TEACHING DESIGN FOR SUSTAINABILITY BEYOND THE ENVIRONMENTAL DIMENSION: A TOOLKIT AND TEACHING STRATEGIES ENCOMPASSING THE CULTURAL AND ECONOMIC DIMENSIONS THROUGH DESIGN FOR SHARING

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ABSTRACT

Design for Sustainability (DfS) latest methods embrace the socio-technical systems, aiming to promote radical changes in societal needs. However, few studies investigate consumer behaviours, motivations and subjective practices as well explore teaching strategies for such approach. Therefore, this conceptual paper addresses the following research question: how to teach DfS beyond the environmental dimension of sustainability as an opportunity for developing solutions that are culturally desirable and economic viable? Its main goal is to present a teaching experience held along 2 years in 2 universities in Brazil. Drawing upon Vasques (2015), the toolkit and teaching strategies integrate de cultural dimension through the Consumer Culture Theory knowledge (CCT) and reflections on self, materialism and sharing. The economic dimension is addressed by questioning the scarcity economic model and developing a project from users' needs and challenges to change consumption patterns identified with CCT and explored with the AT.ONE Service Innovation Method and the Sharing Business Model Compass. Students had raised awareness and fostered critical thinking on the relevance of both cultural and economic aspects related to DfS, suggesting the significance of the approach through design for sharing.

1. INTRODUCTION

Design for Sustainability (DfS) has evolved quasi-chronologic from a product design approach (e.g. green-design, eco-design, emotional durable products, cradle-to-cradle, among others) to Product-Service System (PSS), to the spatio-social innovation level (e.g. Design for Social Innovation, systemic design), and later to the socio-technical system innovation level (e.g. system innovation and transitions, design for transitions) (Ceschin & Gaziulusoy, 2016).

According to Ceschin and Gaziulusoy (2016), the difference among these approaches are:

- Product innovation level: design approaches focussing on improving existing or developing completely new products.
- Product-Service System innovation level: here the focus is beyond individual products towards integrated combinations of products and services (e.g. development of new business models).
- Spatio-Social innovation level: here the context of innovation is on human settlements and the spatio-social conditions of their communities. This can be addressed on different scales, from neighbourhoods to cities.
- Socio-Technical System innovation level: here design approaches are focussing on promoting radical changes on how societal needs, such as nutrition and transport/mobility, are fulfilled, and thus on supporting transitions to new socio-technical systems. (p. 120)

However, DfS evolution has been barely explored in higher education in Brazil beyond the Learning Network on Sustainability (LeNS) efforts. The research carried out by Calegari and Oliveira (2015) on how design courses in the Brazilian Federal universities address sustainability in their programs exposed that mostly focus only on its environmental dimension through green design or eco-design strategies. Despite the environmental dimension relevance, such approach is out-dated, since it remarks to the concept DfS from the period of 1990 and the beginning of the 2000s, while the approaches that also address the socio-ethical dimension had emerged over ten years ago already. It is also limited as it has a lower impact on tackling urgent and complex issues as consumption patterns that we need to face to achieve a sustainable society. Moreover, by analysing the fashion design courses in Brazil, Lima (2018) also called attention to the need of developing a critical and active education, where teaching, learning and practising should be a transformative proposition.

Sharing is, potentially, better environmental, economic and social consumer practice than ownership. Product Service Systems for Sharing instead of the individual possession and usage of products can attend the strategies of life cycle optimisation and product use intensification, reducing its idle capacity (Manzini & Vezzoli, 2002). Furthermore, the reduction of products to be owned can lead to lower production and consequently less discarded products in the future (Turker, 2004). Social innovations (SI) promoting sharing on spaces, products and activities enhance social cohesion (Manzini, 2008). However, as argued Vezzoli, Ceschin, Diehl and Kohtala (2012) Sustainable Product-Service Systems (S-PSS) remain not widely implemented even they present environmental and economic benefits. Notwithstanding, little attention is given to the cultural dimension of PSS for Sharing (Vasques, 2015). Still, from the economic dimension, most studies are carried out focusing on the company's perspective, while users' motivation can be different (Böcker & Meelen, 2017). Thus, this paper addresses the following research question: how to teach DfS through designing products, services or systems for sharing beyond the environmental dimension of sustainability as an opportunity for developing solutions that are culturally desirable and economic viable?

The main goal of this paper is to present a toolkit and teaching strategies that was used for two years (2017-2018) in Design for Sustainability subjects of the Design course at the University of São Paulo, School of Architecture and Urbanism (FAUUSP) and the Federal University of Paraná State (UFPR) drawing upon Vasques' doctoral dissertation (2015). The toolkit and teaching strategies objective is to raise awareness and foster critical thinking on the relevance of cultural and economic aspects related to DfS. Therefore, students can be able to create solutions which, in addition to being environmentally appropriate, are economically viable and culturally desirable, aiming to promote changes in production and consumption patterns that support the transition to a sustainable society.

2. UNDERSTANDING MATERIALISM AND SHARING THROUGH CONSUMER CULTURE THEORY LENSES

Despite the growing offer of products and services for sharing, Mont and Plepys (2003) argue consumers generally try to prefer product ownership rather than a service substitution. And even when the service is accepted, the environmental impact will depend much more on consumer behavioural changes. Thus, to design systems that replace ownership, we need a deep understanding of aspects that may shape the acceptance of PSS offerings:

In order to change system design, it is necessary to understand how consumer acceptance of more sustainable solutions is formed, influenced or changed, what are the influencing factors and what are the leverage points for best results with the lowest costs. Understanding consumer perceptions and behaviour in this context is crucial. (Mont & Plepys, 2003, p. 3; our emphasis)

On the other hand, there are few studies with an emphasis on subjective aspects that are part of the sociocultural dimension of sustainability (Ono, 2008). In the same sense, Mont (2004) draws attention to the need of understanding consumer practices from a sociocultural perspective and from the historical context in which they occur, as a way of comprehending how people assimilate both more eco-efficient consumption alternatives and shared systems. Piscicelli, Cooper and Fisher (2015) also recommend investigating the role sociocultural factors play in the

user's acceptance of PSSs, to scale-up these solutions.

Scholars from Marketing studies have been researching materialism and possessions since 1980. These studies have raised and developed a new research tradition called Consumer Culture Theory (CCT) through investigating consumption from sociocultural, experiential, symbolic, and ideological aspects, thus shedding light to the cultural dimensions of consumer practices (Arnould & Thompson, 2005).

Russell Belk, one of the leading scholars from CCT, summarised that "we are what we have" in his seminal paper on possessions and self-extension written over 30 years ago, stating the self as essential for understanding consumer behaviour. Moreover, possessions delimit and contribute to the construction of the individual identity (Belk, 1998).

Further studies on this research tradition remark the most important objects in people's life reflect their material values. Products embody the owner's value and communicate them to others; thus, influencing what kind of product is consumed and how such products become important (Richins, 1994). In this sense, Kleine, Keine and Allen (1995) pointed out that favourite and beloved possessions are those which help to describe a narrative of a person's life history (e.g. a ring or objects received from inheritance). Hence, more fragile attachment with products usually symbolise periods of life from which people want to detach themselves or that no longer represent their identity.

Still, Ahuvia (2005) agree with Belk (1988) concerning the relevance of the relation between consumption and identity. Nonetheless, he criticises Belk's concept of a central and extended-self as potentially confusing metaphors to define consumption and the appreciation of possessions. People have contact with a vast number of products and consumer activities, but only a few of them are meaningful and therefore loved. Thus, Ahuvia argues beloved products and consumer activities are central to understand consumer identity. However, he considers them as only a partial characteristic to comprehend the consumer's identity, since it is also formed by aspects that people do not like, which, in the same way, can be represented by objects.

Since 2006, Russel Belk has been researching sharing in the CCT tradition as one of the aspects of materialism and consumer behaviour. He calls attention to the fact that sharing was neglected in CCT studies, although comprehending this kind of consumption is critical not only to understand consumer behaviour in the face of new paradigms (as the phenomenon of sharing files, music, photos and videos provided by the Internet) but also as one of the oldest forms of consumption. Moreover, sharing relates directly to emergent issues of social justice, consumer welfare, materialism and sustainability (Belk, 2010). Therefore, we built our toolkit for the cultural dimension bringing the CCT knowledge on materialism and sharing to the DfS classes, using it to help students to understand consumer behaviour and practices, as recommended by Vasques (2015).

3. SHOULD SHARING BE PROFITABLE? QUESTIONING THE ECONOMIC DIMENSION

The economic dimension of Sustainability goes from a conservative perspective to the "green" economy (Vezzoli et al., 2018). Regarding the DfS, the Sustainability Design-Orientation (SDO) Toolkit presents a checklist[1] of considerations to be analysed and to set priorities. It might be useful for a company redesigning a system. However, it focuses on profitability and competitiveness. It also follows the traditional economic vision of scarcity (never will be enough things to satisfy the wanters), while the sharing economy has its foundations on the idea of abundance (resources, creativity and wealthy are enough to everybody if well managed). Moreover, why should we follow the scarcity thinking that leads to greed and selfishness, especially when designing for new consumption patterns?

Sustainable Product-Service Systems (SPSS) guidelines[2] for economic sustainability are also vague when we try to apply them in the context of sharing. Furthermore, SPSS are thought to encompass business traditionally developed to "sell" something (in this case, a service) to users. On the other hand, SI as proposed by Manzini (2008) are bottom-up solutions, which do not fit in the business world. Still, the Sharing Economy embraces a wide range of products and services from spontaneous sharing practices among neighbours to successful endeavours as Airbnb.

Here it is essential to clarify the concept of sharing and if it should involve money or not. Belk (2014) argues services for sharing cannot include money, otherwise it is renting or pseudo-sharing. The discussion is vast and has been losing its meaning with the banalization of the concept of "sharing" in the virtual environment. Instead of entering this barren ground, we propose to focus on the usage of products, following Vasques (2015) definition of sharing: non-individual usage of a product, ranging from spontaneous practices to service-mediated, inside or outside the familiar circle, whether it involves money or not. Frenken and Schor's (2007, p. 4-5) definition of the sharing economy follows the same principle: "consumers granting each other temporary access to under-utilised physical assets ('idle capacity'), possibly for money". These definitions are useful and broader for design purposes since they are less limited to only spontaneous practices of sharing. Again: what if we have hybrid systems for sharing?

The relevance of these discussions emerges from studies (Vasques & Ono, 2016; Böcker & Meelen, 2017) that

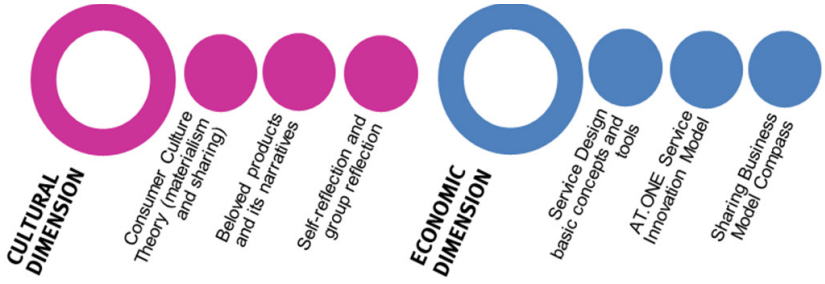
[1] SDO Guidelines for the economic sustainability: 1. Market position and competitiveness: Do you have a weak market position in the current system? 2. Profitability/added value for companies: Is the profitability of the current system low for your company and other external partners? 3. Added value for customers: Is the profitability/value low for customers/consumers? 4. Long term business development/risk: Are there any threats in the current system for your business in the longer term? 5. Partner cooperation: Is your market position in danger? 6. Macro-economic effect: Are there problems on a macro-economic level? E.g. disclosure of participants in economy, monopolistic structures, rebound effects? (http://www.sdo-lens.polimi.it/)

[2] To promote local economy; to strength and enhance local resources; to respect and enhance local culture, to promote network; to value waste reintegration.

have been showing users are more economically motivated to participate in the sharing economy than for social or environmental reasons. Böcker and Meelen (2017) highlight also the difference concerning motivations from users and providers, with most of the providers arguing the main reason to choose a shared service is for environmental awareness while users affirm to be more motivated by economic reasons, especially in different sectors of the sharing economy (i.e. sharing clothes, cars, tools, accommodation). Thus, designing with the standpoint of delivering a "unit of satisfaction", a common driver for SPSS, seems to be failing. Everybody will need to travel from A to B sometime but offering only the most ecologic way to travel seems to be not enough. We need to understand also how the culture and self-identity blur the economic and environmental motivations and vice-versa.

4. TEACHING STRATEGIES AND TOOLKIT

The DfS subject held in USP and UFPR approached: 1. Sustainability and DfS history and concepts; 2. Green design and Ecodesign – concepts, tools and project focusing on the environmental dimension; 3. SPSS and Social Innovation – concepts, tools and project about sharing focusing on the cultural and economic dimensions (teaching tools and strategies described in this paper). To build our toolkit for teaching DfS embracing the cultural and



economic dimensions beyond the environmental one, we borrow research methods and techniques from "Local Wisdom" Project[3], the AT.ONE Service Innovation Method (Clatworthy, 2010) and the Sharing Business Model Compass (Cohen, 2016; Muñoz & Cohen, 2018).

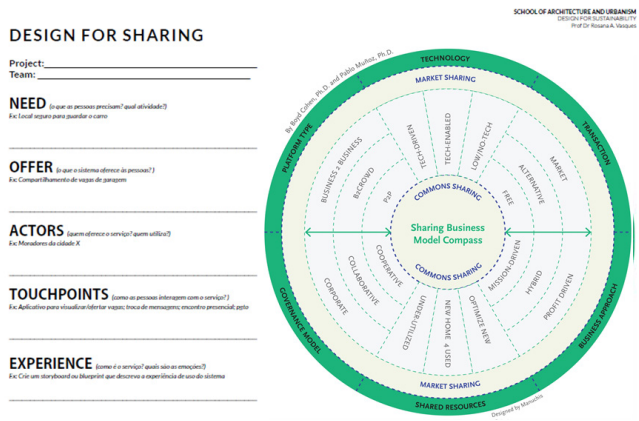
[Figure 1] Framework for teaching DfS beyond the environmental dimension

The "Local Wisdom" Project (a series of photographies and narratives about spontaneous fashion practices towards sustainability collected and documented by Dr Rachel Fletcher) inspired us to ask students to bring their beloved products and share the narrative about it, explaining why the product is essential for the students' identity. After, the students were grouped in 5 and discussed within the group if they would share or not the beloved product with friends, family or strangers. The results brought awareness of materialism and altruism practices bonded in their culture and lifestyles. Self-reflection and group-reflection raised the urgency of understanding deeper consumers' behaviour, identity and cultural habits that may influence or challenge the acceptance of services for sharing learnt through the knowledge from the CCT.

After understanding the cultural barrier or opportunity to develop a new service for sharing, we presented to students basic concepts of Service Design and an integration (Figure 2) of the "AT.ONE Service Innovation Method" (Clatworthy, 2010) with the "Sharing Business Model Compass" (Cohen, 2016; Muñoz & Cohen, 2018) aiming to give a comprehension of how to spot the new product, service or system for sharing from an economic perspective. By using the AT.ONE tool, students were requested to research and reflect on the anagram concept as described by Clatworthy (2010), starting with the needs previously identified with their reflection on materialism and sharing:

A – Exploring new combinations of ACTORS who together can provide a new service for sharing;
T – Designing the TOUCH-POINTS to offer innovative services to sharing (represented in a storyboard or blueprint)
O - Developing new OFFERINGS aligned to both users and the company or community's value;
N - Understanding customer NEEDS and how the new service for sharing can satisfy them;
E - Designing customer EXPERIENCES that delight users, making then prefer to share rather than own.

[3] http://localwisdom.info/



[Figure 2] Integration of the AT.ONE Service Innovation Method and Sharing Business Model Compass

The Sharing Business Model Compass was used to demonstrate the variety of decisions needed to design a common shared resource to a sharing-based business or start-up, supporting and complementing decisions made with the AT.ONE tool. The Compass is also useful to present new possibilities and an overview of economic aspects concerning entrepreneurship and can be used in both SPSS and Social Innovation projects. It has the following structure that guides business decisions:

- Shared Resources: Is it based on an existing product(s) underutilised? Is it second-hand based? Is it optimising the life-cycle of a new product? What are the environmental impacts in which approach?
- Transaction: Is it for free? Is it build on alternative currencies (e.g. time banking)? Is it following the traditional market rules (i.e. money exchange)? What are the economic benefits and value perceived by users and providers?
- Business Approach: Is it mission-driven? Is it profit driven? Is it a hybrid (mixes profit and mission-driven)? How is it economically sustainable in the long-term?
- Governance Model: Does a cooperative manage it? Is it a collaborative service? Is it from a corporate? Who are the human resources?
- Platform Type: Is it P2P? Is it a B2C? Is it B2B? Who are the stakeholders/actors?
- Technology: Is it tech-driven? Is it tech-enabled? Is it low or no-tech? Which one has the best environmental and social impact? Which one is economically viable considering the transaction, governance model and business approach?

These questions guide student's reflection and decision making, following an iterative service design process focusing on its cultural desirability and economic viability. Finally, they must present a storyboard or service-blueprint and discuss the results with the other groups.

6. IMPACTS ON TEACHING DFS FOCUSING ON THE CULTURAL AND ECONOMIC DIMENSIONS

The emerging approach of Socio-Technical System calls for a radical change on how we teach and design. Sharing Economy has the potential to create a decentralised, equitable and sustainable economy, but it is also criticised for creating unregulated marketplaces, besides reinforcing the neoliberal paradigm (Martin, 2016). Thus, because of its inner ambivalent potential, teaching DfS through sharing is an opportunity to raise the students' awareness and critical thinking on the holistic perspective needed to cope with unsustainable lifestyles.

This paper describes a teaching experience of DfS conducted in 2 Brazilians public universities along 2 years (held in one semester per year). The experience is based on the following authors' questioning: How to develop students' skills to embrace the social and economic dimensions of sustainability in projects? How to improve students' autonomy and critical thinking to decide which DfS model (SPSS, SI etc.) is the best solution for the problem they found out?

Teaching DfS through sharing focusing on the cultural and the economic dimension has been a challenging and meaningful experience for both, students and professors. From the professors' perspective, we had to fit the theory, design exercises and project presentation in twelve hours, in a total of thirty hours. Following the subject structure, it is essential first to present both the historical background of the concept and to practice tools addressing the environmental dimension of sustainability, before moving into the SPSS and Social Innovation concepts. From our experience, both the first phase (Sustainability and DfS history and concept) and the second (green and eco-design concepts and tools) of the discipline holds an average of eighteen hours. Hence, we recommend that a new subject could be created such as Design for Sustainability – level 2, which could address the Spatio-Social and the Socio-Technical System Innovation approach, and deeply discuss and explore the cultural and economic dimension with students, as well as the socio-ethic and philosophic dimensions in transitional systems.

From the student's perspective, many of them vocalised they have become more aware on the cultural dimension through practising the concepts of materialism and sharing from CCT since first they were motivated to reflect on their practices of sharing and ownership with their beloved objects before developing a solution that demands others to share. Nevertheless, we stand that CCT is not a panacea that can embrace the myriad of aspects concern-

ing to the cultural dimension for all DfS project, even it had proved to be quite useful on designing for sharing. Likewise, using the Sharing Business Model Compass and AT.ONE Service Innovation Method as tools have helped students to better comprehend the economic aspects of their solutions in this specific context, bonding the economic value to the users' needs. It is worth emphasising that our toolkit and strategies presented here are not a "one-way street" to address the cultural and economic dimensions for designing products, services and systems for sharing. Drawing upon Vasques (2015), the theory, toolkit and strategies were updated along the two years and in the two different universities. Now, we invite you to use them, contributing further from your own experience and context.

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