



Brazilian design for sustainability: in search of a local approach



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ABSTRACT

Small and medium enterprises are fundamental to economic growth and job generation, especially in developing countries. These companies are crucial for the improvement of social conditions and technological development in poorer regions of the Americas, Asia and Africa. However, local conditions are usually very specific and demand a singular approach for sustainability. This paper presents some results of a research aimed at investigating methodologies and tools to support the application of Design for Sustainability principles adapted to the real conditions of Brazilian small and medium enterprises. These enterprises are mainly based on traditional products and technologies. The results of this research were achieved through identifying elements for development of a sustainable approach, with a focus on design of products in Brazil and other developing countries. The methodology considered variables specifically linked to the local situation. The primary focus was on small companies working in traditional production processes (or craftsmanship) in Minas Gerais State, in southeast Brazil. Four main sustainability aspects were considered: environmental, economic, social and cultural. As a conclusion, three cases of intervention focused on sustainable improvement are presented and discussed.

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1. Introduction

SMEs – small and medium enterprises – are increasingly recognised as central contributors to sustainable development. Especially in developing countries, SMEs have a fundamental importance in employment generation and economic development. This paper presents research intending to adapt D4S – Design for Sustainability – methodologies and tools to Brazilian SMEs. The studies were carried out on a large number of companies based on traditional technologies, producing goods using specific manufacturing skills (e.g. food, clothing and furniture). The main sustainability aspects (Savitz and Weber, 2006; Boulouta and Pitelis, 2014) considered are described below:

1.1. Environmental sustainability

LCA – Lifecycle Assessment tools were applied to measure the environmental impact of production processes and products of the local SMEs that adopt traditional materials, work skills and processes. This approach is based on D4S strategies (Crul and Diehl,

2005, 2009) and use of LCA (SAIC, 2006; UNEP, 1996) according to ISO 14040/44. LCA is not just an environmental impact measurement tool. It can also improve “several environmental, economic and social assessment methods” (Jeswani et al., 2010). In this way, LCA method is used as support to a holistic investigation about the influence of product lifecycle on different aspects of sustainability.

1.2. Economic sustainability

The production processes in the selected companies were evaluated and engineering and design tools for the development of original and adequate technical solutions (including new designs in products) were applied. These procedures aim to improve the SMEs' economic results and expand the product line and the market share (including exportation possibilities), but maintaining “fair trade” and “ethically correct” principles (Pitelis, 2013).

1.3. Social sustainability

The working conditions in crafts production and in the SMEs' were considered as a way to understand social relationships. This study intends to contribute to the improvement of social conditions and the way of life of the people impacted by the enterprises (Romeiro Filho and Lima, 2010). This approach is based on the

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context of HDI – Human Development Index and impacts of local companies on population settings such as in the health conditions, education and living expectative of people involved in the production process, their families and communities.

According to Crul et al. (2009, p. 25), “the 3 key elements of sustainability – social, environmental, and economic – are also referred to as *people*, *planet*, and *profit*, and are the fundamental components of product innovation”. This paper also includes a fourth aspect, the cultural sustainability:

1.4. Cultural sustainability

In this approach (similar to the proposed by Mestre, 2008) the importance of local tradition and skills is considered in the new product development, as a way to increase the profit while maintaining local cultural values. In this way, the origins of some traditional Brazilian products were investigated. This enabled the “mapping” of historical and cultural influences and the identification of native knowledge and “savoir-faire”. European and African cultural elements were also identified. This mapping was done in order to maintain the local identity in new designs.

The implementation of design and engineering methods is recognised as a powerful way to improve situations such as those found in Brazil and in other developing countries. However, these methods were originally developed and applied in large companies in developed countries (Klewitz and Hansen, 2014). Unlike the multinational companies, SMEs in developing countries characteristically have an inadequate organisational structure, no trained workforce, low economic resources and low technology. Bearing this in mind, an investigation into adequate techniques focused on the local SMEs' requirements it is essential to improve their competitiveness.

One should also consider the improvement of the local population living conditions, without compromising environmental or degrading cultural values, as well as the working conditions in the SMEs. Cultural conservation is particularly important in Minas Gerais, where there are both extraordinary cultural heritage and national history. The main objective of this research was the adaptation of tools that can improve the insertion of D4S principles in Brazilian SMEs, especially those based on technologies and traditional products.

2. The main issue

Product design is a crucial element for companies' competitiveness and for Brazil's economic development. Currently the relative decrease in the percentage of total industrial GDP to the country's total GDP, demonstrates a risk of “deindustrialization” (Bresser-Pereira, 2012; Souza, 2009). This situation can be aggravated by increasing importation of consumer goods, especially from Asian countries. In addition to the economic aspect, there is an issue of the appropriateness of such products to the needs of Brazilian consumers. Imported products are often standard solutions developed from generic concepts of the needs of a global market and are distant from the Brazilian needs and characteristics.

At the same time, numerous population groups in Brazil live with poverty levels incompatible with the country's economic growth. It has become essential to seek ways of employment and income for these groups, many of whom are descendants of communities that arose during the process of Brazil's colonisation. Although these communities suffer from all types of material deprivation, they maintain important traditions and represent a key element of the Brazil's culture preservation. Its isolation throughout decades of economic deflation is now starting to be reversed and it is necessary to create conditions for its economic

and social development, maintaining the local cultural aspects and reducing the environmental impacts.

A possible solution is to support SMEs, which are traditionally responsible for most of the jobs in the nation and are therefore important elements of employment and income generation. Although this experience brings forth positive results, it's important that these enterprises become more agile in product development and more efficient in production processes, enabling better working conditions and reducing the environmental impact, therefore becoming able to attend more properly to their consumer markets and to extend these market ranges. Product replication, together with production increases through work intensification, are strategies that do not persist in the long term and often bring more damage than benefits (Oliveira and Echternacht, 2007). Hence, there is a need for providing these companies with sustainable processes and social elements while maintaining the local cultural repertoire to generate original design solutions.

Brazilians SMEs are exposed to competition from large national and international companies. Likewise, they are encouraged (or forced) to compete in new markets by trying to access unexplored regions and/or niches or even exporting to different countries. The same thing occurs to groups that operate in traditional manufacturing systems with artisanal bases. These are stimulated by various governmental programs to build up associations and to develop new solutions to increase the target audience reached, the artisans' entrepreneurial capacity and, in particular, the aggregate value of artisanal nature products (Freitas, 2011; Freitas and Romeiro Filho, 2005). Those different actions aim to bring to production processes of artisanal bases relevant contributions to the economic and socio-cultural development of those producing regions.

This research is based on the assumption that traditional methodologies of design and product design, in addition to those oriented toward sustainability, can be inadequate to the observed reality in Brazil, in particular to the existing reality in traditional production systems and SMEs. This situation is similar to observed in other developing countries, e.g. Mexico (Bonsiepe, 2009), Vietnam and Costa Rica (Crul and Diehl, 2005) and experiences linked to principles proposed in the DBoP – Design for the Base of the Pyramid - experiences (Whitney and Kelkar, 2004). In these situations, the specific product requirements and the characteristics of local companies (e.g. weak organizational methods) and people involved (e.g. low education level) lead to the need for specific product development and manufacturing processes. In these cases, a previous diagnosis could be a support to a design intervention aiming the improvement of local products and processes. Intending a deep understanding about a peculiar situation observed in Brazilian SMEs, some research tools are proposed.

Design and engineering provide a remarkable contribution to the improvement of this situation. However, the existing methodologies and tools for product design are, for the most part, developed for application in large enterprises, making them inadequate for SMEs, whose organisational structure, investment capacity and labour characteristics are unique. Therefore, the development of design methodologies adequate for the peculiarities of Brazilian SMEs is appropriate, as a way to raise their competitiveness. We must also consider the improvement of the population's living conditions without compromising the environment or degrading local cultural values. The working conditions in SMEs and the creation of conditions that guarantee that cultural aspects related to traditional manufacturing systems should not get lost in the light of disordered innovation processes. This aspect is particularly important in the state of Minas Gerais, where there is extraordinary cultural and historic heritage.

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