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ANALYSIS

Sustainable homeservices? Toward household services that enhance ecological, social and economic sustainability ☆

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Abstract

The idea of services replacing products is increasingly offered as a solution to making the production and consumption patterns of the affluent consumers more sustainable. However, the discussion about 'sustainable services' or 'sustainable product–service systems' tends to emphasize the eco-efficiency perspective, rather than explicitly capture all sustainability aspects. Social or socioeconomic considerations are often forgotten or by-passed without scrutiny. This paper argues that there is the need for a concept of sustainable services in which the social sustainability aspect is also recognized with equal attention. Since a major part of private consumption occurs in the household context - living at home and moving to and from it—this paper will put forth the concept of sustainable homeservices and will suggest a way to assess sustainability of services directed to households. For assessing the sustainability of services directed to households, a set of indicators relating to the ecological, social and economic dimensions of sustainability is proposed. With the aim of giving an idea of how to assess homeservices in practical terms, the paper will also exemplify how one could operationalize these indicators on an ordinal rating scale. The conclusion is that it is possible to assess the sustainability of a homeservice in a relative fashion, using 'no service' or the 'product alternative' as the point of comparison.

Households alone have a limited capacity to influence their consumption choices, because other actors set the frame. For this reason, institutional arrangements for making services easily available to households are outlined. It appears that housing organizations have a central role in the alternative option for organizing the supply of service provision. They are involved in five of the seven alternative ways of supplying services that could be identified. The role of the housing organization can vary from direct supply to lighter forms, such as cooperative arrangements with external service providers, or resident involvement.

Keywords: Sustainable services; Households; Homeservices; Eco-efficient services

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1. Introduction

Services are increasingly offered as a solution to making our production and consumption more sustainable. The ways in which services are expected to make society more sustainable vary between the proponents of service thinking. Some of them view the 'service solution' from an information society perspective: As the structures of industrial production turn from manufacturing-dominated to information-intensive service models, a de-linking of economic growth and environmental burdens occurs (Bell, 1976; Jänicke et al., 1989). Some others take a "less automatic" standpoint on the role of services. They do not foresee that the increasing share of services as a means of livelihood automatically reduces the environmental load. Instead, they expect that to achieve eco efficiency gains, service considerations must be crafted into models of production and consumption with the purposeful goal of reducing the environmental impact of economic systems (Lovins et al., 1999). However, both groups tend to discuss the sustainability of services mainly from an eco-efficiency perspective, rather than from a more holistic sustainability point of view. In other words, in the sustainable service or sustainable product service systems literature, the social aspect of sustainability tends to be neglected at the cost of environmental and economic arguments. This may be one of the underlying reasons why eco-efficient service concepts, especially those directed to consumers, have not been as successful in the market as their proponents would hope. Keeping the social sustainability perspective explicitly in mind when assessing the added value of eco-efficient services to consumers would perhaps allow a better scrutiny of issues that are relevant to their decision-making (cf. Hobson, 2002).

The goal of this paper is to put forward the idea of sustainable homeservices, i.e., services that enhance the sustainability of living at home.[1] Much of the unsustainable consumption of the affluent Western (and Japanese) consumers occurs in the context of households, i.e., living at home and moving to and from it. However, depending on the consumption cluster (e.g., nutrition, mobility, housing), households alone have only limited—greater or lesser, but still limited—possibilities to influence their patterns of consumption (Sanne, 2002, Roy, 2000). There are always other actors who are relevant in setting the frame for consumption choices. For instance, with regard to housing and construction, property owners (housing providers), local authorities and service providers influence the housing framework. Or as regards mobility, local authorities and service providers have a lot to do with the transport infrastructure, and therefore they set the limits within which households are able to decide how to fulfil their mobility needs (Spangenberg and Lorek, 2002). This is another reason why it makes sense to seek for solutions for household sustainability with the service perspective in mind. Not only does this perspective capture the aspiration to shift consumption from products toward services, but it also takes into account other actors' possibilities to influence the households' consumption decisions. Moreover, by proposing institutional arrangements related to housing organizations as service providers or mediators, we seek to put forth new ideas of how to organize economic activities so that resource users become responsible for managing the resources they depend on (cf. Ostrom et al., 1999).

To put it briefly, there are two major gaps in the sustainable service discussion: the lack of a holistic view of sustainability and the omission of the limited opportunity of households to influence their consumption choices. To include these issues, this paper will put forth the concept of sustainable homeservices, propose some institutional arrangements with which to make them easily available for users, and suggest some preliminary steps to operationalize the concept. The guiding questions can be formulated as follows:

- What kind of concept would capture (holistically) sustainable household services?
- What kind of institutional arrangements could enable the provision of such services?
- What kinds of indicators could be used to assess the sustainability of services directed to households, and in what way could these indicators be operationalized?

The underlying effort in this article is a progressively refined articulation of what could be sustain-

[1] Thus, the term "sustainable homeservices" does not refer to long- or everlasting services. It refers to ability of certain services directed to households to potentially advance ecological, social and economic dimension of sustainable development.

able homeservices. To that end, the paper starts with a brief discussion about services in general, and examines different types of eco-efficient services, as well as the ways in which they can reduce the use of material and energy resources. Following from the above-argued need to extend the eco-service discussion to explicitly include social or socioeconomic aspects, we will thereafter introduce the idea of a sustainable service, i.e., a concept that explicitly captures all sustainability dimensions. As we are interested particularly in consumer services that enhance sustainability, and argue that a considerable part of consumption relates to living at home, we will further narrow down our focal concept. "Sustainable homeservices" is the concept on which we concentrate in the remainder of the paper. Having that focus, we need to investigate how the provision of sustainable homeservices could be organized, i.e., what kind of institutional arrangements would enable the provision of sustainable services directed to households. Finally, to suggest an idea of how to assess the sustainability of services directed to households, we will proceed by proposing a set of preliminary indicators relating to three sustainability dimensions. We will also exemplify how one could operationalize these indicator items on an ordinal rating scale.

2. Ecological sustainability of services

We stated above that an increased role of services in replacing products as our need satisfiers is offered as one way of making consumption more sustainable. Before we look at ways in which sustainability could be enhanced with services, we should say a few words about the intertwined nature of products and services. Traditionally, it is considered that services differ from products because they are intangible, they cannot be stored, and because in many service operations production and consumption cannot be separated (i.e., customers are involved and participate in the production process—e.g., personal energy counseling to the resident) (Baron and Harris, 2003; Zeithaml and Bitner, 1996; Payne, 1993). If we, however, look at the issue from the perspective of consumers fulfilling their needs or wants with various available offerings, we will notice that most products include some services (e.g., delivery), and all services require the use of some tangible elements, or products (e.g., premises) [Heiskanen and Jalas, 2003; cf. Shostack's (1977) classical tangibility continuum]. From the need fulfillment perspective, the definition of services suggested by Heiskanen and Jalas (2003) may be suitable for the purposes of this study, because it avoids the pitfall of making a sharp distinction between products and services. According to them, service is an added value for the customer, i.e., an economic activity that replaces the customer's own labor with activities conducted by the service provider, either personally, automatically or in advance through planning and design.

The notion of immateriality and intangibility often connected to services does not automatically lead us toward more ecologically sustainable society (cf. Mont, 2002). There are, however, two main routes with which services can lead to a decreased environmental burden in society. The first one is the potential related to the general shift to services with a lower than average material intensity, such as medical or personal care, legal services, banking, etc. From a macroeconomic perspective, the shift to services and thus the increased service intensity of the economy contributes to ecology through the decline of traditional smokestack and extractive industries in relation to less materials-intensive and more knowledge- and labor-intensive service industries. These services, however, are not necessarily eco-efficient. Their eco-efficiency must be assessed per each individual service and its context (cf. Salzman, 2000).

Another route for approaching the ecological sustainability potential of services is the eco-efficient service thinking. According that stream of research, there are so-called eco-efficiency instances in which particular services or product–service combinations have the potential to reduce resource consumption while still fulfilling the same need of the consumer as the traditional alternative of owning the product. The ideas for eco-efficient service thinking come from many sources. One of its roots is in the so-called *factor discussion* that urges to decrease the intake of materials into the economy radically: by a factor of 4 (Von Weizäcker et al., 1997) or by a factor of 10 (Schmidt-Bleek, 1998). This *dematerialization* and/or reduction in energy usage is expected to be achieved by fulfilling the needs of customers with the help of services instead of products (e.g., a car-sharing service instead of a private car). Services that replace products

to a greater or lesser degree, and thus reduce the material and energy needed to perform an economic activity (e.g. moving, living, cooking), are often called *eco-efficient services*.[2] The above, however, is not to argue that all services replacing products are always necessarily more environmentally sound than a product fulfilling the same need.

It is possible to identify different types of eco-efficient services. They extend from conventional forms of renting, leasing and sharing to selling 'solutions' (e.g., integrated pest management) (Hockerts, 1999). A number of typologies have been developed to classify the broad range of services that can be seen to involve an eco-efficiency component. The classifications vary slightly depending on the author's line of reasoning. To draw an integrative classification based on the writings of Hockerts (1999), Heiskanen (2001) and Roy (2000), *product-based* services are services that are related to the use of a product. The product may be sold to the customer or not. In the former alternative the service component relates to repair, maintenance, upgrading or take-back of the product. The model can be seen as an example of extended responsibility of the producer even after the point of sale. The concept is relatively close to conventional manufacturing business—for instance, the common practice of giving a guarantee extends the responsibility of the seller or producer of the product. Renting or leasing a product to the user goes a step further: the ownership remains with the producer. These kinds of services are sometimes also called *use-oriented* services, because only the use of product is being sold (e.g., in a car sharing concept, the use of the car is the offering).

Result-oriented services are services within which the focus is on fulfilling customers' needs, and which are or seek to be independent of a specific product (therefore sometimes called need-oriented services). This type of services can be seen as including various forms of contracting, for instance least-cost planning in the energy sector, facility management or waste minimization services. Result-oriented service may be offered by the manufacturer, e.g., an energy provider. It may be profitable for the provider to promote energy-saving equipment. A decrease in demand through gains in efficiency allows the energy company to increase its market share without having to build new power plants. However, these kinds of services are frequently provided by another company, e.g., an energy saving company (Hockerts, 1999; Heiskanen et al. 2001; Roy, 2000).

Why would the services outlined above contribute to eco-efficiency, i.e., to a reduction in materials and energy consumption? There are a number of reasons why efficiency benefits may accrue. Firstly, if the ownership of the product remains with the manufacturer, there is an incentive to produce more durable goods. This is because the income is created by selling the use of the product, not the one-time sale of the product itself. Secondly, a lower stock of products is needed if consumers use the same product in sequence. The lower the stock of products, the less material is needed to produce them. In other words, more intensive use increases the probability of higher service yield before the product becomes obsolete due to outdated technological characteristics or, e.g., fashion. For instance cars or personal computers are often exchanged for newer ones not due to breaking apart, but for reasons that lie somewhere in the midway between outdated technology and fashion. Thirdly, in result-based services where the operator takes responsibility for product use, the service may facilitate more professional product use. To mention one more instance of the potential of services, the service model may contribute to the choice of a product more relevant to the task. For example, in a car-sharing system, the user may choose a car that fits the transportation task at hand: a small car for one person and a family car for multiple persons. This reduces instances of overkill, i.e., choosing products that are too big or with too many accessories, just to be prepared for all possible contingencies (Heiskanen, 2001), such as "we need a bigger car because we sometimes take grandparents with us".

3. Toward holistically sustainable homeservices

The observation that a large share of private consumption occurs in the context of households was one of the starting points for our interest in promoting the concept of sustainable homeservices. Eco-efficient service literature offers us some ideas to start with, but

[2] We also acknowledge the limitations of the eco-efficiency concept, e.g., rebound effect (cf. Jalas, 2002) but that as well as other critique (e.g. Hukkinen, 2003) fall beyond the scope of this paper.

it is a new field of study and consequently there are still a number of 'blind spots' calling for attention. One of them is an absence of social aspects in sustainable service thinking (Gaterleben, 2001) and a limited understanding of economic considerations. The other one is inadequate attention to the question of how and by whom should sustainable services be provided to be used by consumers (Behrendt et al., 2003). These issues will be explored in this section.

3.1. Households and sustainable development

Both in economic and ecological terms—which unlike the social impacts are quantifiable to a certain extent—services are important from the perspective of household consumption. Services used by households differ depending on, for instance, the national culture, income level or the type of housing (single family house vs. apartment building vs. old peoples' home). In general, services constitute a considerable amount of household expenditure in different Western countries, about 60% depending on the country (Eurostat, 2001). As to the environmental impacts of household functions, Spangenberg and Lorek (2002) found that the total resource requirement of only three clusters of household consumption, namely construction and housing, food and nutrition, and transport and mobility make up for nearly 70% of material extraction and energy consumption and 90% of land use.

When looking at sustainable services in connection with households, it is possible to identify a number of pressure points that relate to different levels of analysis. For instance, the rapid growth in the number of households taking place in many Western countries imposes a major burden on infrastructure support (space, basic utilities provision, transport links, etc.), on the socioeconomic system, and on the environment (Turner, 1998; OECD, 2002). Moreover, taking care of the aging population in Western countries will either require building more and more old people's homes, or providing more a sophisticated set of services enabling the elderly to live at home. The former is often considered an economically unsustainable alternative, and it is also less preferred by the elderly themselves. Yet another pressure trend that can be highlighted in this connection is the household use of energy for heating, domestic appliances and the car. Despite the fact that resource efficiency gains derived from *technological* improvements[3] have accumulated, these gains have been offset by the steep rise in the total number of households (which is due to the falling average size of households) (Turner, 1998). In the housing sector, aggregate trends in resource use are continuing to rise.

The developments discussed above imply that problems in the housing sector cannot be solved by technological solutions alone, but that social innovations are also needed.[4] Sustainable services may offer one source of innovation to alleviate the above-mentioned and other pressures related to environmental and socioeconomic problems in the housing sector.

There are, however, some limitations that we ought to take into account when designing services or analyzing their potential to enhance sustainability. In a recent study, it was found that eco-efficient services should be offered to consumers at their home, or near to home (Behrendt et al., 2003). There are basically two underlying reasons. First, if the distance to an eco-service is long, the efficiency gained by using the service is likely to disappear with the transport effects. For instance, if the consumer uses a laundry instead of owning a washing machine, this will have positive effects in terms of less water and energy needed per load in large-scale operations, and in terms of a reduction in materials use due to the need of fewer washing machines (Goedkoop et al., 1999; Heiskanen et al. 2001). However, if the consumer has to drive 3 km back and forth to do her laundry, gasoline use and exhausts released can outweigh the benefits gained. Second, the findings of Behrendt et al. (2003) underscored the point that the consumers' willingness to use services with eco-efficiency potential decreases with the difficulty of reaching the service, e.g., distance or other conditions like difficulty of finding information. Similarly, in an empirical study of nearly 400 Dutch households, Gaterleben (2001) found that social sustainability, i.e., quality-of-life effects, are of pronounced importance for people when judging the acceptance of environmental consumption alternatives.

[3] Such as more efficient domestic heating systems, smaller or less energy consuming electrical appliances, and the installation of building insulation.

[4] This is not to say that we would not be interested in technological developments. On the contrary, many services are made possible by a technological innovation component (especially ICT). However, our focal point is the user perspective, not the technological innovation as such.

3.2. Sustainable homeservices: the concept

The present eco-efficiency discussion still typically uses the terminology of sustainability even though concentrating primarily on the eco-efficiency aspect of services (see, e.g., various writings available at SusProNet, 2003). At best, it is mentioned in passing that eco-efficient services may also have social and economic impacts (e.g. Heiskanen and Jalas, 2003). Hence, the concept of "sustainable (home)service" is yet to be discovered and defined. We will try to take one of the first—rather pragmatic—steps here. The notion of WCED (1987) offers one possible starting point for outlining the concept:

In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both the current and future potential to meet human needs and aspirations.

The notion stresses that all components—ecology, economy and societal considerations—should be in harmony for the development to qualify as sustainable. Consequently, for a service to be classified "sustainable", it should have a positive impact on each of the areas of sustainability. However, this is not to argue that a harmonious optimum is always inevitable. A service may have contradictory impacts vis-à-vis different dimensions of sustainable development, as we will see later in this article (Fig. 1).

We still need to narrow down the focal concept of this article. There is an on-going discussion in many countries about welfare services in general, yet this article does not aim to contribute to that discussion. Although there may be points of connection between social and economic sustainability and the welfare discussion, our main interest is to contribute to the discussion on sustainable household consumption and the role of services in that context. We try to see if there could be opportunities for services related to living at home to reduce the ecological burden caused by extensive resource use, and if this could be organized in a way that contributes to quality of life and is economically feasible for the different constituencies involved. Taking this standpoint, it could be broadly speaking argued that homeservices are services offered to a consumer in connection to living in a home. Consequently, for the present purpose of developing a concept with which to study the sustainability of household services, we propose the following:

> The general definition of sustainable homeservice: a service that relates to living at a home and contributes positively to sustainable development in its environmental, social and economic dimension.

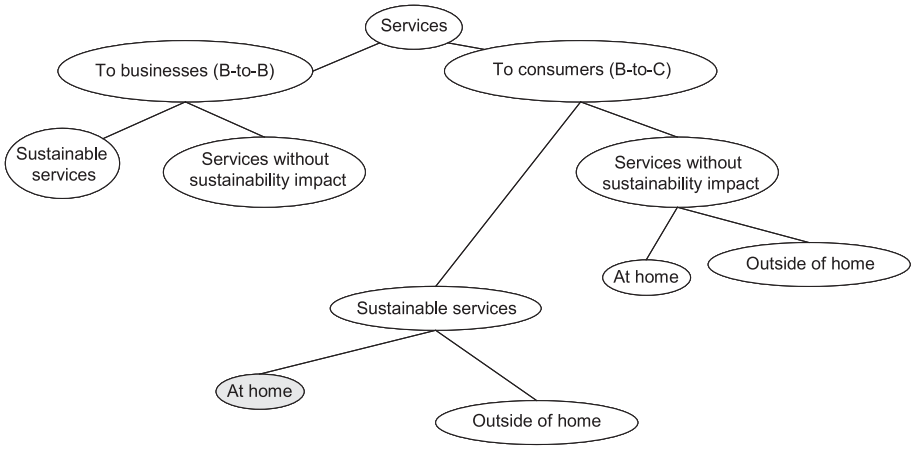

Fig. 1. Sustainable homeservices as an element in the general service system.

3.3. Who supplies homeservices? Suggestion for institutional arrangements of service provision

One of the key challenges for environmental governance of resources is how to organize economic activities so that resource users become responsible for managing the natural resources they depend on (cf. Ostrom et al., 1999). For this reason, we should not settle only with developing concepts and indicators for sustainable development in general or sustainable homeservices in particular. The next task is to ask who should provide sustainable homeservices and how should they be provided to be used by households? It appears that the need to make services easily accessible to consumers in households means that some type of input from the *housing organization* is required (Hohm et al., 2002).

Previous studies on sustainable households have focused on household functions or needs. These would involve, e.g., shopping, cooking, eating, clothing care, shelter,[5] personal hygiene, food storage and preparation, leisure activities within the home, and transportation (Vergragt, 2000; Gatersleben and Vlek, 1998). Within these functions, researchers have tried to prepare scenarios of "alternatives for a more sustainable household" and study their feasibility (Vergragt, 2000). Even if household functions may be a good starting point for exploring new ideas for sustainable services, from the provider's perspective, it might be worthwhile to approach the issue by looking at household service areas instead of functions. The following are some examples of housing/household service areas that can be relevant for housing organizations[6] or other service providers vis-à-vis their service provision, (see, e.g., Scharp et al., 2000; Hrauda et al., 2002).

- Consulting and information (e.g., on environment and energy, social aspects, and financial aspects).
- Care and supervision (of building, apartment, people and pets).
- Leisure time services or activities (e.g., sport, social aspects, culture, and catering).
- Repairs.
- Mobility and delivery (vehicle rental and sharing, delivery, other logistics).
- Safety and security (of building, apartment and people).
- Supply and disposal (energy and water supply and waste disposal).

From within these service areas, it is possible to identify best-practice services in terms of sustainability, as well as potential market niches for sustainable services.

Based on the observation that housing organizations could be a natural agent offering or mediating provision of services directly to the home of the resident, we will next turn to examining alternative ways of supplying home services. Hence, 'living in a dwelling' would become the point of reference. It should be noted that the following discussion relates to other forms of dwellings than single-family housing. With that restriction in mind, a number of ways for service provision may be identified (cf. Hohm et al., 2002). In other words, the resident may get the services through a number of different kinds of arrangements (Fig. 2). However, most of the options of service supply involve the housing organization in one way or the other. We can recognize three main options in which the housing organization is involved: direct supply by the housing organization, a cooperation strategy, and resident involvement strategy. All of these have two subvariations. On the other hand, the external service provider may supply the service independently of the housing organization directly to the resident.

To discuss these options in more detail, a direct supply option means that the service provider is the housing organization itself (e.g., a condominium association, a social or for-profit rental housing provider). A variation of direct supply is the option where the housing organization buys the service from an external service provider (e.g., outsourced gardening, cleaning, etc.). From the resident's perspective, the service experienced is basically similar to one provided by the housing organization's own personnel. However, from the housing organization's perspective, we are speaking about the external procurement of a service, i.e., outsourcing.

The housing organization may also choose to cooperate with the service provider (cooperation

[5] That is, heating or cooling and lighting at home.

[6] Housing organization is, e.g., a social or for-profit rental housing provider, or a condominium association.

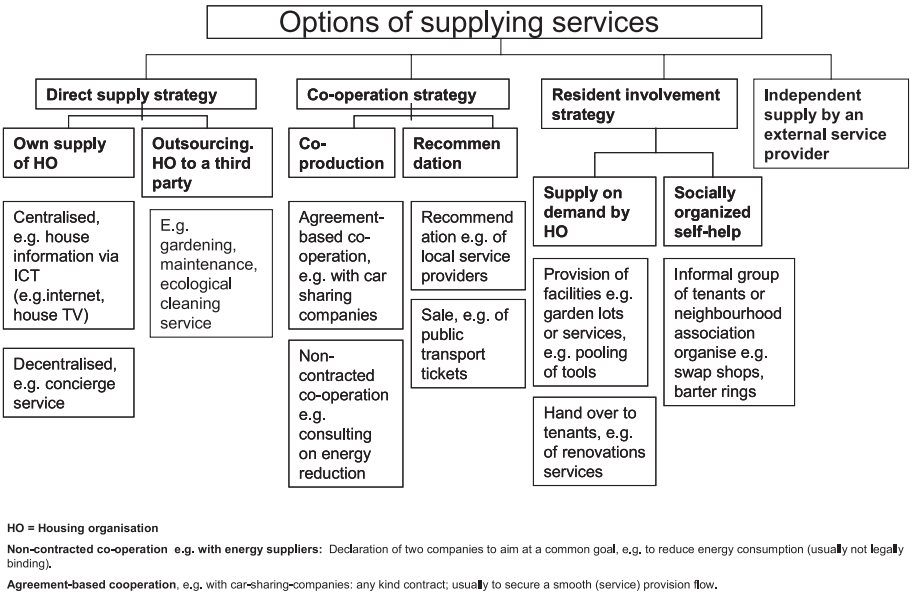

Fig. 2. Options for the supply of homeservices from the housing organization's perspective.

strategy). For instance, residents of the housing organization may get a discount price for the membership of a car sharing: the housing organization provides the parking space for shared cars, and assists in the reservation and key exchange. This arrangement is usually contract based. A lighter institutional arrangement is needed if the housing organization acts as an intermediary between the residents and the service provider, for instance by *recommending* a certain service provider (e.g., plumber) or by taking over a transaction on behalf of the service provider (e.g., a janitor selling tickets to public transport). In all of the alternatives above, the resident can use the service, but assumes a typical customer role in the sense that s/he does not participate in the production of the service.

There is, however, yet another service model: the resident participates in the actual creation of the service (resident involvement strategy). In this case, the service can be organized so that the housing organization provides the necessary material component of a service and the residents do the work themselves. The material component can be durable and shared successively by the residents (e.g., pooling tools), or it can be a single-use good (provide paint or other renovation materials). This can be called a "supply on demand" option (e.g., of tools or renovation materials). Finally, there is an option in which the residents themselves create the service informally, as socially organized self-help (e.g., barter rings, in-house flea markets, informal tenants' meetings, neighborhood association). In this case, the housing organization may have a role as a space provider. The initiator may be either the housing organization or active residents.

4. How to assess the sustainability of homeservices? Suggestion for relative criteria

Earlier in the paper, it was argued that a service could be considered sustainable if it has a positive impact on all three dimensions of sustainable development: ecology, economy and societal aspects. How to put this principle in practice? During recent years, indicators of sustainability have been drafted by different constituencies, e.g., the Commission on Sustainable Development (CSD) (UNDSD, 2002), the Human Development Index (HDI) by UNDP (UNDP, 2001), Sustainable Consumption Indicators by UNEP (Bentley and de Leeuw, 2003), OECD (OECD, 1999, 2001) and the Daly–Cobb Index of

Sustainable Economic Welfare (ISEW) (Mannis, 1998). However, so far, no coherent indicators either for household consumption or for related services have been developed (Lorek, 2002). The first problem that one runs into when attempting to apply the above-mentioned sustainability indicators to the level of individual services or sectors is that they are mainly suited for national-level analyses. Another concern from the perspective of this study is that many of them are at such a basic needs level that they do not make much sense in developed country contexts, but are better suited for assessing the urgencies of less developed countries. For example, the CSD indicator for housing is floor area per person. A CSD indicator for urbanization of population is 'population of urban formal and informal settlements'.

However, these indicators can serve as one source for pointing out areas within which sustainability indicators for micro-level services related to household or housing could be developed. Furthermore, they not only point out issues, but some of them offer an aggregate indicator from which to work downwards to develop more micro-level determinants for assessing whether the focal service has a positive sustainability effect. Developing micro-level indicators for environmental sustainability is slightly easier than for social and economic ones, since some work has already been done both for indicators of the environmental impacts of household consumption (Lorek and Spangenberg, 2001; cf. also Bentley and de Leeuw, 2003) and for assessing the eco-efficiency potential of services (e.g., Heiskanen, 2001; Hockerts, 1999)[7]. From among the 14 environmental indicators of household consumption developed by Spangenberg and Lorek (2002) and Lorek and Spangenberg (2001), at least nine can be *drawn upon*—not used as such—for developing criteria for assessing the environmental potential of services directed to households. These are indicators for: heating energy consumption, resource intensity, living space, organic products, food transportation, shopping and recreation transport distances, modes of transport for vocational, shopping and recreation purposes, and number of passenger cars.

Table 1
A preliminary set of indicators for sustainable homeservices

Environmental aspects	Social aspects	Economic aspects
(1) Material use: quantity and type of materials	(8) Equity	(15) Employment
(2) Energy use: quantity and source of energy	(9) Health	(16) Financial situation of the residents
(3) Water use: quantity and quality (e.g., ground water vs. gray water)	(10) Safety and security	(17) Regional products and services
(4) Waste and emissions: quantity and type	(11) Comfort	(18) Profitability of the service
(5) Space use	(12) Social contacts	
(6) Transport: mode and distance	(13) Empowerment	
(7) Organic products	(14) Information and awareness	

In terms of social sustainability indicators explicitly for the household level, we can refer to quality-of-life indicators developed by Gatersleben and Vlek (1998) and Gaterleben (2001). The ones we can draw upon are comfort, health, safety, freedom/control, social justice, social relations and education and development. Two indicators considered social ones by Gaterleben (2001), work and income, we treat as indicators for economic sustainability.[8]

Our proposal for a preliminary set of indicators for assessing the ecological, social and economic sustainability of a homeservice is shown in Table 1. These indicators are meant for a simple assessment of a service, not for a comprehensive life cycle analysis or for, e.g., calculating the ecological footprint of a household. We find that for the first steps of starting to integrate all sustainability elements into service evaluation, a simple assessment device is sufficient. Furthermore, we wanted to propose a set of

[7] Hockerts' (1999) proposes a test of eco-efficiency of a service according the following indicators: longer life option, lesser material and energy consumption during use, revalorization potential and efficiency of use. Heiskanen and Jalas (2000), on the other hand, adopt a more general perspective and suggest that benefits resulting from the shift from products to services can be: lower manufacturing volume, less impact during the use phase of the product, lower stock of products, and higher rate and quality of utilization of end-of-life products.

[8] Some of these indicators, such as health, education, safety/security and employment, can be also found in writings of Sen (1999) as items of freedom, which according to Sen should be the measure of development, instead of, e.g., GNP growth.

Table 2
Operationalization of sustainability indicators

Material use (environmental)							
The effect of the service on material use compared to status quo (status quo=situation without the service)							
	−2	−1	0	1	2	NA	
Increases material use							Decreases material use
Empowerment (social)							
The effect of the service on residents' ability to influence decision making that affects them							
	−2	−1	0	1	2	NA	
Decreases ability to influence							Increases ability to influence
Employment (economic)							
The effect of the service on the employment							
	−2	−1	0	1	2	NA	
Less jobs/job opportunities lost							More jobs are created

Data are examples of one indicator from each sustainability dimension.
2: A major positive change. 1: A substantial positive change. 0: The service does not make a change to status quo. −1: A substantial negative change. −2: A major negative change. NA: Not available/not possible to assess.

indicators and criteria that are feasible also for practitioners. Using the above-mentioned indicator studies as the background, we ended up with 18 indicators, 7 for environmental aspects, 7 for social items, and 4 for economic sustainability. The indicators in Table 1 are most probably easiest to understand when considered in combination with the method suggested for their operationalization in Table 2.

The social and economic indicators perhaps warrant more discussion here because they have not been previously studied to the same extent as the environmental ones. The proposed social and economic indicators for assessing homeservice sustainability have mainly been developed on the basis of the macro-level indicators discussed above, quality-of-life indicators suggested by Gaterleben (2001) and the findings of living and housing studies by Scharp et al. (2000) and Hohm et al. (2002). It should be emphasized that the suggested contents for the indicators are not exclusive, but should rather be treated as indicative of what issues to consider when assessing the service according to the particular indicator. To start with the social indicators, Equity refers to the questions whether the service improves equality between people, whether it helps to combat social exclusion, and whether it promotes fair trade. The Health indicator evaluates whether the service contributes to preventing mental or physical illness. The Safety and Security indicator relates to crime and vandalism prevention in the neighborhood, and/or to the potential of the service to reduce risk of injuries. 'Comfort' refers to the effect of the service on reducing annoyance such as noise, odor, and/or pollution, on helping residents to save time, or on increasing convenience for the residents[9]. Under the indicator Social Contacts, we would look at whether the service promotes social self-help like barter shops and swap Internet sites, promotes communication in the neighborhood or improves the neighborhood atmosphere in general. 'Empowerment', on the other hand, refers to opportunities to exercise one's own volition and interact with as well as influence the world in which one lives (cf. Sen, 1999). In a homeservice context, this refers to issues like improved opportunities for participation, or the provision of new channels for residents toward decision-makers (e.g., electronic ones). Lastly, under 'Information and Awareness', we would assess whether the service increases training, awareness and skills of the residents.

As to the economic set of indicators, the most self-evident item on the list is perhaps Employment. It refers to whether the service creates new jobs or helps

[9] When comfort relates to reduced pollution, it is connected to ecological aspect of sustainable development. When an increase in comfort results from time saving, it may not only have comfort value (social) for the resident, but also economic significance, at least for those residents whose time has exchange value in the labor market. These instances are, however, to be recorded separately in ecological and economic indicator section; pollution under "waste and emissions" (environmental indicator) and time saving under "financial situation of the resident (economic indicator).

to secure existing ones, and/or whether it helps to tackle long-term unemployment. In this connection, one should consider what kind of employment is in question, e.g., full-time permanent vs. temporary or part-time work. The 'Financial Situation of the Residents' indicator comprises issues like residents' ability to save money or create more income as a result of the service. The following indicator seeks to assess the effect of the service on the regional economy. Finally, the indicator Profitability attempts to answer questions like: Is the service profitable in the long-term? (for its provider, e.g., the housing organization, or some other service provider); and/or does the economic efficiency of the whole service system improve?

As to assessing the sustainability of homeservices, there is a particular problem. It stems from the fact that we are looking at open systems. It is not only difficult, but in many cases impossible to draw a meaningful boundary around the 'system where the service has its influence'. In an open system, the problem arises that we do not have a fixed point against which the potential impact of the service should be measured. Even in a simple case, if we look at a particular building and a service offered to its residents, it may be possible to see, e.g., that a common room reduces the need for individual space, but it cannot be measured exactly how much space is being saved—the result would always remain to some extent hypothetical.

Therefore, our criteria for assessing the sustainability of homeservices are bound to be 'relative' or qualitative criteria, indicating a move in a positive direction[10], e.g., "increasing employment" or "promoting environmentally friendly transport", "reducing waste". No absolute value is involved. The question immediately arises: what amount of improvement counts for a criterion to be fulfilled? This is occasionally problematic, especially with regard to some social and economic criteria. How to judge if a service increases equity? Or empowerment? Or promotes the regional economy (almost any service gives some kind of an input to the regional economy)? Here we are, in the worst case, left with only the gut feeling of a mixed group of experts as a basis for assessment.

[10] Or negative, unsustainable direction.

How to assess a service on the basis of the above indicators, i.e., how to operationalize them? We propose a five-point ordinal scale for each indicator. The homeservices identified as potentially sustainable can be rated along this scale. Table 2 depicts the rating scale with one example indicator from each sustainability dimension. As mentioned above, the proposed indicators are relative, i.e., they indicate a move in a positive (or negative) direction, e.g., a reduction in waste or an increase in employment. For a relative method, the point of reference is an important element. For our method, the point of reference is the 'status quo' alternative in which the service does not exist (i.e., the 'current situation' or the 'do nothing/base line scenario'). If no change results from the service introduction, this would score 0 in the scale. NA in the table means that it is not possible to assess the impact of the service according to the particular criterion.

When applied in service development or assessment, the results of these indicators are not always unambiguous. If they are applied in practice for homeservice development, it is important to pay attention to the functional linkages between the indicators. Developing a service with regard to one dimension may lead to adverse effects in another. For instance, a substantial loss in household energy use may mean a loss in experienced quality of people's daily life when they, for instance, use certain goods less often or less intensively (Gaterleben, 2001). Furthermore, when assessing the sustainability effects of a service, they may occur at different levels: micro-level (household, apartment building) or more macro-level (region, country) or something in between (neighborhood). Most of the time, however, the sustainability effects of an individual homeservice remain at the household or apartment building level. Occasionally, they reach neighborhood level outcomes, and perhaps sometimes the effects might occur at regional niveau, e.g., strengthening of the regional economy via increased use of the services of locally owned companies. The key point is, however, to pay attention to the fact that despite the potential positive micro-level effects, negative impacts may result in the larger system, and vice versa (Dover, 1995; cf. also Wolf and Allen, 1995).

Finally, as mentioned earlier, a decision rule for judging the sustainability effect of a service could be

that it should have a positive impact on all three areas of sustainability. However, one could argue that this maybe too strict (Hrauda et al., 2002): a service that causes a clear environmental improvement and increases comfort for the residents, but does not have a positive economic effect, would be excluded from the list of sustainable homeservices. As a pragmatic solution, one could suggest that if a service fulfils at least two of the three sustainability conditions, it could be considered sustainable. Based on this notion and the previous discussion that services should be offered directly to the home of the consumer, we propose the following practice-oriented definition of sustainable homeservice:

> Pragmatic definition of sustainable homeservice: (1) a service that relates to living at a home and (2) contributes positively to sustainable development in at least two of its three dimensions.

5. Discussion and conclusions

The discussion about 'sustainable services' or 'sustainable product–service systems' has tended to emphasize the eco-efficiency perspective rather than explicitly capture all sustainability aspects. Particularly social or socioeconomic considerations have received very little attention. We argue that this may be one of the underlying reasons why eco-efficient service concepts, especially those directed to consumers have not been as successful in the market as their proponents hoped. The added value of eco-efficient services to consumers may actually often relate to considerations lying in the sphere of social sustainability. This observation, together with the fact that much of the unsustainable consumption occurs in the household context, encouraged us to outline the concept of sustainable homeservice and suggests ways to assess the sustainability of household services.

We proposed two definitions for the concept of sustainable homeservice, a general and a pragmatic one. In general, a sustainable service for households can be considered a service that relates to living at home and contributes positively to sustainable development in all dimensions. However, we contended that all sustainability conditions—environmental, social and economic—are difficult to fulfil simultaneously and therefore it may be useful, for pragmatic reasons, to accept that a sustainable service is one that satisfies two of the three. Furthermore, we discussed alternative institutional arrangements through which services contributing to sustainability can be supplied to households, and contended that housing organizations can play a central role. Altogether, we proposed seven options for supplying homeservices. Five of them require greater or lesser involvement from the housing organization, whereas two options of supply are independent of it. In the independent option, the service is created via socially organized self-help or by being offered directly to residents by an external service provider.

We find that for the time being, there are no absolute criteria for measuring the sustainability of services directed to households. There is some previous literature on criteria for the eco-efficiency of services, i.e., on environmental sustainability. However, as regards social and economic sustainability, we are so far left with only macro-level indicators to draw on. Consequently, we put forth a set of sustainability indicators that can be evaluated along an ordinal scale, where the point of reference is the status quo, i.e., the current situation without the existence of the service. In this fashion, it is possible, at least at a crude level, to assess whether a service improves sustainability compared to the "no-service" alternative. In other words, we proposed indicators and relative criteria for assessing homeservice sustainability. Future research may develop absolute and more sophisticated indicators, but we argue that for the time being, even a simple and relative fashion of evaluating service sustainability offers an opportunity for taking the discussion in the field a bit further.

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