Article

Making Ours Mine: Increasing Consumer Acceptance of Access-Based PSS through Temporary Product Customisation

Vivian S. C. Tunn *, Richard Fokker, Koen A. Luijkx, Silke A. M. De Jong and Jan P. L. Schoormans

Delft University of Technology, Landbergstraat 15, 2628 CE Delft, The Netherlands; R.Fokker@student.tudelft.nl (R.F.); K.A.Luijkx@student.tudelft.nl (K.A.L.); S.A.M.deJong@student.tudelft.nl (S.A.M.D.J.); J.P.L.Schoormans@tudelft.nl (J.P.L.S.)
* Correspondence: v.s.c.tunn@tudelft.nl

Abstract: Access-based product-service systems (AB-PSS) have the potential to lower environmental impacts. Currently, a lack of consumer acceptance and, consequently, low adoption levels of AB-PSS are challenges preventing the realisation of their sustainability potential. This study proposes temporary product customisation to lower barriers for the acceptance of AB-PSS. We investigated whether customisation through modifying the appearance of an easily changeable attribute of a typical product, and thereby changing the product personality, could improve consumer acceptance while limiting the impact on sustainability. To explore this, a 3×1 between-group design experiment was conducted with consumers who are familiar with offerings similar to the AB-PSS we tested. The results indicate that respondents have a strong preference, as is widely recognised, for typical products in an AB-PSS. Infusing meaning and intangible value into accessed products through customisation can simultaneously lead to wider acceptance in the market and individual consumers' satisfaction. Our findings confirm that consumer acceptance increases if a product fulfils intangible needs along with functionality needs. The results can be used to think about new ways in which product design can enhance the diffusion of AB-PSS in the consumer market.

1. Introduction

In recent years, the circular economy concept has gained popularity as a path towards more sustainability through perpetual cycling of products, components, and materials, thereby reducing the need for new products and virgin materials [1]. The circular economy concept requires business models that can help achieve these sustainability improvements. Product-service systems (PSS) have been suggested as business models that might support achieving sustainability and circularity [2,3]. A recent interview study with circular economy experts from academia, industry, and policy confirmed this. Among other business models, the experts suggested different PSS to achieve a circular economy and sustainable consumption [4]. In PSS, products and services are combined to satisfy needs because a customer "does not really demand the products or services, per se, but what these products and services enable a user to achieve" [2] (p. 851). PSS might prolong product lifetimes by eliminating incentives for planned obsolescence and through better maintenance of products [5].

Access-based PSS (AB-PSS) have been suggested to be particularly promising; they can be implemented with the current products and technology and can potentially reduce the environmental

impact of consumption. In AB-PSS, a providing organisation owns products and consumers pay to access them. In literature, AB-PSS are also referred to as use-oriented PSS [6] and access-based consumption [7]. An example of a successful AB-PSS is car sharing. Consumers can satisfy the need for a personal vehicle, for example, for the weekly grocery shopping, through cars owned by a company such as Greenwheels [8]. Car sharing could be more sustainable than car ownership because one car can be used by different consumers sequentially rather than each consumer owning a car that is idle most of the time.

The wide diffusion of AB-PSS is essential to realise their sustainability potential, but also to guarantee a financially viable business model. A sufficient number of consumers in the same geographical area need to be willing to access the provided products interchangeably. If only one consumer uses a shared car, impacts do not decrease compared with those of an owned car. AB-PSS need to be widely adopted and used by consumers to be more sustainable than owning products. In order to achieve intensified use of products in AB-PSS, the offering needs to be accepted by a large group of consumers. However, consumers compare PSS offers with purchasing the product, and the latter often scores higher [9], as these products better match individual consumers' preferences.

2. Literature Background

Strategies are needed to satisfy consumer needs better and thereby achieve wider consumer acceptance of AB-PSS and realise sustainability goals. Armstrong et al. [9] (p. 38) suggested that emotional needs "could be met through PSS models offering personalized or customized design". In this paper, we focus on longer use durations, more specifically, one product being accessed for several months. Temporality is one of the dimensions that Bardhi and Eckhardt [10] determined to describe AB-PSS offerings. They distinguish between the duration of the access option and the duration of the product use and argue that the use duration influences the product–consumer relationship. It can be expected that consumers will feel a stronger relationship with a product when they use it for an extended period.

2.1. Barriers to PSS Diffusion in the Consumer Market

As mentioned in the introduction, consumer adoption is necessary for AB-PSS to reach their sustainability potential. However, at the moment, the acceptance of AB-PSS in the consumer market is a challenge. A number of studies have identified barriers and enablers for consumer acceptance and adoption of PSS. The identified barriers relate to the service and the product aspects of the PSS. Barriers and enablers that are related to the service are price complexity [11], availability of product information [12], the reliability of the service providers, and consumers' trust in the system [13]. Barriers that are also related to the service aspects of the PSS are the lower convenience because of availability [3] and accessibility of products [14]. Other barriers and enablers are related to the products involved in a PSS. PSS are less likely to be adopted if the product requires consumers to alter their habits [15] or to learn new skills [16]. At the same time, relieving consumers of burdens of ownership such as repair and maintenance of products could make PSS more convenient than ownership [13,17].

Several psychological aspects also influence consumer acceptance of products in PSS. Consumers have a desire to own products [9,12]. Ownership goes hand in hand with perceived control over the products that one misses when using PSS [3]. People might not feel at ease using products through AB-PSS out of fear of accidentally damaging them [17]. Edbring et al. [18] found that consumers are concerned about hygiene when using PSS because other consumers have previously used these products. Baxter et al. [19] explored the negative effects of the sequential use of products by different consumers in more detail. They emphasised the need for products that "can be used by multiple people and maintain a positive (or at least neutral) user experience" [19] (p. 513). Other barriers are the meaning that consumers extract from owning or using products and consumers' relationships with products. Santamaria et al. [20] (p. 24) stated that PSS "will not be perceived as a desirable option for the user if it lacks the allure or symbolic value that other competing options provide". The findings

of Armstrong et al. [9], who extensively studied AB-PSS for clothing, confirm this. These authors concluded that consumers' desire to own a product goes beyond mere control, but also relates to the expression of social status and provides emotional value. In the last decades, companies have increasingly competed for the attention of consumers in the market by introducing soft, intangible product benefits next to product functionality. Until now, AB-PSS often fail to match the soft, intangible values that owned products deliver [3,17,20].

2.2. Customised versus Prototypical AB-PSS

In recent years, the concept of customisation has been introduced [21]. According to this concept, products and services should not be adapted to consumer segments, but rather to the preferences of individual consumers. The customisation of services is found in many markets nowadays. One example is online retail, companies like Amazon adjust their retail environment to the individual consumer using, for example, earlier buying behaviour, to provide purchase suggestions. Using this kind of service customisation is found to lead to higher consumer satisfaction when it benefits the consumer [22]. The studies of Sakao et al. [23] and Fargnoli et al. [24] both show advantages of the implementation of service customisation in AB-PSS. Service customisation might tackle some of the previously mentioned acceptance barriers. For example, consumers can nowadays access information about the availability and location of bikes in many rental systems through a smartphone application. This reduces the barrier of product availability.

Customisation of product design has been implemented in diverse markets. For example, BMW and Adidas offer their customers the chance to personalise cars and shoes, respectively [25,26]. Consumers can customise their products on many product attributes and receive a car or a pair of shoes that perfectly fit their preferences. The downside of this is that customised product become so "idiosyncratic" that they only fit one specific consumer and as such do not fit the preference of a larger group of consumers. Consequently, the customisation of the product component of an AB-PSS might create an additional acceptance barrier for many potential consumers.

In order to avoid this barrier, AB-PSS need to incorporate products that most consumers would find acceptable rather than customised ones. Prototypical products might fulfil this requirement. Prototypical products are products that provide existing standard functionality [27]. These products often also have a typical appearance that corresponds to the average value of the attributes of a category. A typical product appearance has the greatest familiarity for consumers [28]. For example, the prototype of a TV would be a rectangular box with a grey or black colour [29]. For many PSS, using prototypical products is a good strategy. In particular, when consumers access a product mainly for its functionality, they prefer products with typical functionality and aligned appearance. In many AB-PSS, the functionality of the product is pivotal and, therefore, products in AB-PSS score high on typicality. For example, if a tourist wants to rent a bike for a day, the tourist seeks a bike with typical functionality. Next, the design of the bike needs to tell the tourists most of all that it is a (simple) bike, not more and not less.

The challenge is to design AB-PSS that achieve wide consumer acceptance while also satisfying individual consumers. As indicated before, the products that are used in AB-PSS are often quite typical. If the products are only used because of a functional goal or for a very limited time, this is a sensible choice. However, in many cases, consumers demand products that also relate to intangible, soft values that are thus less typical. As phrased by Ward and Loken [30], "when the intangible benefits, for example, the status related to a product, become more important consumers like atypical products more". The evaluation of different rental scenarios showed that consumers accept typical products less if the use duration is longer [31]. In such a case, it is probable that the soft values of the product will become more relevant and as such, consumers' preference for typical products will decrease. After comparing Zipcar users and Harley Davidson users, Catulli et al. [32] concluded that "the proposition of a use-oriented PSS to types of consumers who look at their brand as a vehicle of self-expression

would be problematic". Soft values can be relevant in AB-PSS and not only in the case of high-status products, but also for other products.

2.3. Customising through Personalisation of Products in AB-PSS

Product design is one of the prevalent ways of creating symbolic and emotional product value [33]. One possibility to create these intangible product values is by designing product personalities. Govers [34] defined a product personality as the set of personality characteristics that people use to describe a specific product and to discriminate it from other products. Personalisation is "a process that defines or changes the appearance or functionality of a product to increase its personal relevance to an individual" [35] (p. 468). The product personality concept is directly derived from the (human) personality construct. One of the widely used and accepted models is the five-factor model (FFM) of personality [36]. The five factors of the FFM are found to describe the human personality quite robustly and are also referred to as the Big-Five. These five factors are openness, conscientiousness, extraversion, agreeableness, and neuroticism, represented by the acronym OCEAN [37]. The FFM adopts the basic ideas that underlie trait theory [38]. It suggests that individuals can be characterised in terms of relatively enduring patterns of thoughts, feelings, and actions and that these show a certain degree of consistency across situations [38].

The five OCEAN factors are rated on a scale from 1 to 5. Every extreme of the scale is a different indication of the personality score. For example, openness could be explained as conventional on one end and as imaginative on the other end. If the score ends up in the middle, this would mean in-between extremes [39]. Govers [34] showed that in the case of products, three of the five OCEAN factors are appropriate to describe differences in product personalities, namely, conscientiousness, extraversion, and agreeableness. Design elements like form, colour, and material can be used to create a specific product personality. Product personalisation increases product preference if the product personality matches that of a consumer. Govers and Schoormans [40] demonstrated that consumers have a higher acceptance for products that match their personality.

In AB-PSS, the importance of intangible value depends on the duration of product use. Intangible value increases product preference in an AB-PSS when consumers use a product for an extended period. A product can be personalised to increase one consumer's preference for the product, but this results in less typical products because consumers differ in personality. Consequently, a personalised product is less interesting for a larger group of consumers. Therefore, a challenge for AB-PSS design is balancing wide consumer acceptance with the satisfaction of individual consumers. A way of overcoming this challenge is by customising a small product attribute that can be added to a product easily each time it is rented out—a temporary customisation of the product. The assumption is made that such a relatively small customised product attribute with a personality that matches the personality of the consumer, further referred to as product–person match, will increase the acceptance of the total PSS by the consumer. In this research, we answer the following research question: How does a temporary product customisation by personalising a product attribute affect the acceptance of AB-PSS in the case of longer product use periods? To be able to answer this question we defined the following two hypotheses:

Hypothesis 1 (H1). *AB-PSS that involve products with a typical appearance are preferred over less-typical products.*

Hypothesis 2 (H2). *AB-PSS that involve products with a typical appearance that also match the personalities of the individual consumers are preferred more than products that do not match their personalities.*

3. Method

For the study, an experiment with a 3 × 1 between-group design was used. In the following sections, the stimuli, sample, and procedure applied for this experiment are outlined.

3.1. Sample and Stimuli

The participants were Dutch-speaking design students aged 18–27. This sample was chosen as the population of students in the town of research were the main target group of the studied AB-PSS for bikes. In this town, a number of commercial AB-PSS for bikes are available; they are all well-known and popular among students. The Dutch company Swapfiets [41] offers simple bikes for a monthly fee, and the fee also covers maintenance and repair. Next to Swapfiets, Mobike and OV-fiets also offer bike AB-PSS. Mobike is a floating bike-sharing system (without docking stations), and OV-fiets rents out bikes at Dutch railway stations. The total sample comprises 86 students—58% female and 42% male. They received a small, non-financial incentive for participating. Furthermore, we conducted a pre-test in English (n = 10) that showed that participants had difficulties grasping the nuances of the English language. Therefore, the main study was conducted in Dutch. Participants were presented with a questionnaire that included a stimulus. This stimulus showed one of three bikes. For the typical bike appearance, a picture of one of the most commonly used bikes in the Netherlands was used—a black roadster bike—depicted on the top in Figure 1a. The lower bikes in Figure 1 are the personalised bikes. Two different designs were added to the coat guard to change the appearance of the bikes: the personalised bike pattern (bike in Figure 1b) and the personalised bike grapefruit (bike in Figure 1c). The changes to the coat guard had no impact on the functionality of the bike. To avoid possible brand effects, the brand name was removed from the stimuli.

(**a**)

(**b**)   (**c**)

Figure 1. The three stimuli. Top (**a**): typical bike, bottom (**b**,**c**): typical bikes with personalised coat guards, pattern and grapefruit.

## 3.2. Procedure

The participants completed the experiment individually. They were presented with a scenario that stated that students could rent the depicted bike for a fixed monthly payment (indicating a longer renting period of at least one month). They first assessed their personality. Subsequently, they assessed the product personality of one of the three bikes. To assess the personalities, we used a visual one-dimensional forced-choice personality test in the format of a tablet application. This application was developed by the Center for Applied Product Personality Research [42] and was based on the Big-Five personality traits model, OCEAN, which was developed through a factor analysis of 18,000 adjectives [36]. Participants completed the experiment by filling in a questionnaire. With the questionnaire, participants rated product liking using the following four items: I would use this product, I think this product is a good product, I would subscribe to this product, I think this product is attractive. Person/product fit was assessed with four items that were adapted from Govers and Schoormans [40]: considering the people who would use this product, I am exactly like them; considering the people who would use this product, I am similar to these people; this product matches my personality; this product is like me. All items used a five-point Likert scale.

4. Results

4.1. Manipulation Check

We created three stimuli to test our hypotheses. We first checked that we succeeded in designing different product personalities in our three stimuli as intended. As indicated above, Govers [34] proved that product personalities differ between products mainly on three dimensions, namely, conscientiousness, extraversion, and agreeableness. We thus compared the perceived product personality of the typical bike with that of the two personalised bikes for these three dimensions. We used a one-way analyses of variance (ANOVA) to do so. The ANOVA calculate to what degree the means of the perceived product personalities differ between the three stimuli. The analyses shows that the three bikes differed significantly on perceived conscientiousness (F (2, 82) = 3.93, p = 0.023) and on perceived extraversion (F (2, 82) = 19.45, p = 0.000). No significant difference for the perceived agreeableness was found for the three stimuli. Next, we used *t*-tests to check which of the means between the perceived personality dimensions of the three stimuli differ (see Figure 2). The *t*-tests show that the typical bike differs from both personalised bikes on the dimension conscientiousness (typical bike M = 3.64, SD = 0.68, N = 29) (personalised bike pattern M = 3.05, SD = 1.07, N = 30); t(47), p = 0.061; (typical bike M = 3.64, SD = 0.68, N = 29) (personalised bike grapefruit M = 3.03, SD = 1.01); t(44), p = 0.056. The same holds for the dimension extraversion (typical bike M = 1.8, SD = 0.80, N = 29) (personalised bike pattern M = 3.42, SD = 1.43, N = 30); t(47) p < 0.000; (typical bike M = 1.8, SD = 0.80, N = 29) (personalised bike grapefruit M = 3.38, SD = 1.03, N = 27); t(44), p < 0.000.
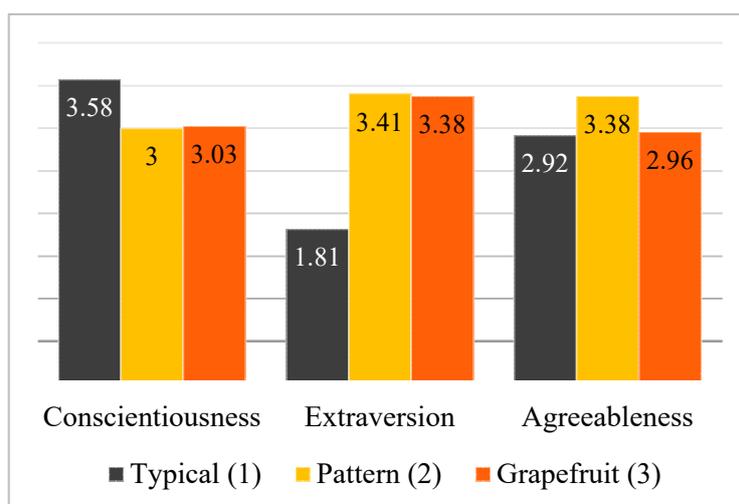
Figure 2. Differences in perceived personality between the three stimuli on the personality factors relevant for product design.

The results of the *t*-tests indicate that the typical bike (Typical (a) in Figure 2), compared with the two bikes with the personalised attributes (Pattern (b) and Grapefruit (c) in Figure 2), is considered to reflect more extraversion and more conscientiousness. Therefore, the personalised bikes differ in perceived personality on two of the three dimensions that are known to be relevant for product personalities. This indicates that our manipulation was successful, we succeeded in designing three bicycles that differ in product personality. Therefore, we could use these stimuli to test our hypotheses.

4.2. Test of the Hypotheses

We hypothesised that overall consumers prefer typical bikes. Additionally, we also hypothesised that the more a bike fits a person's personality, the more it will be preferred by that person. Before testing the two hypotheses, we created two factors, preference for the bike and product/person fit. Preference for the bike is based on the four items mentioned before. The items were added to form one scale, alpha = 0.85. We did the same for personality fit. The four items assessing this personality fit were added to form one scale, alpha = 0.77. Both scales show a good alpha, and thus it is acceptable to use the scales in the next step of the analysis.

To test both hypotheses, a standard regression analysis with product preference as the dependent variable was performed. The person/product fit is included in the regression as an independent variable. To be able to assess the effect of the three bikes, two dummy variables were formed (dummy 1 = typical bike versus the other two bikes; dummy 2 = personalised bike pattern versus the other two bikes). These two dummies were also included in the analysis as the independent variables. Using this specific regression, we can calculate if the product preference of the participants is influenced significantly by the degree of typicality of the bikes. Next, it allows us to see if the degree of fit of the personality of the bikes with the personality of the participants influences product preference, irrespective of the degree of typicality of the bike. The regression is highly significant, $R^2 = 0.489$, $F (3, 82) = 26.12$, $p < 0.000$. This means that the product preference of the bikes is strongly influenced by the differences between the three bikes, as was expected. The analyses further show in more detail that the first dummy 'typicality versus the personalised bikes' has a significant effect: beta = 0.41, $t(82) = 4.5$, $p < 0.000$. The second dummy has no significant effect. This means that the preference for a bike is stronger when the bike is more typical. All in all, this is still in line with hypothesis 1, which proposed that consumers prefer typical products over less typical products. The variable person/product fit shows a strong significant effect: beta = 0.595, $t(82) = 0.595$, $p < 0.000$. This means that participants prefer a bike that better fits their personality. This confirms our hypothesis 2.

5. Discussion and Future Research

The purpose of this study was to determine how customisation of a typical product by personalising a small product attribute influences consumer acceptance of AB-PSS, in which products are accessed for an extended period. We explored this using a typical bike and the same bike customised with a small, personalised attribute (coat guard). In this research, we determined participants' personalities, their perception of one of the products, and how this relates to the person–product personality match and product preference. We found that most participants liked the typical bike and would accept it within an AB-PSS. Further, our research shows that personalising a small attribute of a typical product changes the perceived personality of the product. Such temporary customisation increases consumer preference for the AB-PSS if the person/product fit increases.

Wide adoption is crucial for AB-PSS to achieve their sustainability potential. On the one hand, previous research indicates that a high use intensity can lead to sustainability improvements [6] and that products incorporated in PSS need to maintain at least a neutral experience [19]—both arguments imply typical products. On the other hand, adding intangible value to PSS has been suggested (e.g., [3,9,32]), pointing towards customisation. We brought typicality and personalisation together in the concept we refer to as temporary customisation. Temporary customisation uses typical products and a small feature is either adjusted or added, thereby making it better meet individual consumer's preferences.

Depending on the use duration of one product, the consumer–product relationship and consumers' expectations of products in AB-PSS differ [10]. The longer the period of access of one consumer to one particular product, the more important the satisfaction of consumers' intangible needs becomes, and hence personalisation. Very short access periods (e.g., one day), on the other hand, allow for a high degree of typicality as consumers in this case mostly care about the functionality of the product.

The advantage of AB-PSS over other types of PSS is that they can be implemented now with current products and can potentially achieve sustainability improvements. To be clear, the transition to a circular economy requires radical innovation and change that goes beyond AB-PSS. At the same time the transition also requires rapid action and implementation of measures that can reduce environmental impacts now and not in a decade or two. Improving consumer acceptance of AB-PSS by adding intangible value through temporary customisation can improve the sustainability of consumption through the intensified use of products and a reduction of idle ones. Temporary customisation could further improve sustainability by giving consumers a sense of psychological ownership, causing them to take better care of the products [43,44]. An AB-PSS itself needs to be designed carefully to ensure that it is more sustainable than the sold product it is substituting. This means that the ratio of products to consumers needs to be improved in AB-PSS compared with ownership (e.g., one bike per five consumers). Additionally, the attributes to customise products in AB-PSS need to be selected sensibly to ensure that they have a minimal sustainability impact. The coat guards discussed before in the bike case have a low sustainability impact and are easy to attach and detach when a bike is rented out or returned.

Some AB-PSS are already intuitively following this principle; the bikes of Mobike [45] are used for a very short period by each consumer, and only one model is available, whereas the bikes of Swapfiets [41] that are rented out for several months are available in different colours and optionally with multiple gears. However, Swapfiets users currently cannot choose their preferred colour and a bike with multiple gears is available for a higher fee. These two types of product differentiation cannot be easily customised and giving consumers free choice among the options would require increased stock levels. Applied to PSS in practice, temporary customisation could lead to wider diffusion of PSS in the consumer market, while also satisfying individual consumers needs for intangible value and enabling low levels of stock as products are interchangeable.

This study represents a first exploration of customisation through personalisation in the PSS context. We found that the majority of participants liked the typical bike because the typical design inherently closely matches the personality of many consumers. As a result of the between-group

design we applied, the preference for the typical bike was the highest overall. We recommend applying a forced-choice design with more options for add-ons in future research for people to select the bike they prefer and that probably matches their personality. Thereby, the influence of a larger number of add-ons with different personalities can be tested. Further, we purposely selected a sample that is familiar with the type of offer we investigated, it is possible that other consumers need additional explanation, and perceive the offer differently as they are likely to own bikes already. In this research, we investigated one way to customise AB-PSS, it would be interesting to study the effect of other types of customisation on consumer acceptance and sustainability. A bicycle is modular by design, whereas clothing items are rarely modular. Further, for everyday clothing, a good fit for one consumer is detrimental to achieve a long lifetime and high use intensity. Thus, different customisation strategies, circular strategies, and business models might be appropriate for different types of products [4], and should be investigated and compared. The takeaway for other AB-PSS from this research is that intangible value can be added to these offerings and that the product use time determines to what extent consumers desire intangible benefits.

6. Conclusions

Personalising a product in an AB-PSS might sound like a paradox because current AB-PSS offerings, for example, Greenwheels [8] car sharing and Mobike [45] bike sharing both offer extremely limited ranges of products. However, customisation of products in AB-PSS could help to tap into customer segments when the lack of intangible or emotional benefits represents a barrier to adoption [9,20]. Allowing consumers to choose between a few different, low-impact customised options for products could make AB-PSS attractive for these segments and across subsequent use phases by different consumers [43]. This research is a step towards exploring PSS that support the need for self-expression through products, as suggested by Catulli et al. [32]. Customising products using temporary customisation strategies could potentially even lead to a feeling of psychological ownership that in turn leads to consumers treating products with more care [19], and probably to more intensified use.

The adoption of AB-PSS in the consumer market has been slow [3], even though their sustainability and circularity potential has been mentioned repeatedly in literature. If many consumers adopt an AB-PSS, it has achieved diffusion in the market. In order to generate widespread market adoption, typical products are needed—products that fit many consumers. However, consumers increasingly demand products that also fulfil soft requirements—they prefer products that perfectly match their preferences. This paper suggests small changes in product appearance as a way to customise products to these preferences and thereby increase consumer acceptance of AB-PSS. Temporary customisation is one strategy that can be used by product and PSS designers to create AB-PSS that are both sustainable and attractive for consumers beyond their functionality. It is also imaginable that service elements and payment schemes could be personalised to improve consumer acceptance of PSS. More research is needed to develop AB-PSS that are better able to compete with products that consumers like to own and that support the transition to a circular economy.

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