

WR1204

Household Waste Prevention Evidence Review: L2 m4-3 – Product Service Systems

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Waste and Resources Evidence Programme

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Table of Contents

1.1	Evidence reviewed	1
1.2	The concept	1
1.3	Consumer attitudes	2
1.4	Potential impact	2
1.5	Barriers	3
1.6	Opportunities	3
1.7	Discussion - policy implications and issues	4
1.8	Bibliography	4

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L2 m4/3

Product service systems as a mechanism to prevent household waste

This paper summarises the findings from a single WREP report that investigated a specific concept for the application of product service systems to reduce household waste, by taking away the need to own household appliances. Information is presented for:

- Evidence reviewed
- The concept
- Consumer attitudes
- Potential impact
- Barriers
- Opportunities
- Discussion – policy implications and issues

Related modules are:

L2 m1 Technical report, section 4

1.1 Evidence reviewed

This part of the review focused on one very specific investigation by Cranfield University (in conjunction with house builder Taylor Woodrow) of a particular application of the concept of product service systems (Gottberg et al, 2008, WR0106). 'Product service systems' are when a firm offers a mix of both product and service, rather than just the product on its own. There is a much larger literature on this subject, and on models that are different from the one examined here, but it was agreed with Defra that a full investigation was beyond the scope of the review. The WREP study undertook a literature review of PSS which provides a starting point for interested readers¹.

1.2 The concept

In his study of public attitudes and behaviour for the Centre for Remanufacturing and Reuse, Watson (2008) notes that business to consumer (B2C) PSS is largely undeveloped whereas business to business (B2B) applications are more established and are a growing market. The Cranfield study was set up to devise a B2C PSS model that could be offered by Taylor Woodrow as part of its after sales service to new home owners. The model (including hypothetical costs and service income) was then tested with potential consumers, Taylor Woodrow and its service suppliers, by means of six workshops.

Drawing on the literature and current practice, the study initially identified three sorts of PSS that might be considered as the basis for the model:

- *Product orientated PSS* – where the consumer owns the product but is supported by an ongoing service relationship, for example, through warranties and maintenance contracts;

¹ See also examples of using hire services instead of buying in the International Review [L3 m5/2 \(D\)](#)

- *Use orientated PSS* – where the consumer is provided with the means (i.e. product) to carry out a task but does not own the product - for example, through a leasing arrangement, or access to shared facilities (e.g. communal laundry rooms in a housing block).
- *Result orientated PSS* – where the consumer has no contact with the product and simply buys an outcome, for example, clean clothes or a tidy garden.

The last 'results orientated' option was selected as the basis for the Cranfield model, examining PSS solutions for:

- Home improvement
- Garden maintenance
- House cleaning
- Laundry (clothes & linen)

In the models tested, the PSS would be delivered through either a regular subscription or an ad hoc call out. The service would be administered by the housing developer through a call centre for consumers and service contracts with suppliers.

1.3 Consumer attitudes

Consumers in the workshops were generally interested in the idea of PSS but were reluctant to consume it as a substitute for owning products; they tended instead to prefer PSS as a complement to 'self service' (SS) – that is, being able to do the task themselves when they wanted to, meaning that they would need to own the relevant appliance as well as using the PSS. They generally preferred the idea of PSS for home improvement and gardening than for home cleaning or laundry.

Interest in PSS was also greater among those who were still in the process of buying new appliances for their newly built homes than residents in the other workshops who were longer established residents.

The main condition influencing whether or not consumers liked the idea of PSS was a standard economic trade off between time and money. Those on higher incomes but time constrained were more likely to favour PSS than those on low incomes and retired. Other aspects that influenced whether consumers were interested in PSS included:

- Whether or not they enjoyed the task that the service would replace (e.g. gardening).
- Whether or not they felt competent at performing the task; where they did they may have less confidence in the ability of a service provider.
- Lack of interest in environmental benefits from reduced WEEE waste.
- Concern about loss of convenience and flexibility if reliant on a service (for example, the laundry model might require arranging a time to be at home when clothes could be collected or delivered).

1.4 Potential impact

Given a range of assumptions about take-up rates of PSS and the degree of substitution of appliances, the authors suggest that PSS has the potential to reduce the amount of WEEE waste from households on new developments, as follows.

Table 1. Waste prevention in tonnes of WEEE for 200-household eco-development, 100% adoption of Product Service Systems, 80% ownership of smaller washing machines and vacuum cleaners, 25% ownership of drills and lawnmowers.

Time period	House Cleaning	Garden Maintenance	Home improvement	Laundry	Total
10 years	0.7	3.2	0.3	8.8	13.0

Source: Gottberg et al, 2007, WR0106

The environmental analysis (Gottberg et al, 2007, Technical Report 3) suggests that potential waste reduction impacts are contingent on other factors, transport in particular, since use of PSS creates new journeys by service providers to reach the household subscribers. The authors also warn that actual consumer behaviour is a substantial unknown, since the models were tested as hypothetical 'what ifs'. The illustrative waste reduction impacts rest on critical assumptions about substitution of large appliances for smaller ones that households then keep for longer than usual (15 years as opposed to 7). The assumption here is that consumers hold onto appliances until the end of their operational life, rather than replace them because of aesthetics, fashion or upgrading to the latest technology.

Cooper (2005) shows that the latter reasons are, in fact, key drivers of short product lifespan and that one-third of discarded appliances in a recent study (E-SCOPE cited in Cooper) were in working order when thrown away, and a further third "in need of repair". There are also significant consumer barriers to keeping appliances in working order, including moderate to low interest in repairs (L3 m3/2 (D), Cooper, 2005) and a systematic tendency to over-estimate the cost of repairs (Huysentruit & Read, 2008).²

1.5 Barriers

In addition to barriers arising from the consumer demand side, obstacles arising on the supply side in the Cranfield study included: concern about lack of competency in service supply which might dilute profit from core operations (i.e. for the house builder); uncertainty about the likely volumes of consumer demand and therefore about profitability; and lack of regulatory stimulus (e.g. through environmental or planning regulations) that would support the business case for PSS.

A very specific barrier was identified for providing PSS on a new build housing development: the study found that PSS take-up would be enhanced by an on-site service centre but the developer expressed concern that making a plot available (and foregoing profit on that plot) would reduce overall commercial benefits.

1.6 Opportunities

The Cranfield study developed scenarios of potential costs, pricing and income from the four models identified above, demonstrating a business case that delivered a small profit margin in each case (Technical Report 2).

Given the illustrative waste reducing potential of PSS, the authors also considered ways in which PSS of the kind tested in the study could be encouraged on new housing developments. They suggested that amendments could be made to the Code for Sustainable Homes, or Planning Policy Statements, to establish targets for PSS; or that additional indicators to the new National Indicator set for local authorities could draw attention to the role of PSS. The role of eco-labels was also explored as means for

² Product lifespan is not covered in detail in this review, even though it is likely to be of fundamental importance to waste prevention. WR0107, for example, ran a modelling scenario which showed that doubling product lifespan could have a significant impact on household goods arisings. The work of the ESRC network on product lifespans is currently being pulled together and will be published in a book in Spring/Summer 2009. <http://extra.shu.ac.uk/productlife/>

stimulating take-up of PSS by providing quality assurance to consumers, though limitations were outlined regarding being able to compare the claims of PSS as compared to the 'self-service' alternative.

1.7 Discussion - policy implications and issues

Business to consumer PSS is relatively undeveloped in the UK and much more needs to be understood about its potential before it can be considered a realistic option for household waste prevention. Its contribution, if any, is more likely to be medium term.

The Cranfield study authors (Gottberg et al, 2007, WR0106) suggest that pilot projects run on new housing developments could produce evidence that would test out the assumptions made in their models, and contribute to the development of a business case for PSS. Various options for piloting are suggested, including through Eco Towns, or new social housing developments where the landlord would take on the role of service provider.

On a wider scale, the concept of PSS challenges our notions of the separation between 'producer' and 'consumer'. Looking forward – to much closer integration between demand and supply sides in an economy set up for reuse and remanufacture - Watson argues that much more research is needed in order to understand the new role of the consumer in the kind of 'socio-technical' system such an economy will involve.

1.8 Bibliography

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Basis of this report

The material in this paper is derived from a large scale evidence review of household waste prevention conducted by Brook Lyndhurst, the Social Marketing Practice and the Resource Recovery Forum for Defra's Waste and Resources Evidence Programme.