

A MODEL OF LOST HABITS: TOWARDS A STRATEGY TO IMPROVE THE ACCEPTANCE OF PRODUCT SERVICE SYSTEMS

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Abstract

User acceptance is one of the largest barriers for the success of product-service systems (PSS). Often, PSS require a user to change his or her behaviour, which may conflict with existing habits. This results in non-acceptance of the PSS, which is disappointing for designers who aim to develop successful PSS.

Research on acceptance of PSS has been focused on the context in which PSS could operate, and on how PSS should be designed and marketed, in order to trigger and stimulate behaviour change. These methods centre on the viewpoint that change is a necessity. However, change is difficult, because people tend to hold on to their habits.

In this paper we will propose that habits can be used in the design process, for which we introduce the term "lost habits". When people lose habits due to undesired events, they may be very motivated to accept something that is instrumental to restore their habits. A PSS that addresses these so-called lost habits, might therefore be successfully accepted. In this paper, we will present a model that builds on this point of view, and we will present an explorative study to find how this model can be used in the beginning of a design process.

Keywords: Product-service systems (PSS), Human behaviour in design, Lost habits, User acceptance, User satisfaction

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1 INTRODUCTION

Innovative product-service systems (PSS) such as car sharing or product sharing services, replace traditional, economic principles as purchasing and owning, for more contemporary economic principles, such as sharing and using. For example, car sharing initiatives such as Zipcar, MyWheels, and Car2Go reduce the required amount of private cars by sharing vehicles among subscribers. Uber offers chauffeured vehicles to clients, and AirBnB offers shared space. Moreover, the increasing amount of bike sharing initiatives in many countries, can decrease the need for private cars, and consequently the amount of noise or exhaust gases. Various types of PSS are a good development from an efficiency and/or sustainability perspective (i.e. Herodes & Skinner 2005; Mont 2002; Tukker 2004; Baines et al. 2007; Goedkoop et al. 1999), and for some people, PSS are indeed an interesting proposition. However, for the vast majority, PSS that claim to be less expensive or more efficient, are not necessarily favoured above the more expensive or less efficient products and services already in use.

This shows a dilemma for all those, involved in the design and development of PSS, because the implicit benefits of PSS can seemingly not be matched with the practice of everyday life. Behaviour change and habits are at the core of this dilemma, as put forward in a call for papers by Vezzoli et al. (2012). They studied the development of PSS and found that "their (PSS) introduction and 'scaling-up' require fundamental changes in behaviour and practice that are implemented by individuals, groups, business communities, policy actors and society-at-large."

This suggests that behaviour should be changed, in order for PSS to be accepted. However, changing people's behaviour is very difficult, and may in some cases even be too difficult. Therefore, in this paper, we propose that PSS can also be successfully accepted when they do not require an active behaviour change. We propose that designers could look for situations in which people have already changed, because in such situations, people's habits have become discontinued. We will introduce a model that builds on these so-called lost habits and that shows which factors contribute to the acceptance of innovations, allowing people to restore their habits.

Our model presents a relation between habits and user acceptance, which is hypothesized to be moderated by three factors: Importance, Voluntariness and Time gap. The model can be used as a guideline for developing scenarios, in order to generate PSS that are more likely to be accepted. First, we discuss the theoretical background for our model. Second, we will present the results of an experimental study to the applicability of the model, and the recognisability of each construct in the model.

2 PROBLEM STATEMENT

In our introduction, we have shown that the acceptance of PSS is an important and difficult issue. Traditional acceptance models consider that people search for the most efficient or effective way to achieve their goal. These models are based on economic and rational principles. However, for PSS, this does not always seem to work. In general, people tend to prefer holding on to habits and familiar behaviour, which acts as a barrier for gaining user acceptance, as is concluded by Vezzoli et al. (2012), and confirmed by Ceschin (2013).

This barrier is problematic for the success of PSS. Vezzoli et al. (2012) argue that solving the complexity of PSS resistance involves many means and methods that combined could improve and increase PSS acceptance. It is however unclear which means and methods are needed and how these should interact. Therefore, in this paper, we will propose a new viewpoint that can serve as a tool for improved acceptance for PSS. First, we will discuss the foundations of why people do not accept PSS and second, we will offer a PSS design strategy that uses habits and behaviour change.

2.1 Changing behaviour is difficult

We have outlined previously why required behaviour change is an undeniable barrier for PSS acceptance. In this section, we will discuss that in theory, behaviour is not necessarily hard to predict.

However, when people have habits, prediction becomes incredibly difficult and behaviour change does often not happen.

Traditional acceptance models, such as the Technology Acceptance Model (TAM) (Davis, 1989), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003) or Theory of Interpersonal Behaviour (TIB) (Landis, Triandis, & Adamopoulos, 1978), are commonly used to predict acceptance of technology. For example "intention to use" is a generally seen decisive factor for acceptance. However, in the case of repeated behaviour, actions become automated and habits may become a better predictor than intentions (Gardner, 2009; Landis et al., 1978). Others have also found that intentions completely lose their predictive capacity when people have developed automated behaviour (Aarts, 2009; Verplanken et al., 1998).

The relation between habits and acceptance has been studied on car sharing services by Meijkamp (1998), who found that non-adoption should be explained from habit strength. Moreover, Rexfelt & Hiort af Ornäs (2009) studied consumer response on four "ownerless" PSS concepts, such as car sharing and garment leasing. They found that participants in their study rejected PSS concepts, when they could not oversee the change in activities related to using the PSS. As a conclusion, they claim that an ideal PSS should, among others, be "compatible with the values and habits of the intended user group." This is a very useful comment. Considering habits in the design process touches the main issue for PSS acceptance. In order to understand how habits can be used, we will zoom in on theory on habits in the next section.

2.2 Habits and behaviour change

Working with habits requires some understanding of why habits are so strong and difficult to change. We will emphasize two reasons that seem to be connected. First reason is the fact that people create stimulus-response (s-r) actions (Aarts, 2009). When a given stimulus-response often and consequently results in a satisfactory reward, the s-r association becomes stronger and habits are formed. Given stimuli become initiators for automatic processes that result in the related reaction. Interestingly enough, stronger s-r associations result in rewards becoming less influential. In this process, conscious decision making moves to the background, which makes it difficult to motivate or convince people to change behaviour using rational benefits in products. Aarts argued that behaviour could hardly be changed when there are simple s-r relations. However, he sees opportunities when behaviour is more purposeful and complex. In this situation, he proposed to improve awareness about the selection context, to create "implementation-intentions" or to reprioritize unconscious goals.

The second reason is the value that people add to what they have. This is explained by Gourville (2005), who elaborates on the "endowment effect"; an effect described by Thaler (1980) and Kahneman et al. (1991). This effect entails that people value products they own much more than products they can obtain. The endowment effect could explain why something new may objectively be better, but will not be accepted. The effect is a result of a principle called "loss aversion", which claims that losses have a far greater impact on people than similarly sized gains (Kahneman and Tversky, 1984). This could explain why behaviour change is sometimes difficult, and offering similar, alternative products may not be successful.

Luckily, methods to change behaviour exist. External triggers, and extrinsic motivation, such as financial cues, context changes, or education, are powerful tools and also generally proposed for development and implementation of PSS (i.e. Baines et al., 2007; Ceschin & Vezzoli, 2010; Skinner, Haines, Bowyer, Fergusson, & Senft, 2004; Verplanken & Wood, 2006).

Such motivators and triggers are especially useful for policy makers, although the problem with extrinsically motivating people is that the resulting behaviour does not necessarily change sustainably. The main reason is that often the old behaviour returns when the triggers for motivation disappear or that behavioural change comes with lots of opposition (Thøgersen and Møller, 2008; Verplanken and Wood, 2006).

For designers, this may sound rather disappointing. Fortunately, the area of design for behaviour change provides designers various tools and methods to change behaviour (i.e. Darnton, 2008; Fogg,

2009; Lockton et al., 2010). However, people's freedom to choose puts a high responsibility on the designer. He or she has to design an artefact in such a way, that people will be persuaded to choose it among many alternatives, and this seems to be very difficult, especially when people have already defined their behaviour.

2.2.1 Don't change behaviour

Design for behaviour change suggests that behaviour should be changed. We will follow an alternative approach that is in line with the ideas of Gourville (2006) who works in the field of behavioural research and consumer decision making. He aims to give developers, such as designers, tools to work around user resistance with two strategies: accepting resistance i.e. by waiting for a long time, or minimizing resistance, i.e. by developing behaviourally compatible products.

Gourville proposed the model as shown in Figure 1, where he sketches the relation between required behaviour change and degree of product change.

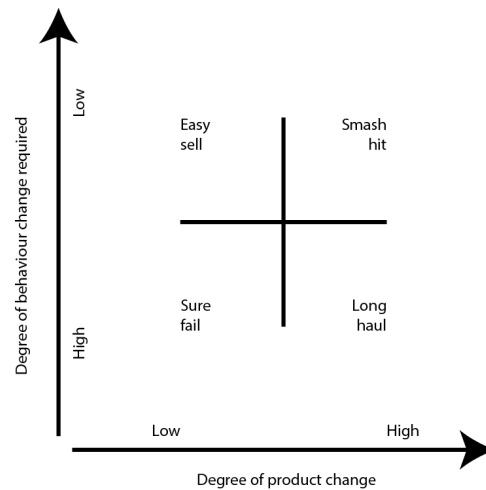


Figure 1. Model adapted from Gourville (2006)

He shows that a product may sell very well, as long as required behaviour change is minimized. Whether the product will be a great success, depends on the degree of product change.

This model is very insightful for designers, as they have an inherent influence on the degree of product change. Moreover, although they may not have major influence on behaviour change, they are stimulated to consider to what extent they require people to change their behaviour. Deliberate choice is a core construct in the model, as people can be motivated to provide the required behavioural change, or not.

Situations in which people have no deliberate choice, and change against their will, are not covered by this model. Examples of situations where people must change habitual behaviour are a new job offer, or migration. In such situations they have to adapt to a new context, and often have to break their old habits at least temporarily (Aarts, 2009). Similar situations are personal changes. For example when a person changes physically, he is forced to discontinue old habits. Unfortunately, such situations cannot be placed in Gourville's model, because he takes fixed behaviour into account and suggests what amount of behaviour change is required. We developed a model, inspired by Gourville's model, which explores how PSS acceptance is influenced when behaviour is already changing, or has already changed.

3 MODEL OF LOST HABITS

In the previous sections, we have pointed out that the acceptance of PSS is an important and difficult issue, because behaviour change is often required. We also showed that habits have a very strong influence on behaviour. To increase acceptance, one way is to design for as little required behaviour change as possible, as Gourville suggested. We propose that designers can embrace the strong

influence of habits in the design process of PSS and we will present a model that explains how this can be done.

Central to our model are situations in which habits are lost involuntarily. These situations may offer opportunities for PSS design, first because a habit is not there anymore and people will be sensitive for alternative offerings. Second, because people may still be very motivated to continue their lost habit. Therefore, we hypothesize a relation between addressing lost habits in the design process and acceptance or adoption of the designed PSS.

This relation is hypothesized to be influenced by three factors: Importance of habit, Voluntariness and Time gap. We will briefly explain each of these factors, after we have introduced the important variables in our model: Lost Habits, Acceptance/adoption and Change.

3.1 Variables

Our model of lost habits is built on the following dependent and independent variables.

3.1.1 Change and lost habits

We define lost habits as habits that people have discontinued, due to personal circumstances. They are characterized by a transition process from one situation to another. This new situation is often a degraded version of the previous situation and people are hypothesized to be motivated to recover the old situation. The magnitude of change is expected to positively influence the magnitude of the lost habit, which is expected to positively influence acceptance. This also means that the presence of change is conditional for the model to work.

The difference with existing theories is that design for lost habits suggests that habitual behaviour should be restored, or that people can at least use an innovation as instrument to regain experiences that were lost, due to lost habits. We hypothesize that addressing lost habits result in acceptance of a PSS that is able to restore habits.

3.1.2 Acceptance/adoption

Acceptance and adoption are the dependent variable in our model. Renaud and Biljon (2008) describe acceptance as an attitude, while they define adoption as a process. They consider a product accepted if the user has purchased a product. Adoption is considered as embracing the technology by making it part of one's life.

In our model, we focus on acceptance and see acceptance as a "green light" towards PSS use. That means that a person has decided to start using a PSS and acted accordingly.

How the following adaption process will be, is unclear, but presumably a new habit will be formed around the use of the new PSS, which means that the PSS becomes adopted.

3.2 Influencing factors

As outlined above, we hypothesize three influencing factors in our model, which we will explain next.

3.2.1 Importance of habit

Habits are important for people. They reduce the cognitive effort needed to perform a task (Jager, 2003), and they offer rewards, such as a good feeling. However, rewards become less important when the habit becomes stronger. Accordingly, a habit may gain value in time and losing the habit is assumed to be a high value loss. We therefore hypothesize that an important habit is valued higher than a less important habit and the influence of a lost habit on acceptance will be positively influenced by importance of habit.

3.2.2 Voluntariness

In his model, Gourville (2006) argues that products can be successful if there is a low amount of behaviour change required. Products that require a high amount of behaviour change, can therefore be less successful. This suggests an inversely proportional relation between required behavioural change and acceptance. Moreover, two basic assumptions are derived from this model:

1. A person must adapt his or her behaviour to the required behaviour to use the product;
2. People do not like to change, due to loss aversion.

We go one step further and question what would happen if people change involuntarily, and the required behaviour to use the product is adapted to a person's past behaviour. In this situation, people did not decide to change, which may stimulate dissatisfaction. Involuntariness, is the magnitude in which someone is pushed away from his or her desired behaviour, independent of his or her will, Involuntariness is therefore hypothesized to influence the relation between lost habits and acceptance positively. However, for a better understanding, we will use the term voluntariness, and accordingly, we hypothesize that voluntariness influences the relation between lost habits and acceptance negatively.

3.2.3 Time gap

Time gap is the time between the moment a habit is lost and the moment a PSS is presented. It is expected to be painful when people lose their habit, and people may be willing to restore this habit as soon as possible. However, after a while, people are expected to accept the situation, and new habits will be formed. Therefore, Time gap is therefore hypothesized to have a negative influence on the relation between lost habits and Acceptance.

3.3 The model

The Lost Habits model requires change as a condition to work. Change results in lost habits. Addressing lost habits hypothetically influences acceptance, because people are motivated to continue their original behaviour. The relation will be influenced by the importance of the lost habit, the lack of voluntariness and by the time gap between the moment the habit is lost and the alternative is offered. This results in the following model, which is presented in figure 2.

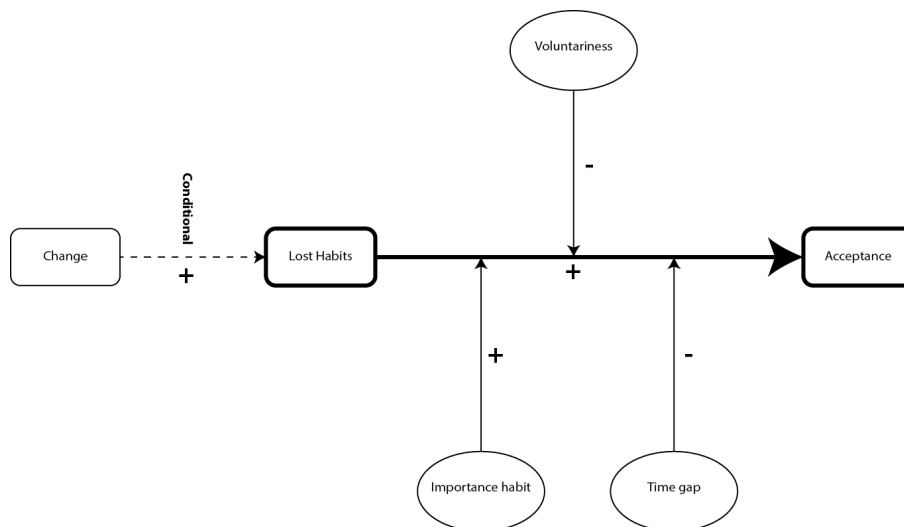


Figure 2. Theoretical model of Lost Habits. Relations are displayed by arrows. The direction of the arrow illustrates which factor influences another factor or relation. The magnitude of influence is either positive, illustrated by "+", or negative, illustrated by "-".

4 VALIDATING THE LOST HABITS MODEL

The proposed model is not intended to be seen as "the" model to increase acceptance. However, the factors can be used as a guidance or strategy in the design process to identify promising markets, people and situations, and to design new products and services. It can be regarded as a tool in design fields such as user-centred design and scenario-based design to find users with lost habits, or to identify scenarios in which a habit played a large role.

4.1 Method

As part of a larger study, we conducted a validation study towards scenario creation. Our aim was to develop distinctive scenarios, based on the factors presented in the model of Lost Habits. Following, we present the results of this validation study towards scenario creation.

4.1.1 Participants

The study was conducted via a survey, among a group of 42 respondents. All respondents were free to stop the survey at any moment, although questions could not be skipped. 10 respondents did not finish the survey. It is unclear at which part the survey was abandoned, although colleagues told that some questions were ambiguous or difficult to answer.

2 entries have been ignored, as these respondents gave an unreal age. Therefore, the answer reliability cannot be verified. This resulted in a group of 30 respondents, of which 9 were women between the ages of 23 and 63 years, and 21 were men between the ages of 26 years and 67 years. The average age of all respondents was 42 years old.

Invites were sent to half of the colleagues working at the department of Design, Production and Management, and respondents were asked to spread the survey among acquaintances. Moreover, a selected group of acquaintances from the researcher have been asked.

It has not been monitored which respondents were colleague, or acquaintance, as the responds were taken anonymously.

4.1.2 Materials

An online survey was created on limesurvey.org. Two themes were developed (Holiday & Food), each containing 2 scenarios (Lost Habit (LH) and Not Lost Habit (NLH)). The independent factors in the model have been manipulated. In scenario Holiday LH and Food LH the factors were manipulated to enhance the relation between lost habits and acceptance, in scenario Holiday NLH and Food NLH, the factors were manipulated to decrease the relation.

The scenarios were built according to the following modular structure:

Scenario = Introduction (general) + Importance (positive or negative) + Voluntariness (positive or negative) + Time gap (negative or positive)

The scenarios were written in Dutch. The introduction was identical for both scenarios within the theme. Thereafter, the scenarios were tailored towards a Lost Habit scenario (LH) and a general, control scenario (NLH).

All scenarios were created in a modular way, following a specified course of events. The LH scenarios introduced one or two main characters who enjoyed a recurring activity. Then, this activity has to be discontinued due to an external event. This happens short before the habitual activity would be performed.

The NLH scenarios introduced the same one or two characters as used in the LH scenarios. However, they enjoy various similar and recurring activities. Their ability to perform some of these activities is discontinued by their own choice. This choice is made long before a recurring activity will be performed.

Each scenario was accompanied by a collage, representing the main character(s) and their activities.

4.1.3 Procedure

Each respondent was assigned to one random scenario from each theme, so a total of two scenarios was presented (Holiday LH or Holiday NLH and Food LH or Food NLH). For each presented scenario, respondents were asked to read the scenario and to take a look at the collage. After a scenario has been presented, the respondent evaluated the magnitude of each moderator on a 9-point Likert scale with end points "Very little (1)" to "Very much (9)". After two scenarios, the gender and age of the respondent was asked. In this way, the magnitude of each factor was evaluated twice, resulting in 4 different values for each factor. All questions and answers were given in Dutch and all questions were mandatory.

4.2 Results

For the evaluation of the study, a one-way ANOVA has been carried out on the different factors. The sample size for scenario's were: Holiday LH: N=12, Holiday NLH: N=18, Food LH: N=19 and Food NLH: N=13. The results are presented in Table 1 and Table 2.

Table 1. Scenario A

Factor	df	Holiday LH Mean	Holiday NLH Mean	F	p
Between subjects					
Importance	1	8.17	5.33	22.582	.000
Voluntariness	1	2.42	8.17	120.278	.000
Time gap	1	2.75	5.22	7.931	.009

Table 2. Scenario B

Factor	df	Food LH Mean	Food NLH Mean	F	p
Between subjects					
Importance	1	6.59	6.77	.058	.811
Voluntariness	1	2.12	6.38	45.334	.000
Time gap	1	2.76	5.62	11.470	.002

From the factors Importance, Voluntariness, and Time gap, the means and F-values have been evaluated. A successful manipulation would result in a significantly higher mean score for Importance in the LH scenarios than the NLH scenarios. The means for Voluntariness and Time gap would score significantly lower for the LH scenarios than the NLH scenarios. A high significance would be illustrated by a low p-value, which is usually the case when $p < 0.01$.

In Table 1 and Table 2, we see that the means of the factors Voluntariness and Time gap score significantly lower in the LH scenarios, than the NLH scenarios, which means that the factors are successfully manipulated. The means for factor Importance scores significantly higher in the Holiday LH scenario, than the Holiday NLH scenario, which also means a successful manipulation. However, the factor Importance in the Food scenarios is not significantly different. This manipulation has therefore not been successful.

4.3 Discussion

Our model was built on three factors: Importance, Voluntariness and Time gap. The manipulation of factors showed mixed results. The effect of Voluntariness was highly significant in both scenarios. The effect of Importance was only significant in one scenario, and not at all in the other. The reason for this could remain in over-interpreting the question for Importance in the Food scenario, resulting in a too abstract question.

The Food scenarios asked for the impact of change from one activity to another. This was foreseen to identify how valuable the activity was for the main character, but instead it seems to be proved that the impact of change is rather high in both the LH as the NLH situation.

We expect that this question confused the respondents, as the question focused on the wrong aspect of the scenario. Asking a more direct question, and thereby providing the respondent a clear idea of which aspect of the story is referred to, could result in more reliable scores.

The effect of Time gap was moderately significant in both scenarios. The factors could significantly be differentiated, but the exact influence of this factor on the model is unclear. Our model hypothesized the influence to be negatively, which is based on the assumption that people gradually rationalize their loss, concede the situation and establish new habits. However, other literature suggested that emotions become less accurate after a period of time (Wilson et al., 2003). According to that study, past positive events were recalled to have more impact than they actually had. Arguing from such a perspective, suggests that a PSS that addresses lost habits, might be better accepted if it recalls habits that gave a positive feeling. In that case, people could be prone to relive the lost experience.

This could flip the influence of Time gap on the relation between lost habits and acceptance from negative to positive.

5 GENERAL DISCUSSION

In this paper, we have presented and discussed a model to design for lost habits, based on theory on user acceptance and behaviour change. We have also presented an explorative study in which we have tested the validity of this model as a scenario development tool.

Both the factors in the model, as the modular configuration of the scenario, are useful cornerstones for scenario development. If a designer intends to design for lost habits, this method can be used as a guideline in the design process. It provides a robust scenario, which can help to understand the situation of the target group. It can make the designer conscious about the abilities and inabilities of the user and it helps to focus on what might be really important for him or her.

The main problem that we have addressed in this paper is the lack of acceptance of PSS, due to the fact that people tend to hang on to formed habits. We have proposed a model that uses already changed behaviour as a starting point, instead of trying to influence people to change their behaviour.

Using situations in which people have been forced to change their behaviour (habit) may seem limiting, because it implies that a designer is not entirely free to design any PSS he wants, and not all people will be eligible for the designed PSS. However, this may not be a bad thing. Our vision is that designers act to serve users. Therefore, designers should adapt to users with their design, instead of the other way around, when users have to adapt to the designer's ideas. As a result, the design strategy can help to find solutions which are very likely to fit the user's situation, and therefore to be accepted.

Our 'design for lost habits' model, being a model that envisions that behaviour should not be changed, may seem to conflict with the various methods and theories that describe ways to 'design for behaviour change' (Dorrestijn, 2010; Lockton et al., 2010). In our opinion, both visions have their value. Tools and methods on design for behaviour change may be very well suitable for situations in which people should change their behaviour for their own benefit or that of society (think of areas such as design for sustainable or healthy behaviour (Lilley, 2009; Ludden and Hekkert, 2014; Tang and Bhamra, 2008). However, our approach offers an alternative that we think could lead to more successful acceptance of PSS in these and other areas.

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