

# Product Service System (PPS): From Theory to Practice

## A sharing of the experience of a research project exploring PSS within the provision of baby equipment

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### Abstract

This paper summarises the findings of the scoping phase of a pilot project, *Exploring and developing ways to help people increase the useful life of products*, through a leasing rather than ownership model of consumption. The focus of the research was into the provision of Baby and Nursery Equipment (B&NE). A primary objective was to explore attitudes towards this mode of consumption within both consumers and manufacturers. A secondary objective was to explore and demonstrate the feasibility of the business model(s) linked to modes of consumption through leasing rather than ownership. The project was funded by the UK Department of Environment, Food and Rural Affairs (DEFRA) and was part of their exploration of a Sustainable Lifestyle Framework, published in July 2011.

The paper presents the initial stages of the research and does not attempt to give definitive conclusions. The key purpose of the paper is to outline the positive and negative findings highlighting both a possible structure and the barriers to a successful implementation of Product Service System Model of Consumption within this market sector.

### Keywords

*Consumer Behaviour, business models, PSS, consumer research, whole life, distribution, ownership*

### 1.0 Introduction

This paper shares the experiences of a pilot research project into a Product Service System (PSS) within the provision of maternity equipment. The context is crucial as the product category is important economically and present considerable risks of waste generation. The market for B&NE is of considerable size and importance, with a turnover of £758M in the UK in 2011 and a rate of growth that was forecasted as 28% per annum. This, together with the environmental advantages deriving from the durability of some components in respect to others, which often results in products being discarded when still serviceable, and an overall durability which means that these products are only

partly utilized, they last years but are used for months, making strollers and other B&NE an ideal candidate product to design a PSS around.

A PSS is a “system of products, services, supporting networks and infrastructure that is designed to be competitive, satisfy customer needs and have a lower environmental impact than traditional business models” (Mont, 2001:239). Within this marketplace the stroller is the largest financial outlay and consequently the most suitable product for consideration within a PSS provision, but the supply, use and after life of other products are also included in the research. Based on a previous study by (Mont et al., 2006), it is believed that this market would benefit from a PSS approach due to the following factors:

1. The ‘use’ lifetime of the product, on average two years, was well below the functional lifetime of the product.
2. There was a strong social network of information sharing amongst new parents.
3. Constant turnover of products and need for innovation within the marketplace.

The initial driver for the research project was social and environmental sustainability, that is, to investigate increasing product longevity while reducing material consumption and impact. The B&NE market was selected due to the high turnover and wastage of materials due to factor 1 above. The type of PSS is a use oriented PSS, when consumers use a products but suppliers retain the ownership of it (Cook, 2004). The research built upon the work of Prof. Oksana Mont (Sweden, 2006) but with a broader remit to investigate perceptions and attitudes of consumers (parents and expectant parents) and manufacturers as well as life cycle assessment. It was considered important to conduct research into perceptions and attitudes rather than only base the research in implementation and structure. The first phase of the project (scoping phase) involved individual interviews and conducting focus groups. These activities took place with both consumers and manufacturers/retail outlets. This initial phase identified both drivers and barriers for change. These were resident within both groups. The second phase (currently on going) is building on the original findings with the implementation and documentation of a pilot study to gain insight into PSS from a practical as well as a theoretical perspective. This paper will deliver information on the research, methodology and summarise findings of the pilot study.

The authors felt it important to ascertain consumer and manufacturer attitudes as little research had been done into this important aspect of PSS (Catulli, 2012; Rexfelt and Hiort af Ornäs, 2009). The streams of literature that dealt with these business models, e.g. environmental management & economics and design and engineering have mentioned in passing the issue of compatibility of business models not based on ownership of goods with culture, but no detailed research has been done, apart from a recent study by Bardhi and Eckhardt (2012). That study can be seen as a landmark as it is a key analysis of the reaction of consumers when confronted with access based consumption. The research tries to extend the work made on strollers by Mont et al. (2006).

The paper is of interest to academics and practitioners interested in consumer receptivity to PSS.

## **2.0 Objectives of Research Study**

The primary objective of this pilot study was to gain an insight into consumer and manufacturers (including other interested stakeholders) attitudes to PSS within this market sector. A secondary objective was to establish a feasible structure to conduct a pilot study including identifying a network or supply chain of Manufacturers and other Stakeholders willing to participate in a field trial with the provision of equipment and support. The scoping phase had as goals:

1. To assess the feasibility of a PSS “leased” provision of maternity equipment in practical and economic terms, with attention to the main barriers and enabling factors to adoption;
2. To investigate existing networks for mothers and
3. To identify supply, in the form of manufacturers of maternity equipment that are willing to lease equipment at a competitive price. As part of this item it was necessary to investigate the attitudes of the management of these suppliers to adopt a PSS provision model, including establishing remanufacturing schemes, and their willingness to do so;
4. Work towards the design of a “demonstrator” project, by producing a blueprint describing an implementation model for a “demonstrator” project. This would encompass and build around the stakeholders identified in 3.

This paper summarises the key findings of the scoping project.

## **3.0 Methodology**

This research has been mainly qualitative, because the objective was to elicit narrative based evidence of feelings, opinion and attitudes of suppliers and consumers. This was indispensable because the newness of the topic. The research methods employed in this study were exploratory, within a constructionist epistemology. Within the context of an Action Research project, consumer research built on:

- 10 One to one, in depth qualitative interviews with managers of commercial organizations involved in the manufacturing and/or marketing of baby products, as well as non- commercial organizations such as the Baby Product Association and the NCT (UK Charity to support parents).
- Ten semi-structured in depth interviews of expectant women and mothers of young children.
- Workshops involving commercial organizations and learned organizations.
- 5 focus groups involving circa 30 consumers, these included about 10 expectant mothers, 10 mothers and four male partners.

All the above were recorded with a digital recorder and transcribed: both audio recordings and transcripts. The analysis was conducted with NVIVO software; the research was conducted under the protocols of the University of Hertfordshire Ethics Process. The ethical protocol number for this research released by UH is BS/R/036 11.

## **3.1 Consumer Research**

Props were used in the focus groups to stimulate discussion. Neither interviews nor focus groups were filmed as this was found to tense the participants.

### **3.2 Company Research**

Formal one to one interviews were conducted in conjunction with focus groups.

### **4.0 Initial Findings**

The research team had ascertained in previous research that this type of consumption behaviour (PSS) is in conflict with consumer culture in most Western cultures, as ownership of products is used by consumers to project a self-image to the outside world (Bardhi and Eckhardt, 2012; Belk, 1988; Belk, 2007) and to express affiliation to groups of like-minded consumers (Cova, 2012; Shouten and McAlexander, 1995). In effect it has been reported that when confronted with PSS based propositions consumers exhibit fear of contamination from sharing products with others (Bardhi and Eckhardt, 2012), opportunistic behaviour, negative reciprocity (negative feelings towards other consumers) and they reject attempts by the provider to become part of communities of practice (Bardhi and Eckhardt, 2012). In prior research on a hypothetical provision of strollers as part of a PSS, parents expressed concerns about hygiene, health and safety, as well as product obsolescence when rented out several times, and a stigma effect as parents could be seen not to care for their children (Catulli, 2012). Users could also be concerned by a low perceived control, this is a factor which influences consumers' decision towards ownership away from services (Bateson, 1985; Hui and Bateson, 1991). Finally, consumers were concerned by typical satisfaction criteria of services, such as reliability of services, responsiveness to bookings and complaints, empathy of service personnel, assurance and on demand availability of the products (Catulli, 2012).

### **4.1 Benefits of PPS**

#### **4.1.1 Benefits to Consumers**

The findings from surveying consumers were complex. Consumers seemed favourable to the concept in principle. The most important expected benefits were financial, as respondents thought they could use top of the range, luxury brands of prams with a monthly charge, and spaces savings, as they would not have to store the products in their houses as the children grew. Of course some recognized that environmental advantages were also a benefit but very few of the interviewees felt that environmental issues alone were a strong enough reason alone for adopting a PSS within B&NE. Consumers are also interested in the flexibility of a PSS and possibility of sampling various products. Critical success factors would include assurance, including quality of refurbishing and remanufacturing and environmental standards and labels, accessibility of service personnel and products, brand names, choice of products, reliability of supply and responsiveness to requests and complaints.

### **4.1.2 Benefits to Manufacturers**

Benefits to manufacturers include brand values, steady income, producer end of life responsibility, improved affordability for consumers, opportunity to learn and educate consumers, more direct distribution, new market opportunities, waste reduction, and control of the second hand market.

Respondents (managers of B&NE companies) thought that they would be seen doing the right thing and adopting green values, these values would enrich their brand; most respondents associated the scheme with waste reduction and recycling. The scheme would facilitate producer end of life responsibility, make products more affordable for consumers, assist their education on sustainable use, improve suppliers' relationship with consumers and open new market opportunities (including taking charge of the second hand market) and create a steady flow of income for the providers. Within the industry sector as a positive environmental model, an opportunity for innovation and a stronger connection to customers were seen as possible benefits. Within this it was acknowledged that a PSS would demand a different approach to the design of products where manufacturers had a product stewardship role throughout the life of their products.

## **4.2 Barriers to PSS**

### **4.2.1 Barriers for Consumers**

The respondents' main concerns include the health and safety attributes of the provision, possible stigma of using remanufactured, leased or rented products, concerns with commitment to a financial agreement with associated preoccupation with debt, quality concerns and risk of being allocated an obsolete, out of fashion product. B&NE is an emotive subject and consumers make purchasing decisions for psychological, social and cultural reasons as much as for financial or functional benefits. Any new system would need to 'educate or reassure' consumers to the psychological and cultural possibilities and benefits of PSS. For example consumers at times see their possession as an extension of self and a way of self-expression (Belk, 1988; Richins, 1994) and feel the need to modify these products, which would make of ownership a more appropriate choice. Furthermore consumers might not trust PSS provision as they would be uncertain as what they would get; they would also be concerned about quality, responsiveness of providers to requests and complaints, empathy and reliability of supply, as well as, for some products, hygiene and safety issues. Concerns were raised about the reliability of used equipment which is a cornerstone of a PSS.

### **4.2.2 Manufacturers and other Stakeholders**

There seem to be several commercial barriers to the diffusion of PSS. It is feared that the fall in industrial production engendered by a reduction of product proliferation due to the diffusion of PSS could have economic repercussions (Mont and Lindhqvist, 2003). There are difficulties in designing eco-efficient PSS' (Mont, 2001; Manzini and Vezzoli, 2002); companies may oppose end of life responsibility (Mont, 2001) and often undervalue the environmental potential of PSS, so other reasons need to be used to spur them to adopt the model (Sakao et al, 2009). There is also paucity of successful business cases (Mont, 2001; Mont and Lindhqvist, 2003). Not all PSS are eco-efficient

(Manzini and Vezzoli, 2003). PSS design needs to satisfy precise environmental criteria. Another barrier is the need for companies to work in integrated networks in order to successfully operate PSS provision (Mont, 2002; Evans et al., 2007); there is evidence that businesses are not well equipped to do this (Evans et al., 2007; Roy et al. 2002) challenge the assumption that de-materialization always enhances sustainability, for example in the case of education when comparing on campus and distant learning.

The authors' research identified similar findings but consider that when issues are isolated they can be resolved. These included possible damage to the brand if the service was not sufficiently good, cash flow issues, investment payback period, costs, effort and resources of managing change, legislation, health and safety concerns, quality of refurbishing and remanufacturing, logistic costs and possible channel conflict. Two key concerns were legal and control of the Brand. With the former, in the UK a lessor has to obtain a Consumer Credit License (CCL) which would take companies into a new financial market sector. For most companies this is a shift in their business model which they were hesitant to take. Providing products to a PSS provider, who has the financial structure and CCL, raised the issue of protecting the Brand. That is if the service was poor the impact would also fall on the Brand or manufacturing company. This was perceived as a business risk.

Although beyond the scope of the study it was noted that problems with geographical patterns of demand could render the provision unreliable and even unavailable in some areas, and create difficulties in networking with business partners.

## **5.0 Discussion and Future Work**

### **5.1 Pilot Study Structure**

At the end of the first phase of research an initial structure diagram was proposed (see fig.1 below) for the second phase of the research project. This structure was constructed around organisations that were willing to participate with a pilot project. In this scheme the pilot rests on two pillars, a "marketing" hub (currently confidential) which purports to recruit the consumer participants to the pilot; and a "logistics" hub (currently manufacturers). The logistics hub company is able to store products, service and replenish them and deliver them. Findings from consumers highlighted that this mode of delivery would succeed better if integrated with a service provision, for example advice, knowledge supplied around the practices of child rearing, warranties, financial assistance, upgrade of tangible products as the baby grows. For this reason a marketing hub (currently a not for profit organization) was included rather than a direct link between manufacturer and consumer. This engenders a feeling of impartiality in the system to the consumer.

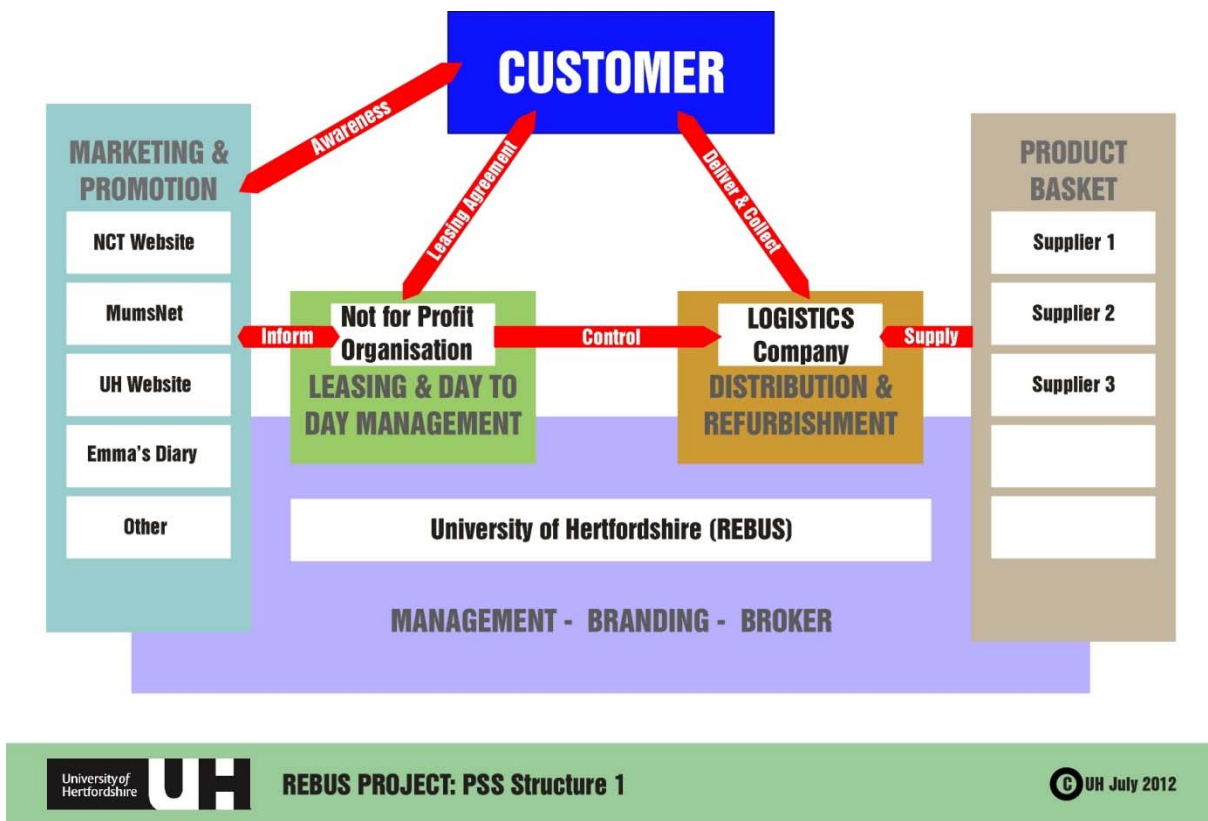


Figure 1: Proposed Business Structure of Field Trials

In order for the pilot or even a scaled up provision to be successful, the PSS should be given assurance and certified in respect to its quality and sustainability, including the quality of refurbishing and remanufacturing processes. They should be flexible and supported with good service and transparent communications from suppliers. The tangible products supplied should also be top of the range.

Consumers seek information about products and services from credible sources, for example midwives and health visitors, expert bodies such as the NCT, and other parents; they seem to be looking for information from on line information facilities and social networks both real and virtual.

Overall, the research seems to suggest that the pilot would be accepted by both suppliers and consumers, and promotional strategies used to promote the concept would need to build on the sources and media consumers consider credible. On-line information sources are important as consumers compare notes with other parents and seek endorsements from reliable sources. It is imperative that consumers gain confidence in the structure and quality of this mode of consumption for PPS to work effectively. In essence the structure should be seen as a 'BRAND' in which supplier-consumer trust is built.

## 5.2 Pilot Study Objectives

Building on the findings of the scoping project the authors are working towards a pilot study implementing and documenting the provision of B&NE with a control group of consumers. Work will include;

- A full financial appraisal of the pilot model.

- Building a promotion and information network utilising, wherever possible, existing networks which consumers have confidence in.
- The provision should be focused on 1-2 major items, e.g. strollers, and these should be top of the range branded products.
- In the implementation of the pilot, and certainly for any future scaling up project, an investment should be made in a certification process such as for example quality and environmental labels. These should also cover the quality of refurbishing and remanufacturing processes.
- Future research should interrogate both consumers who buy in the PSS, and those that turn it down; these are very important, because they would add valuable insight into the reason of what the stumbling blocks are to the diffusion of the model.
- Qualitative surveys should also be administered to those business partners who drop out of the initial involvement, for a similar reason, as they would have a more advanced understanding of the PSS provision and will probably have devised a rationale for not implementing the pilot.

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