by its own. The necessities and function from this project was specific for their needs.
2. The wood for this project was brought from the community, the caña guadua (local bamboo) for the structure, the paja toquilla for the cover and also de foundation was found on site. The joints and all the construction was developed on site. The technology transfer implemented was the foundation.
3. The man power was from the community in collaboration with the design workshop (con lo que hay Ensusitio) from the design to the construction. The sense of collaboration and pertinence was created during this process. Seeing the project as a never ending infrastructure that will add new pieces and adapt for new necessities.
4. The sense of independence and empowerment that this process leaves is very strong, since the technology was developed on site based on their ancestral construction knowledge and whichever improvement was shared and mutually developed, then the community by themselves will be able adapt, built, repair and even develop their own technology for their own building.

Bolívar Alvarado Yumba -Community President 2012-2014 “Greetings in the name of the Community of Santa Rita. I thank the workshop “con lo que hay” and Pacari chocolate company who have brought us this project and in which we have worked together, community and students, sharing and making an important support for the good of Santa Rita and it´s families. Never in my life have I seen such a big construction for the enrichment of the community to become a reality. Thanks to this construction the community has changed. For the first time people have come and put an effort to work together with the community and give valuable input. The project we are receiving is a first step forward and this way we grow strong as Santa Rita Community”.

We would use a small example in order to illustrate this phenomenon of relevance of a project to the community where it belongs. The foundation system found in both buildings is a small scale example that reflects the development of the project in bigger scales.

For the first case, the foundation applied on the government structure, the detail is a generic foundation for a building anywhere without respecting the natural slope in an extremely wet environment. See Fig.3

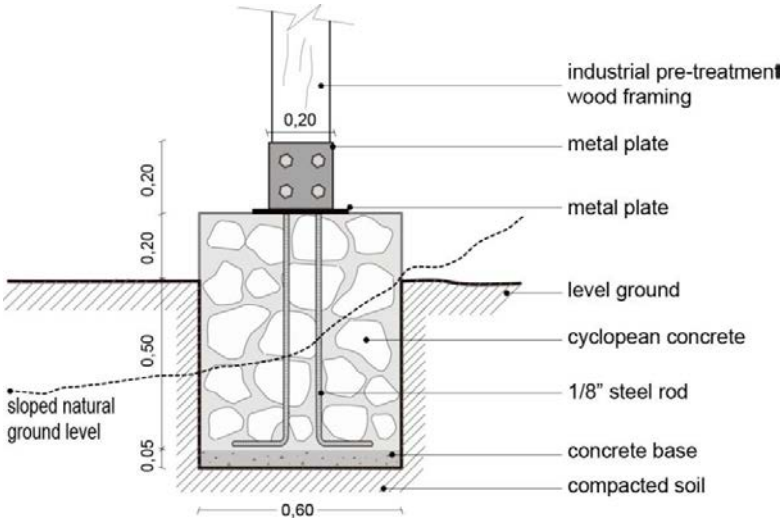

Fig.3. Foundation with introduced materials

1. The site where the structure was built was leveled and the foundation was built over the leveled ground.
2. The foundation, in order to prevent ground humidity, has to be built over the new ground level, introducing cement to the site.
3. The whole foundation system was generic and brought and implemented in Santa Rita: materials, man power.
4. The wood for the structure was industry pretreated wood framing, meaning that this wood needed to acclimatize on site and retreated on site in order to be resistant against local insects and weather. See Fig. 4

Fig.4. Foundation of the government infrastructure

In this case the example for the community will be to: level the ground and implement a foreign systems disregarding what they may find in the surrounding area.

In the other hand, the Cocoa Cabin, the detailing is site specific. See Fig. 5 and Fig. 6

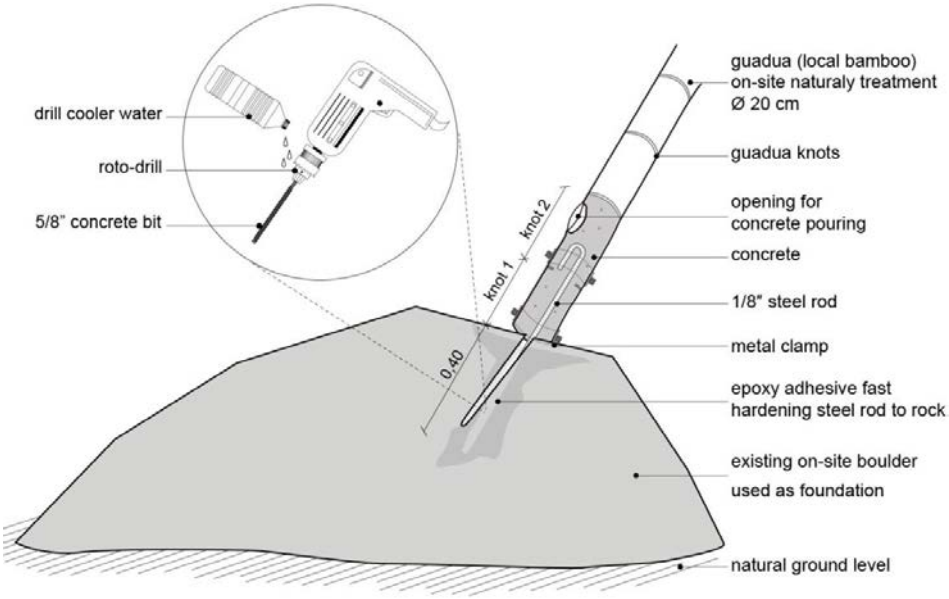

Fig.5. Foundation with local materials

1. The site was used on its own state, using the existing stones, boulders, as foundation.
2. The bamboo was local bought form the local farmers and the treatment was develop on site by harvesting the bamboo on a raising moon, immersing it in nearby small river and by smoking it.
3. By understanding the nature of the material, local bamboo, the stones provided the need of having the bamboo over the ground level in order to protect it from the ground humidity.

Fig.6. Foundation of the Cabaña del Cacao

4. The structural issue to solve was how to build the joint between the bamboo and the stone, what was developed was system that makes them work unitary by perforating the stone and introducing a steel road in and confine both, stone and bamboo, by the use of a small amount of cement and an epoxy adhesive, (liquid stone). Using this simple process both materials stay together and work as a structural system. This system was developed on site by an engineer, the designers and the community, taking in consideration

what was available and what was needed to be done, neither more nor less than that. By using the materials and a shared man power the appropriate technology transfer is ensured, because people from the community shared the conceptualization of this method is now capable of: maintenance of the structure, if needed, replicate or improve the detail. See Fig. 5 and 6

2. Conclusion:

Two years after both interventions, the one developed by the government is still without any use, because, in their own words: they don't know what to do with it, in the other hand the Cabaña del Cacao is not only in full use but it also holds community activities, like workshops, meetings, and even small parties.

Some of the community still sees the government building as a model of development, since it has everything imported, and sometimes in this kind environments imported is better, but a big portion of the community sees the process taking place in the cocoa cabin itself as an interesting model because of all the maintenance and growth they can do by themselves.

Based on this case study we can conclude that technology transfer oriented processes will have a stronger impact in communities rather than product oriented processes that can have undesirable impacts. Processes are often initiated based on necessity and evolve based on participation and in the other hand product oriented processes mainly end up creating unnecessary dependence on communities. In addition while having processed the understanding and appropriating of the technology leads to the development and evolution of it besides the "copy and paste" nature of the product causes misuse or disuse. Process can take more time to be implemented rather than products but in the long term the technology applied by process will support the development of communities rather their dependence on maintenance and appliance of it.

Comparing both systems, technology transfer project vs. process leave us confident that it is needed to create independent and empowered communities in order to ensure their autonomous development, this achievement can be supported by technology, and this technology must be transferred by process not by product consumption.

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