CENTERS OF SUSTAINABLE CO-CREATED PRODUCTS BY BOP:
DEVELOPMENT INSPIRED BY SOCIAL ENTREPRENEURS

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ABSTRACT

This paper frames the main components required to set up Product Co-Creation Centers (PC\textsuperscript{3}) within (rural or urban) BoP environments as a method to (1) identify creative and entrepreneur individuals; (2) aid the process of generating new ideas; (3) support the co-creation of products and services as well as their related business models for BoP needs, and (4) carry out market and social impact analysis to determine new development policies. This paper describes an analysis of secondary information sources, which provided the components of our integrative approach to frame the co-creation of sustainable products as a means to boost social entrepreneurship. The paper also describes coming research efforts to make our approach operational. To overcome potential risks along the operationalization of the method, we propose analyzing case studies that enlighten the processes and conditions to successfully implement PC\textsuperscript{3}. The general characteristics of our first showcase in a BoP community in Mexico are also explained. We expect that the approach presented in this paper will turn out into a novel philosophy opening up a broad multidisciplinary field of research.

1. INTRODUCTION

Design for the base-of-the-pyramid (BoP) is a term referring to the creation of products and services targeting the needs and affordances of people living on less than $2 a day. Since Prahalad and Hart (2002) raised the awareness of Multinational-Corporations (MNC) on the existence of a very large pool of unattended customers among the world’s poorest, design for BoP has become a well-known approach for boasting development in poor urban and rural areas. In fact, they stated that around 90% of designers create products for the richest 10% of the world population. Based on such statistics, Paul Polak in his book “Out of Poverty” (Polak 2008) declares that BoP should therefore be seen as a market where cheap products can be sold in large volumes to generate value and improve live standards.

Based on such thought, the hypothesis that innovation can save BoP has become popular in recent years. However, there is contradicting evidence probing its validity, as many cases have shown that even designing for very low costs is not cheap enough to be affordable for its target BoP market – for example the moonlight lamp developed by Kamworks for poor rural areas in Cambodia (Alvarez et al, 2008) was not able to reach the market because its prize, though being very competitive, was not cheap enough. So, traditional product development approaches - in which it is first determined which market share is available for which type of product, and then the product is designed and manufactured according to the obtained specifications - often leads to not economically feasible products for BoP. In conclusion, innovations alone are not enough for saving BoP.

Aware of this, Simanis and Hart (2008), with their BoP Protoco 2.0 initiative, developed a new vision on how to serve the needs for products and services for BoP. This new vision is based on the notion of co-creation logic (see Figure 1): the development of products and services has to be the result of co-venting with BoP from the idea development up to the creation of new businesses. The key aspects that differentiate this protocol from the afore mentioned practices are:

- BoP should be a business partner, rather than a pure consumer which implies that the capacities of BoP’s require development,
- imagination has to be expanded towards hidden BoP life standards requirements, rather than focusing on reducing costs of existing products,
- capabilities should be integrated and shared commitments built, rather than keeping companies fully responsible for all the development trajectory,
- a deep dialog with BoP should determine the requirements of product/service development, rather than extensive listening of needs,
- NGOs should facilitate direct and personal relationships with BoP, rather than serving as purely relationships facilitators.

In general, they concluded that instead of selling to the poor a more effective approach is to co-venture business with the poor.

![Co-creation logic in BoP Protocol 2.0 framework (from Simanis and Hart (2008))](image-url)

Concurrently, technology development has often been reported in literature as a key driver for economic development (Aghion and Howitt, 1997; Romer, 1990). For example, the four Asian Tigers (Hong Kong, Singapore, South Korea and Taiwan) experienced an exceptionally high speed economic growth after implementing policies focusing on rapid industrialization and exporting products and (financial) services to rich and industrialized nations. Something similar occurred to the BRICS association of leading developing economies (Brazil, Russia, India, China and South Africa), which have recently become industrialized nations and are starting to play an important worldwide role as technology suppliers. Common to these examples is the fact that industrialization has been sustained by large scale top-down governmental policies supporting research and development initiatives. Andrea Gentili (Deputy Head of Unit - European Commission Directorate General for Research and Innovation) explained during the 2011 Manufacture Conference held in Wroclaw, Poland, that manufacturing is still the driving force of the economy in Europe, as it provides about 20% of all jobs (more than 30 million mostly concentrated in SMEs in 25 different industrial sectors), it accounts for three quarters of EU exports, and it provides over
80% of EU private sector technology Research and Development expenditure. As an interesting remark, he even concluded that those countries with a strong manufacturing base get out of the crisis more rapidly.

As these examples suggest, developing technology serves as a fundamental engine for socio-economic advance, as it requires the expansion of existing knowledge frontiers (at least new to the society developing it), requires the creation of organizations that support the emergence of technologies, and targets the improvement of life standards of individuals. The latter being subject to the level of development of the society where technology development takes place according to Maslow's hierarchy of needs. Simultaneously, technology development pushes or is pulled by physical entities (e.g. a service, a product, a machine) fulfilling social or individual needs, having entrepreneurs (either as part of corporations, firms, working groups or just as individuals) in charge of envisioning and materializing them. This is supported by Audretsch’s (2007) thesis that the mechanism through which new knowledge is brought to the market, creating new products and services, is entrepreneurship.

In this context, this paper proposes a method for boosting social entrepreneurs in BoP settings by supporting them in the creation of sustainable products that fulfill the functionalities demanded by their context while creating the opportunity to start new businesses. The method is based on the implementation of Product Co-Creation Centers (PC3). PC3 are defined as secure environments where social entrepreneurs are merged with technical experts and product development tools (e.g. computers, design tools, rapid manufacturing technologies) to co-create new product ideas. This co-creation process should result in the professionalization of social entrepreneurs, producing product ideas with market potential and generate potential businesses. Our approach to the co-creation processes is to facilitate the product idea while, at the same time, developing the capabilities of the poor. The processes of “assistance” to the learning may also require the use of innovative (virtual) tools to bridge opportunities with knowledge and experiences. Ultimately, by integrating Business Incubators (BIs) into a system of PC3, economic growth and social development will be further stimulated. The ultimate goal is to install a network of centers in BoP scenarios where social entrepreneurs can co-design a product, co-manufacture it and co-create a business plan with the support of specialized professionals.

This paper is further organized as follows: Section 2 describes the key aspects we are integrating in our approach; Section 3 describes the concept of centers of sustainable co-created products and the research directions required for developing them; Section 4 describes a first showcase where the method described in this paper will be partially implemented, and finally, Section 5 provides conclusions and presents future research efforts.

2. KEY ASPECTS OF THE APPROACH

Our proposition on PC3 mixes three base ingredients: social entrepreneurship, product design and sustainability. The following subsections describe them and their role in our approach.
2.1 The expected result: social entrepreneurs

Social entrepreneur is a very popular term in spite of its newness. One of the most quoted definitions of “social entrepreneurship” was formulated by Dees (1998) as “A social entrepreneur plays the role of change agent in the social sector, by: (1) adopting a mission to create and sustain value (not just private value); (2) recognizing and relentlessly pursuing new opportunities to serve the mission; (3) engaging in a process of continuous innovation, adaptation and learning; (4) acting bodily without being limited by resources currently in hand, and; (5) exhibiting a heightened sense of accountability to the constituencies served and for the outcomes created”. In the sense of profitability, Tan et al (2005) define social entrepreneurship as “making profits by innovation in the face of risk with the involvement of a segment of society and where all or part of the benefits accrue to the same segment of society”. This led to a crossing link among product innovation, profits and the entrepreneur characteristics and his/her origin. Indeed, social entrepreneurs are often described in literature (Dees, 1998), as good at understanding the needs and values of the people and communities they serve. Moreover, they often have a very close relationship with the community in which they operate.

With our approach we seek to identify and support potential social entrepreneurs in BoP settings. In this context, social entrepreneurs need to be sensitive to the needs and expectations of their investors because they seek to provide real social improvements to their beneficiaries and their communities, as well as financially return on investments. Some authors, as Martin and Osberg (2007), describe social entrepreneurship as the one forging a new, stable equilibrium to alleviate the suffering of the targeted group through imitation and creation of a stable ecosystem around the new equilibrium to ensure a better future for the
group and society. In general it has been stated in reported cases that “social entrepreneurship” has an important side effect in the form of solving social problems (Mitchell, 2005).

2.2 The means: Product Design

By engaging social entrepreneurs in product design, we intend to stimulate the development of products and related services to cover both BoP needs and BoP purchasing power. Current product design practices (professional designers and design institutes) target the end-users in advanced markets because of their high purchase power (Jiehui, and Kandachar, 2009). Some research institutes pioneering in design for the BoP are Delft University of Technology (TU), Illinois Institute of Technology (IIT), Berkley and Standford. Delft University has been specially active in developing product design methods that fulfill BoP conditions, as their design for sustainability method presented by Crul and Diehl (2010) shows. Examples of products designed for BoP are shown in Figure 3 (for more examples see Kandachar et al, 2011). Figure 3a shows a posture support wheelchair for children and adults. The design has been careful though ergonomically and physiologically while keeping material and manufacturing costs low. Figure 3b shows a mobile user interface for semi-literate users designed in cooperation with Siemens for people in rural areas in India. This product was conceived to support health care workers in keeping records of medical histories and health statistics.

Additionally, some MNCs (Siemens, HP, Intel, Philips and Microsoft) have started taking BoP markets into account in their product portfolios. However, the efforts made are still marginal in relation to the size of the BoP market, which is according to World Bank around 4 billion people (World Bank, 2005). Furthermore, the notion that technology change is responsible for economic growth is widespread (Aghion and Howitt, 1997; Romer, 1990). According to this view, growth is driven by technological change created endogenously and
intentionally by purposed investments in the creation of knowledge. Here, the newness of knowledge is relative to the context where it is created. Actually, even for developed markets, the focus on new product and service turned away from innovation for the sake of innovation, and moved toward innovation more relevant to people’s lives (Sanders, 2005), which is less reliant on state of the art knowledge.

2.3 The inspiration: Sustainable products

Sustainability is central to our approach. Citing the BoP Protocol 2.0 (Simanis and Hart, 2008) “If 6.5 billion people (8-9 billion by mid-century) consume at the levels of today’s typical American, we would need 3-4 planet Earths to supply the raw materials, absorb the waste, and stabilize the climate”. The three main pillars of sustainability -social, economic and environmental- embrace our concept of sustainable products. To encourage the awareness of sustainable characteristics in products, different mechanisms should be explored (e.g. “eco-labels” (Lavallée & Plouffe, 2004) which is a European label for “green-products”). Large companies have already created their own green-line of products (Dangelico & Pontrandolfo, 2010) and their own labels. From the sustainable viewpoint, it is possible to see products labeled as “fair-trade” (Nicolls, 2010) as an indicator of the social and environmental conditions during their production and trade. In spite of the existence of such certifications, we, as consumers cannot always point them out from the large amount of products in the markets. In this regard, policy instruments associated to green and sustainable products promote innovative production towards the optimization of energy use and environment friendly raw materials are at the core of our approach.

3. PRODUCT CO-CREATION CENTERS (PC3)

In this paper we propose the research into Product Co-Creation Centers (PC3) as a means to boost social entrepreneurship among the people living at the BoP. We define PC3 as physical environments where social entrepreneurs, with no specific expertise, interact with field experts (e.g. industrial designers and engineers) to co-create products from an initial idea up to a physical prototype or proof of principle. In this paper, we emphasize 2 topics we consider essential to be studied for the successful implementation of PC3, namely, the development of a co-creation method and design of an organizational structure. The following subsection describes these topics in more detail.

3.1 Towards a co-creation method

Figure 3 shows how the language used to refer to people being served by products and services has changed over the last 3 decades (Sanders, 2005). The figure indicates that user centric design is driving the creation of new products, and that the era of market driven design is in decline. Sander (2005) states that the once called customers are starting to be conceived by more firms as co-creators: people thought of as participants of the design process. This trend should definitely not be different for the people to be served in BoP markets.
As indicated by the BoP Protocol 2.0, the “co-” component of “co-creation” captures the need to work in equal partnership with BoP communities to imagine, launch, and grow a sustainable business. This statement relates directly to the social entrepreneurship description included in section 2.1. Furthermore, co-development evaluates business imagination and ensures that the business model is culturally-appropriate and environmentally sustainable by building off of local resources and capabilities. It also expands the base of local entrepreneurial capacity, as only locally-based initiatives can be truly culturally-appropriate and embedded in the local economy and landscape.

On the other hand, the “creation” component of “co-creation” refers to designing and fabricating something new. Bruce Archer (1973) defined design as “a human activity concerned with the ability to mold the environment to suit material and spiritual needs”. Furthermore, designing requires all 4 levels of human creativity (shown in Figure 5), which enables the development of new cognitive abilities. In this framework, creation can be understood as the sequenced succession of design and production processes that lead to materialized product or process through the application of all 4 levels of human creativity.

Table 1: Levels of creativity (from Sanders, 2005)

<table>
<thead>
<tr>
<th>Level of creativity</th>
<th>Motivations</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doing</td>
<td>To get something done</td>
<td>Minimal interest</td>
</tr>
<tr>
<td></td>
<td>To be productive</td>
<td>Minimal domain experience</td>
</tr>
<tr>
<td>Adapting</td>
<td>To make something my own</td>
<td>Some interest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some domain experience</td>
</tr>
<tr>
<td>Making</td>
<td>To make something with my own hands</td>
<td>Genuine interest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Domain experience</td>
</tr>
<tr>
<td>Creating</td>
<td>To express my creativity</td>
<td>Passion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Domain experience</td>
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So, co-creation can be defined as the act of creating something new with a group of individuals. In the context of this research, co-creation is practiced by a mix of non-knowledgeable social entrepreneurs and product development experts. For the convenience of our model, BoP represents the input of our co-creation center and after the operationalization of our model (method), the BoP profile turns out into a “social entrepreneur”. This is shown in Figure 4.

![Figure 4: Product Co-Creation Centers](image)

In order to guide the co-creation process and be able to use it as a tool to boost social entrepreneurship capabilities, a method is required that incorporates the following steps:

1. Identification of co-creators: Concerns determining the different actors of the co-creation process and the expertise they should incorporate (e.g. social entrepreneurs, professionals and technicians).
2. Co-creating: Implementing co-creation requires new competencies (as empathy and respect for the creativity of everyday people), new relationships (as the ability to communicate and work across disciplines, across organizations and across cultures), new design methods (as lean design approaches and information based design) and new manufacturing techniques (as for example rapid prototyping techniques to produce low cost proofs of principles). Therefore a descriptive method is required to specify these aspects in the context of PC$^3$.
3. Impact analysis and retro-alimentation: Develop measurement methods to evaluate the impact of co-creation in the communities where it is implemented with the goal of development policies, adjust the co-creation process and determine the new needs.

The development of this method will be the target of further research into the development of the PC$^3$approach. We have also decided to give more emphasis to the co-creation of products fitting the following themes:

- **Exchange**: showcases design solutions that emerge out of knowledge exchange and collaboration between informal and formal sectors of a city.
- **Adapt**: works to acclimate design solutions to climate- and terrain-related realities in the urban environment.
• **Include**: highlights efforts to close the divide between the established city and the marginalized.
• **Lifestyle**: focuses on the design of artifacts to support and improve the lifestyles of the urban poor.
• **Access**: focuses on design solutions that work to resolve issues of access to water, sanitation, food, electricity, health, education and transportation.

This classification is inspired on the theme classification used by the Smithsonian's Cooper-Hewitt National Design Museum, New York, USA, in their exhibition “Design with the Other 90%”.

### 3.2 The organization structure

Our goal is to research PC3 at three levels of implementation: at a unit center level, at a system of centers levels, and integrated to Business Incubators. At the unit center level we refer to the implementation characteristics in a particular setting, as for example the show case presented in Section 5, while at a system level we refer to how to operate several PC3 integrated according to a common set of milestones, capabilities and resources. By integrating PC3 with Business incubators with aim at translating products into new businesses.

#### 3.2.1 Unit center level of implementation

The two most important organizational aspects to define in a co-creation process are ownership and openness, as they result in 4 different types of co-creation processes (Sanders 2005). On the one hand, and as it is shown in Figure 5, the ownership of a co-creation process can be on the hands of the initiator or can be shared by the initiator and the contributors. On the other hand, the co-creation process can be opened to anyone to join (e.g. social entrepreneurs and community members) or restricted to a selected group of people. (e.g. only contributors).

Another issue to consider are the hardware and software tools required for implementing a center unit. Required tools range from brainstorming sessions, to computer aided design tools and rapid manufacturing machines. Furthermore, space wise, a PC3 should have two 2 labs, one for product design and another for prototype fabrication. A popular approach to rapid manufacturing are FabLabs (fabrication laboratory). A FabLabs is a small-scale workshop offering (personal) digital fabrication. It is generally equipped with an array of flexible computer controlled tools that cover several different length scales and various materials, with the aim to make "almost anything". They have already shown the potential to empower individuals to create smart devices for themselves.
3.2.2 System of centers level of implementation

Aspects to take into account are related to the implementation PC3 at different levels of hierarchy, the definition of standard milestones and the efficient usage and exchange of both human and material resources. One example of implementing a system of centers is El Sistema, a publicly financed voluntary sector music education program in Venezuela, founded in 1975 by economist and musician José Antonio Abreu under the name of Social Action for Music. El Sistema is a state foundation which watches over Venezuela's 125 youth orchestras and the instrumental training programs that make them possible. The organization has 31 symphony orchestras, and between 310,000 to 370,000 children attend its music schools around the country. 70 to 90 percent of the students come from poor socio-economic backgrounds. We believe that adopting a similar organizational structure can boost economic growth and development at a macro scale.

3.2.3 PC³ integration with Business Incubators (BIs)

The vision that we have in mind about the centers of sustainable co-created products can be easily connected to the so well-reported concept of Business Incubators (BIs) which correspond, according to the literature, to secured environments where new companies can establish and develop themselves protected from the market competition Ratinho et al (2010). The idea is to support new companies during their first years of existence and guide them up to the point where they can coexist with the market competition. The first two years after starting an enterprise are the most crucial years for the entrepreneur, a significant number of enterprises does not survive this early period. Many of the enterprises that do survive do not grow within the crucial years nor after. Those that show growth often start expanding their enterprise at the end of the second year, this makes it possible to identify the potential of an enterprise in the early stage (Mead, 1998).

Nascent firms lack the necessary resource base to maximize their chances of survival. In this sense, BIs provide new firms with three main types of resources: infrastructure, business support and access to networks (Ratinho et al, 2010). Relevance of BIs on
development is, as pointed out by Tiago Ratinho et al (2011), the effect that they have on the creation of jobs and wealth. Furthermore, in some contexts, BI’s might facilitate that new businesses can receive funding from their Minister of Economy if businesses show an official stamped document from business incubators (Erlewin, 2007).

However, one of the problems for people in the BoP is transforming an idea (or group of ideas) into a product or service that serves as base for initiating a new firm. Therefore, BoP requires another type of support to allow for setting the bases for creating new business. This was also explained by Mead (1998) who stated that one of the reasons why many entrepreneurs fail to set up and grow their businesses, and therefore contribute to the local economy, is the lack of capital and support. Programs aimed at supporting the entrepreneurs can increase the likelihood that these enterprises can survive. There has to be a shift from supporting small enterprises towards supporting entrepreneurs in their start because this will increase the chances of surviving. This can be achieved either through a shift at the level of policy makers or through the support by organizations.

In this context, the goal of creating centers for sustainable co-created products is to support the social entrepreneurs in BoP in determining the products and services they consider that can be used for starting up a new company. We believe that combining PC3 with BIs will eventually lead to the creation of new business providing technologies though for BoPs cultural, economic and social contexts.

4. PUTTING TOGETHER THE INGREDIENTS: THE SHOW-CASE IN PUEBLA

In this section, we present a case which will serve us to monitor the implementation of our “model”. Due to its complexity and the need of multi-requirements, we decided to use a first showcase under simple settings.

The principles framing the showcase are in line with those of “co-creation”, “social entrepreneurship” and “sustainability”, all of them centered on the individual development (from BoP to social entrepreneur). Although, we foresee in our framework that the individual impact can scale upon a larger social dimension. More specifically, in our showcase we would support women from San Agustin Calvario, Puebla in Mexico who live with low incomes. They are regular visitors of a development Center (Ethno botanic) and they mostly join activities such as workshops for learning how to elaborate specific handcrafts, among different activities. These have diverse purposes such as support the visitors to become more aware about the values related to the natural environment and intra-familiar peace (Greathouse, 2010). This center is also visited by children and youth. There is then the potential to expand this project to other societal groups at the same Center.

The town of San Agustin Calvario (SAC) has few economic activities with an unbalanced gender distribution (Tochimani, 2011). Most of the male members work (temporarily) in U.S.A. and few of the women are owners of micro businesses. One of the main drivers of the SAC’s population is to attract more tourists. The environmental situation does not have any particular demand of attention and there are some implemented initiatives towards animal welfare, although preservation of natural resources and animal protection need to be reinforced. As for the social ingredient of sustainability, the development Center Ethno-botanic has the mission to “teach” how to live in harmony: interpersonally at home.
and inter-naturally with plants and animals, its motto is “promoting a culture of peace”. The integral vision of this Center and our contacts with researchers from the Benemerits University Autonoma of Puebla (BUAP) who volunteer there, have made this Center a potential case to start with the implementation phase of our development approach.

There will be women engaged to develop five low-tech-products for sustainable tourism. All of the products include components of: sustainability (utilization of recycled or local natural resources and applying considerations of resources preservation and some others considerations of animal welfare during their production and consumption), co-creation (principles of BoP by poor principles with multidisciplinary coaching of two educational partners, one located in Puebla and the second in Twente, The Netherlands) and social entrepreneurship (business development ad hoc to the context with philanthropic purpose but still generating individual profit and regional prosperity).

As for the setup of this show-case, this will be carried out in partnership of University of Twente and BUAP. At the University of Twente, we will work with students in their last bachelor’s year. The students have to work in multidisciplinary teams on a case of sustainable development studies. Their case is framed in 10 weeks’ time and they will receive the case documented at the starting point of the course.

Interaction processes, virtual bi-lingual and multicultural communications, project oriented to a product development, among other characteristics of the implementation phase of our model are considered key aspects for success. This show case counts with the support of dr. Louise Greathouse and her experience in virtual learning settings for multicultural-bilingual projects, as reported by Bruiguier & Greathouse (2011). Added to that, the method and milestones to execute and assess the showcase will be fully defined by the second week of November, ready before the kick-off of this showcase.

5. CONCLUSIONS

In this paper we have described our research into Product Co-Creation Centers (PC3) as a means to boost social entrepreneurship among the people living at the BoP. We define PC3 as physical environments where social entrepreneurs, with no specific expertise, interact with field experts (e.g. industrial designers and engineers) to co-create products from an initial idea up to a physical prototype or proof of principle. Our long term vision is:
- to have systems of interrelated PC3 in charge of identifying, recruiting and developing capabilities of social entrepreneurs at the BoP,
- to integrate such networks with Business Incubators (BIs) supporting the generation of new firms that will eventually contribute to the generation of employment and economic growth at the BoP, and
- to fuel the growth of a new industrial sector serving the needs for sustainable products and services for BoP

This multi-factorial setting certainly relies on collaboration among different skilled people from different type of organizations (rural and urban centers for training; established companies –as part of their social responsibility activities--; universities). Networking is a crucial aspect to hold all along the processes for BoP and product developments. Therefore, communication and coordination will require particular attention to ensure the
operationalization of the method and all of that brings us to the financial aspects of the center(s) which per se is a product of social entrepreneurship. By running the showcase, practically without direct financial support, we aim to test the method and identify those potential risks for further developments. By executing the showcase, we train young people to experience what might be in the upcoming years one the most popular business models: social and sustainable entrepreneurship.

6. ACKNOWLEDGEMENTS

We are very grateful to count with the interest and collaboration of our Mexican partners for this show case who accepted to include this project in their own portfolio. Our tribute goes in particular to dr. Louise Greathouse Amador and drs. Norma Contreras. Research outcomes from this show case are expected to generate jointly publications in peer-reviewed journals.

7. REFERENCES


