SUSTAINABLE INNOVATION AND THE ISSUE OF SCALE

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ABSTRACT

Sustainable innovation and eco-innovation have become priorities within the area of sustainable design. Focusing not only on production, also consumption and systemic changes have been addressed in order to handle increasingly substantial issues. Consequently, the focus of sustainable innovation has shifted from products to solutions and systems. However, as design has traditionally been a product-oriented profession, adopting operational models that require greater influence throughout the value chain is not necessarily easy. This paper explores the issues that the scale of sustainable innovation poses on design and suggests that the concept of environmentally sustainable innovation should be approached more deeply also at the product level.

INTRODUCTION

Environmentally sustainable design has developed significantly over the years. Starting from reactive end-of-pipe measures the focus has been extended to production processes, the actual products produced and lately to consumption (Vezzoli & Manzini 2008a). The reason for expansion has been the inability of the previous approaches to deal with environmental issues. For example, while the products of today are often better for the environment than their predecessors, the increase in consumption has resulted in the growth of overall environmental impact (Robins & de Leeuw 2001). As a result, sustainable consumption and production has risen as an approach in environmentally sustainable innovation.

Environmentally sustainable innovation or eco-innovation can be defined as 'any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources' (European Community 2006). For the purpose of this article the issue of specific interest are the levels of eco-design innovation that are often identified (see Figure 1). These levels can be seen to be derivatives of the development of eco-design: the approaches of refining and repairing are less effective when compared to redesigning and rethinking of products and entire systems. As Figure 1 also suggests, design should focus on redesigning and rethinking current products and processes. In practice, lifecycle design methodologies that optimize the environmental performance of products and systems are often offered as the main approach for redesigning products and services towards eco-efficiency. For rethinking and creating more radical eco-innovations, product-service systems (PSS) are

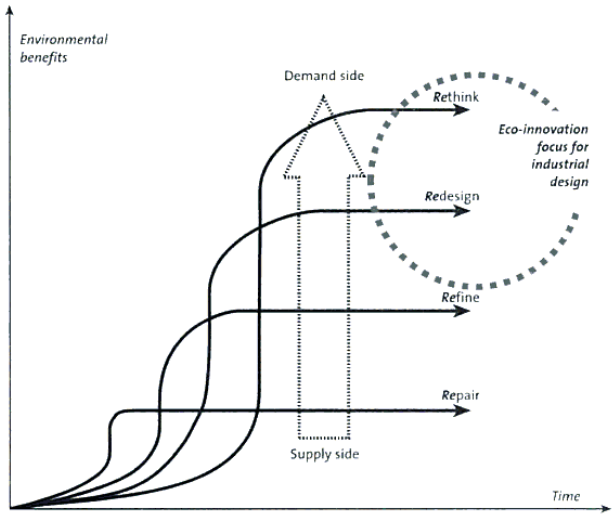

Figure 1. Revised model of eco-design innovation for industrial design. (Thompson & Sherwin 2001).

often brought up as the practical approach. A product-service system can be defined as 'a marketable set of products and services, jointly capable of fulfilling a client's need'. (Goedkoop et al. 1999). Product-service systems focus especially on decoupling consumption and environmental degradation by enabling more intensive utilization of goods and shifting to different product-ownership models that create incentives towards eco-design for manufacturers (Mont 2002). Although evidence of substantial environmental benefits created through more service-oriented business models is scarce (Heiskanen & Jalas 2003) some inspiring success stories – such as Interface Inc. and Xerox – have surfaced (see Mont & Emtairah 2008).

However, when looking at more generic design innovation literature – generic in the sense that it does not specifically target sustainability – it seems that there is a different size of scale in play. The writings of eg. Verganti (2009) and Kelley & Littman (2001) are full of examples of product-innovation: from wristwatches to furniture and shopping carts to computer mice. Although successful product innovation does most certainly require certain system dynamics behind it there seems to be no presupposition of scale of the outcome in generic innovation: it can be done on many levels, from products to services to systems. Eco-innovation, however, seems to hold a presupposition of scale by definition: Charter & Clark (2007) express the highest level of sustainable innovation as no less than 'design for sustainable society'. What is more, the discussion on the levels of sustainable design seems to have created some separation and even juxtaposition between products and systems. When speaking of the possibilities design can use to improve sustainability, Tukker (2008) states that the activities of product design 'centre on products and production rather than on consumption patterns' and gives higher priority to the 'design and envisioning of 'satisfaction-fullfilment' systems', ie. product-service systems. Similarily, Vezzoli and Manzini (2008b) insist that design should abandon its product-oriented nature and concentrate more on systemic and solution-oriented approaches. Even though this suggestion to abandon the product-oriented nature of design mainly criticizes current design approaches and not products *per se*, the tension between products and solutions is tangible in this notion.

It is obvious that design is not responsible for designing entire systems of consumption and production on its own and the necessity of considering the systemic level in eco-design is unquestionable. Nevertheless, the scale that seems to be built into the very definition of eco-innovation is not devoid of problems. This article approaches the issue of scale in environmentally sustainable innovation by looking at the amount of influence design generally has in product development in comparison to the expected requirements to arrive at radical innovations such as PSS. The main arguments of this paper are that environmentally sustainable product design should be explored in greater depth and that attention should also be paid to eco-innovation opportunities at the product level.

DATA

To discover the problem of scale in sustainable innovation the main issue addressed through the data is the amount of influence designers generally have within the product development process. The data has been gathered from two main sources: previous findings about the influence of design within the product development process and interviews conducted with Finnish designers on the topic of sustainable design. It is worth noting that the issues will be discussed in the Finnish context and the focus is on designers working in design agencies, where most Finnish designers are employed (Holopainen & Järvinen 2006).

LITERATURE

By examining the underlying principles behind the idea of product-service systems introduced earlier, it is evident that the improved sustainability performance behind them stems from how things are organized: the system includes products that are just put to use in a more efficient manner (eg. through a car-sharing system). While this does to some extent justify the notions that design should focus more on need-satisfying solutions than products, it also raises the question of whether designers working in agencies are in a position to create systems of this scale? An attempt to push design to higher levels of influence within value chains is, without a doubt, a positive thing but do designers really have that amount of influence?

Valtonen (2007) has studied the development of the industrial design practice in Finland and recognized that designers have constantly aspired to participate earlier in the product development process in order to generate a greater impact, both in the process as well as in business in general (ie. moving from product design to strategic design). However, a survey conducted in 2006 states that product design was still the most bought design service in Finland: 64% of the responding companies had bought product design from design agencies. In comparison, concept design had been bought by 29%, branding by 27% and strategic design only by 2% of the respondents. The report concludes that design has not been used to its full potential, especially in the areas of strategic design and business development. (Holopainen & Järvinen 2006).

When looking at the typology of product-service systems, the problem of influence becomes increasingly evident. Tukker & Tischner (2004) categorize sustainable product-service systems into three categories in increasing amount of service content, sustainability benefits and radical innovation: product-oriented, use-oriented and result-oriented. For this paper the interesting issue are the necessary requirements for transforming companies towards more service-oriented business models. Gebauer et al. (2008) have studied

service development in traditional product manufacturing companies and state that the more service-intensive the offering, the more resources and antecedents are required from the providing organization, ie. the larger the scale of action. Thus for new businesses a PSS might be a great deal easier to set up, but in established businesses transforming from product manufacturing to solution-oriented business requires action on a wide scale and is mostly a question of strategy and business models.

INTERVIEWS

A total of eight semi-structured interviews were conducted between November 2008 and February 2009 with design professionals on the topic of sustainable design. The purpose of these interviews was to explore the relationship of Finnish design – mainly industrial design – and environmentally aware design. For this article the interesting part relates to the designer's sphere of influence within the product development processes.

The interviews give insight into in what stage of the product development process design is typically bought at and how much there is room for influence. The following contains insights into the influence of design from two designers:

'Design is bought fairly late in the product development process and at that stage the specifications are pretty much set. At that stage you don't anymore question whether or not you'll design a mouse but you design the mouse according to the specifications. There is very little room there to influence.'

'Always in these environmentally oriented projects there is some existing infrastructure or system that limits the possibility to influence things… and then when you get into these projects as a designer you can't necessarily influence the underlying basic questions anymore.'

Based on an interviewee's notion of the product development process and at what point design is bought at, Figure 2 summarizes the current situation well: design typically steps into the picture fairly late in the product development process.

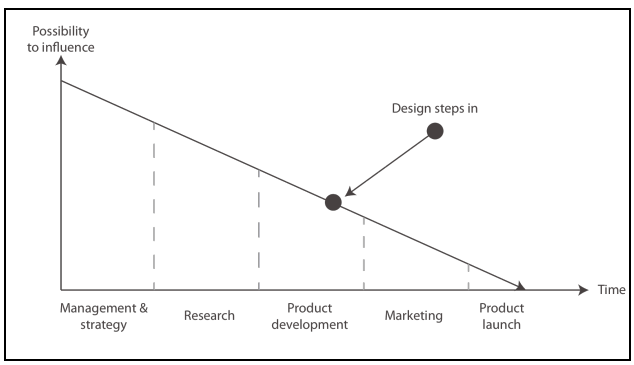

Figure 2. Product development process and where design is bought at based on an interviewee's experience.

However, one designer did mention that design is slowly shifting towards the earlier phases of product development and that the possibilities to influence are growing. Despite this he did acknowledge that in typical product design projects the problem still exists:

'These kinds of very typical product design cases, where the customer has already defined pretty much everything and then you start doing it, often make you think – almost self-evidently – that some issues could have been defined a bit differently earlier in the process.'

Although the question presented about the influence of design and designers should be researched in greater depth to draw solid conclusions, the quotes above do highlight the fact that the sphere of influence for design consultancies is not necessary big enough to generate solution-oriented design or question the principles behind the design brief (ie. whether to design a product or a solution).

CONCLUSIONS

The relationship between eco-innovation and design is problematic: eco-innovation requires action on a wide system scale, but design – especially when bought from outside companies – does not typically possess the necessary power to address these systemic issues. It is obvious that action on a wide scale is required in order to achieve sustainability and design is not solely responsible for designing entire systems: as Wahl & Baxter (2008) suggest, problems related to sustainability are complex issues that require action and awareness across disciplines. However, the issue of scale does indicate a need to explore i) eco-innovation possibilities at the product level because of the limited role of design and ii) how product design influences and can influence the systemic level. Using a simple example can highlight the importance of these aspects: designing a disposable paper cup suggests a completely different consumption pattern and system conditions when compared with a ceramic cup. A paper cup is likely to be used for only a few times or just once whereas a ceramic cup can be used again and requires washing etc... It is evident that products are not only objects in intelligently crafted systems but actors that create, shape and influence systems and behaviour.

Looking at current product level eco-design methods and comparing them with the concept of eco-efficiency – 'creating more value with less impact' (WBCSD 2000) – also reveals that there is room for development. For example, current lifecycle methods focus mainly on technical guidelines for minimizing negative impacts of products and production (see eg. Vezzoli & Manzini 2008a) and say very little about the creation of more value in the context of sustainability. Some approaches that stress the creation of value have been raised up, eg. emotionally durable design (Chapman 2005). Another potential source can be found from the more mainstream approaches to design and innovation: even if many

examples of product-level innovation can be judged as environmentally unsustainable (eg. watches as fashion accessories, see Verganti 2009), the undeniable fact is that these examples offer great insights into creating value for companies and especially consumers. What needs to be done is to take these examples and explore how the very same mechanisms that might drive conspicuous consumption could be turned to serve sustainable consumption. Eco-innovation on a product level needs to be explored in greater depth: not only as a set of technical rules that deal with production but also as a means of connecting with consumers on a sustainably meaningful level.

DISCUSSION

This paper has explored the problematic nature of the growth of scale in environmentally sustainable design and innovation. As shown, designers often have a limited role in formulating strategies and business models. On one hand, this stresses the importance of pushing design towards higher levels of influence but on the other hand it also indicates that innovating for environmental sustainability at the product and production level should be explored in more depth as well.

Although utilizing products and goods more efficiently through product-service systems seems like a big step towards more sustainable business models, an approach where products are seen as mere passive objects within intelligently crafted systems is outdated. Products inevitably imply certain patterns of consumption and form consumption patterns even if current eco-design methodologies do not stress this point. Furthermore, the whole concept of eco-efficiency as creating more value with less impact should be embraced more thoroughly in sustainable product design.

To conclude, more research and development is needed in all levels and dimensions of sustainable design in order for design to be able to fill its full potential when it comes to solving sustainability issues. Aspiring for more influence within the product development process through strategic design is important, but in the mean time the immediate opportunities for shaping consumption and innovating at the product level should not be missed either.

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