DESIGN DIRECTIONS FOR PRODUCT ATTACHMENT AND SUSTAINABILITY THROUGH ENABLING USER INVOLVEMENT

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ABSTRACT

DESIGN DIRECTIONS FOR PRODUCT ATTACHMENT AND SUSTAINABILITY THROUGH ENABLING USER INVOLVEMENT

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This thesis study aims to explore the ways for considering product attachment in the early phases of design within the context of a field study. The influence of user involvement on product attachment was taken into consideration as the focus of the study. The study includes an extensive literature review along with preliminary research aimed at exploring the field. To explore the relationship between user involvement and product attachment, a diverse group of participants, who were able to strengthen their product-user relationship through user involvement, was interviewed. The narratives from the participants were studied under several concepts including types of, motivations, drivers and barriers for, and results of user involvement. In conclusion, a range of design directions with design guides was offered for product attachment through enabling user involvement. The study aims to offer holistic and inspirational insights for the early phases of design to reduce the environmental impact of their products by enabling product attachment through user involvement.

Keywords: Product Attachment, Product Life, User Involvement, Early Product Replacement

ÖZ

KULLANICI KATILIMI YOLUYLA ÜRÜN BAĞLILIĞI VE SÜRDÜRÜLEBİLİRLİĞİN GÜÇLENDİRİLMESİNE YÖNELİK TASARIM YÖNERGELERİ

Bilgin, Pelin
Yüksek Lisans, Endüstri Ürünleri Tasarımı
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Bu tez çalışması, bir saha çalışması bağlamında tasarımın erken aşamalarında ürün bağlılığını dikkate almanın yollarını araştırmaktadır. Kullanıcı ürün müdahalelerinin ürün bağlılığına olan etkisi, çalışmanın ana odak noktasıdır. Çalışma geniş bir literatür taraması ve alanı keşfetmeye yönelik bir ön araştırma ile başlamaktadır. Ürün müdahaleleri ve ürün bağlılığı arasındaki ilişkiyi araştırmak için, kullanıcı müdahaleleriyle ürün-kullanıcı ilişkisini güçlendirmeyi başaran kapsamlı bir katılımcı grubuyla görüşülmüştür. Katılımcılardan gelen anlatılar, kullanıcı müdahalelerinin türleri, motivasyonları, itici güçleri, engelleri ve sonuçları kavramları altında incelenmiştir. Sonuç olarak, kullanıcı ürün müdahaleleri yoluyla ürün bağlılığı oluşturmayı hedefleyen bir dizi tasarım yönergeleri sunulmuştur. Çalışma, kullanıcı katılımı yoluyla ürün bağlanmasını sağlayarak ürünlerinin çevresel etkisini azaltan bütünsel ve ilham verici tasarım yönergeleri sunmayı amaçlamıştır.

Anahtar Kelimeler: Ürün Bağlılığı, Ürün Ömrü, Kullanıcı Müdahalesi, Erken Ürün Değişimi

To mom & dad

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You are all deeply loved.

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CHAPTER 1

INTRODUCTION

Today, the environment is undergoing human-made destruction and its alerting signs are on our most immediate surroundings. Initially, the production systems, in which scarce resources were consumed at an irreversible pace were found responsible. Later, the linear production systems shifted towards a circular economy (Bocken et al., 2016), which suggests benefiting from the goods that have completed their expected life cycle, as new resources for the production system (Ayres, 1994). Researchers have recently readdressed the sustainability issues from the user's perspective (Haines-Gadd et al., 2018). Discussions are now focused on the power of design in the resolution of sustainability problems.

Currently, the environmental problems are acknowledged as "a behavioral crisis" (Chapman, 2015, p. 26). To achieve sustainable consumption, a change in consumer behavior is mandatory (Cooper, 2000). In that sense, the focus of sustainable design has shifted from production-related issues to user behavior.

Sustainable consumption requires people to make better choices on products, services, and the lifestyles they pursue regarding the impacts of these choices on the environment. Cooper (2016) argues that reducing the pace of consumption is fundamental for sustainability and highlights the importance of product life.

From a broader perspective, it is imperative to understand that consumption is a cycle of events that are not restricted to the moment of purchase. The succeeding activities such as; product use, maintenance, repair, and disposal, play critical roles in the environmental agenda and require the full attention of product designers.

Today's high product turnover rates, deriving from overproduction, pose a massive burden on the environment. As a "throwaway society," we are indulging ourselves in careless consumption for the sake of consumption itself (Cooper, 2005, p. 52). This irrational habit has built huge waste yards around the globe, overfilled with "toasters that still toast and microwaves that still microwave" (Chapman, 2010, p. 61). As we have reached a point where improving the production systems isn't sufficient, the overall amount and pace of consumption should also be reduced.

1.1 Problem Definition

Product attachment is defined as the degree of emotional bond between a person and a product (Mugge et al., 2004). It is critical in determining the overall consumption rate because products that elicit a strong product-user relationship tend to be kept longer. Users postpone their replacement behavior, which extends the life of the product in return.

On the other hand, user involvement is the user-initiated interventions throughout various activities within consumption (Prahalad & Ramaswamy, 2004). The user's active involvement contributes to sustainable consumption by extending product life through product attachment. The increased personal relevance of a product deriving from user involvement prevents the replacement behavior. Thus, the amount of consumption is reduced. Deriving from the apparent influence of user involvement on the consumption rate, the study questions whether user involvement is a requisite for product attachment. By reapproaching product attachment from a user involvement perspective, products' overall lifecycle can be improved and the users can be empowered.

So, where do product designers stand against the new approach to sustainable consumption? Designers need to understand that products evoke certain emotions.

These emotions can determine the overall product experience and the beholder's willingness to continue using it. The consideration of a product's psychological impact during the early design phase can result in extended product life.

Hence, product attachment brings a new perspective to product design as well as employing new responsibilities to the designers. Considering the urgency to adopt this approach, providing well-defined design directions for product attachment and sustainability through enabling user involvement benefits both designers and users.

1.2 Aim and Goal of the Study

The preliminary research findings, which will be explained later, present the importance of user involvement in building up product attachment. By reviewing the preliminary research data and existing literature, the study is based on the hypothesis that, as users invest more time and effort into their products, a more long-lasting relationship develops between the user and the product. Thus, this study aims to provide a guideline for designers who are motivated in pursuing sustainable design approaches to achieve product attachment through user involvement.

From this point of view, the research has the following goals:

- To have a deep understanding of user narratives to learn the motivations behind developing product attachment towards cherished objects
- To examine the effect of user involvement on product attachment along with motivations for extending product life
- To reconceptualize these findings into design strategies for designers

1.3 Research Questions

The research questions of this thesis study are:

What are the effects of user involvement on product attachment?

- What are the motivations and drivers for user involvement?
- What are the barriers to user involvement?

What are the potential design directions for product attachment with a specific focus on user involvement?

1.4 Structure of the Thesis

This thesis constitutes of five chapters. The first chapter is the introductory chapter which starts with the significance of product attachment within the context of sustainability. Later, problem definition, aim, goal, and research questions are explained. The Figure 1.1 presents the structure of the thesis.

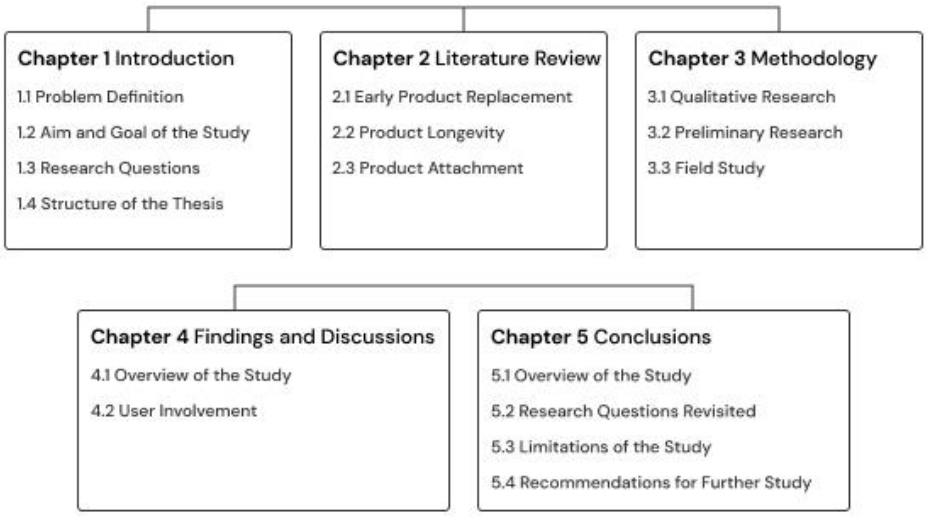

Figure 1.1. Structure of the Thesis

In Chapter 2, the literature review about related subjects is presented. The literature review investigates the concepts of early product replacement, product longevity, and product attachment.

Chapter 3 continues to explain the methodology of the research. This chapter touches upon qualitative research, preliminary research, and field study.

Chapter 4 details the findings of the field study. The findings are analyzed from the perspective of user involvement. After giving an overview of the participant narratives, this chapter lays out types, motivations, drivers, barriers, and results of involvement.

Finally, in Chapter 5, a brief overview of the study is given. Later, the research questions are revisited to make inferences from the findings in the scope of the research focus. In response to the second research question, the findings are reconceptualized as design directions for product attachment and sustainability through enabling user involvement.

CHAPTER 2

LITERATURE REVIEW

Once foreseen by scientists, we are facing the consequences of climate change in our daily lives. Higher sea levels, more destructive weather events, rapidly approaching drought and an overall increase in the temperature are a few of the consequences of our careless lifestyles (Stocker, 2013). NASA (2022) announced that the atmosphere's carbon dioxide level is at its highest in 650,000 years, with 417 ppm, the global temperature has increased by 1.18° F since 1880 and the polar ice is losing a mass of 428 billion metric tons per year. These statistics are continuing to deteriorate the globe in more apparent ways every day.

Circular economy suggests benefiting from goods that have completed their life cycle as resources and thus closing material loops (Ayres, 1994). From a different perspective, designers have reapproached sustainability-related problems from the user's standpoint (Haines-Gadd et al., 2018). As a result, discussions on the power of the user-centric approach on sustainability issues have emerged.

The inclusion of design into the discussions has brought a new perspective. Manzini and Jegou (2003) argue that design is not only capable of bringing about artifacts but also influencing lifestyles and perspectives towards global problems. Rather than contributing solely to the design of a product, designers have approached consumption as "influencing social norms, consumption and lifestyle aspirations" (Richardson et al., 2005, p. 9). Thus, more emphasis is put on consumption as "a crisis of behavior" (Chapman, 2015, p. 26). Whereas Mugge (2007, p. 22) argues the necessity to focus on the "psychological lifetime" of

products, the time interval in which the user still associates the product with a certain value, as opposed to improving the durability of the artifacts.

The several approaches suggested by design researchers aim to achieve sustainable consumption. Sustainable consumption is related to people's mindset while making choices. United Nations Environment Programme (2015, p. 10) defines sustainable consumption as the following:

> *"Sustainable consumption and production (SCP) is a holistic approach in minimizing the negative environmental impacts of consumption and production systems while still promoting the overall quality of life for all."*

To truly achieve sustainable consumption, users need to pay more attention to the products and services they prefer, as well as the lifestyle they lead. Preferring sustainably acquired consumer goods, using energy-efficient products, composting kitchen waste, recycling, and utilizing environmentally friendly modes of transportation are some examples of the pro-environmental behaviors of sustainable consumption (Jackson, 2005). Regardless of the several strategies, Cooper (2005) asserts the importance of slowing down consumption practices.

Bhamra and Lilley (2011, p. 429) highlight that consumption is related to "developing routines and rituals of use". Therefore, consumption does not occur only at the moment of purchase. The following processes during the use of a product provide a richer and more meaningful experience to act upon. According to (Koskijok, 1997), the use, maintenance, repair, and disposal of a product is also inherent to the consumption. These stages have severe implications on the environment and require the attention of product designers.

On the contrary, the industry is continuing to pursue overproduction strategies. Although quite profitable for the manufacturers, the high product turnover rate is

challenging the limited resources. As a "throwaway society," we are indulging ourselves in careless consumption for the sake of consumption itself, without thinking about the consequences and the afterlife of the purchased products (Cooper, 2010, p. 43). Consumers have adopted a habit of replacing consumer goods quicker than necessary (Chapman, 2010). Overall, reducing the amount of consumption is crucial.

2.1 Early Product Replacement

The duration from acquisition to disposal of a product constitutes product life (Oguchi et al., 2010). This duration doesn't only refer to a period when the product is actively in use but also embodies repair or storage (Bakker et al., 2014). Early product replacement is defined as the replacement of a still-functioning product because the user is attracted to a new product (Bayus, 1991). Today, many products are being replaced before completing their functional and material life (van den Berge et al., 2021) because users seek a better experience (Roster, 2001). This situation suggests that product life is no longer determined by the manufacturer, but by the users (Stahel, 1986). This shift highlights the importance of change in consumer behavior in the context of sustainable consumption (Mugge et al., 2005). Although the manufacturer predetermines an expiration date for each consumer good, the end of product life depends highly on the attachment. Chapman (2015, p. 13) even suggests manufacturing products with shorter life spans because designing for durability yields to the occurrence of "highly durable waste".

2.1.1 Underlying Reasons for Early Product Replacement

One of the underlying reasons for product replacement is aesthetic obsolescence, which is discarding products because their appearances are no longer fashionable

(Burns, 2010). The consumer may detach from a product because it does not appeal to his/her aesthetic taste anymore (Bayus, 1991). Also, product wear can be a motive to replace the product with a better-looking alternative (Mugge et al., 2005).

Moreover, due to improved features, consumers start growing interest in the latest products, whereas the current product depreciates in value (Bayus, 1991). Degradation of product performance, although delivering the primary function, can persuade users for a product replacement (Mugge et al., 2005). Similarly, users may lose confidence in the functioning products and seek a more trustworthy experience (Bayus, 1991).

When consumers experience a change in their social status, certain products fail to keep up with the emerging new needs. Changes in family status, marriage, the number of people in the family, moving to a new house, or changing the financial income are also influential factors for early product replacement (van Nes & Cramer, 2005).

Lastly, when a consumer has a product that needs repair and finds that repair cost is comparatively higher than its replacement, most consumers choose to dispose of the older product and acquire a new one with new advantages (van Nes & Cramer, 2005).

As an overview, the replacement decision depends on the overall experience between the consumer and the currently owned product. Chapman (2006, p. 62) highly associates the product's durability with psychological product life, involving personal emotions and values. Thus, he identifies early product replacement as “a failed relationship”.A poor relationship may lead to a desire for a new and better practice followed by discarding the prior relationship.

2.1.2 Implications of Early Product Replacement on Sustainability

Currently, there is a very high product turnover rate which means the consumers replace their products long before they complete their lifecycle. The replacement behavior results in massive landfills around the globe. One of the main issues with disposed consumer goods is that a large number of those products are still functioning (van Nes & Cramer, 2005). Early product replacement generates a large amount of potentially useful waste and consumes extra energy resources (H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). So, in terms of sustainability, a high rate of product replacement is undesirable. Cooper (2005) suggests that designing for product longevity would reduce the negative environmental impact of our consumption behaviors.

2.2 Product Longevity

An approach to sustainable consumption is “lifetime optimization”, which consists of either extending or shortening the life of a product depending on the effects of its activities on the environment (van Nes & Cramer, 2005, p. 287). The optimum lifetime of a product is defined as the time when its replacement would positively impact the environment compared to extending it (van Nes et al., 1999). An example of this may be, replacing an inefficient car due to its high energy consumption with a more efficient and environmentally friendly model. In such a case, the replacement of the product has a more positive outcome as opposed to its inconsiderate efficiency. This example shows that extending product life may not always have a positive influence on the environment. Therefore, strategies for product longevity should be carefully incorporated into the design process while taking into consideration the product type and product function. However, when such examples are kept aside, product longevity reduces the overall negative

impacts of consumer goods (Cooper, 2000). Sustainability is a multi-faceted concept with various areas to act upon. The manufacturing bodies should aim for minimizing the environmental impact of their products by considering several approaches. For appropriate product categories and use-scenarios, product longevity can suggest a potential for manufacturers to reduce their impact on the environment.

Designing for product longevity reveals new considerations to slow down product cycles, like reimagining the relationship between the producer and the consumer as long-lasting (Haines-Gadd et al., 2018). An example of this relationship would-be long-term repair services warranted by the clothing brand “Patagonia” (Lofthouse & Prendeville, 2017), which offers free-of-charge repairs.

Towards a change in perspective of product longevity, it should be recognized that product life is actually determined by the user (van Nes & Cramer, 2005). Hence, it is worthwhile to understand the motivations behind product replacement. The impact of psychological lifetime currently plays a major role in replacement decisions than the intended end-of-life built-in by the manufacturers. The empowerment of the user in the determination of product life encourages a more “resilient relationship with products” and results in diminishing overall consumption (Haines-Gadd et al., 2018, p. 2).

2.2.1 Product Life and Industrial Practice

Manufacturers feel threatened by extended product life because the current system can’t accomplish the highest revenue with a reduction in sales (van Nes & Cramer, 2005). Thus, the accelerated product lifecycle is practiced by almost all manufacturers. The production system either offers new product features developed in parallel with more recent technologies or seduces the consumers with improved

aesthetics (Mugge et al., 2005). Such marketing motivations aim to boost consumers' desire for immediate product replacement. However, at the same time, a product's profitability should be maintained due to the economic demand for more recent and better products competing in global markets. This fundamental paradox suggests that manufacturers' financial concerns should also be addressed in determining the product's commercial life (Bakker et al., 2014). Appropriating compatible strategic business models based on product longevity would protect the company's long-term business interests as well as minimizing the product's environmental impact. Although the current more conventional business and production models can be improved with this perspective, new approaches can also be adopted. More innovative models about business and production which emphasize sustainability would benefit manufacturers as well.

Besides, there isn't a single product longevity strategy suitable for every product segment. Product characteristics and business constraints should be closely investigated while choosing a mutually satisfactory product-life strategy (Bakker et al., 2014). By introducing design research into business decisions, innovative solutions such as rental models can emerge (Catulli, 2012).

2.2.2 Product Life Extension Strategies

Designing enduring and meaningful products has been acknowledged as an efficient and economical way to reduce the environmental impacts of the overall consumption practices (McDonough & Braungart, 2003). Seven eco-design strategies address product longevity from different perspectives by bearing in mind the user motives for early product replacement (Mugge et al., 2005). These strategies can be summarized as:

- Increasing product's reliability by reducing technical failure

- Providing easy maintenance and repair
- Offering a life-long guarantee
- Utilizing modular or adaptable design solutions
- Offering variations of a product
- Detaching from fashion trends
- Strengthening the consumer-product relationship

These strategies are from the manufacturer's perspective to positively influence consumer's replacement behavior. Following these strategies and applying them to overall processes, starting from design to manufacturing, would result in delivering consumer goods with a minimized impact on the environment.

2.2.2.1 Increasing Product's Reliability by Reducing Technical Failure

Durability is related to the material quality of a product. The degree of durability results from the careful decisions about the design and manufacturing of the product (Cooper, 2000). Highly durable products are more successful in establishing reliability with its user. If a product demonstrates frequent technical failure, trust in the product weakens, and the user is prone to replace the product. Thus, designers can make deliberate contributions to a product's durability and achieve a strong product-user relationship based on material trust. For example, within the preliminary research of this study, several users have stated that they wouldn't consider replacing their laptops because the currently owned product hasn't shown any technical failures in restoring personal data (see Chapter 3, Section 3.2). As the example shows, designers can design for reliability and postpone product replacement (van Nes & Cramer, 2005).

2.2.2.2 Providing Easy Maintenance and Repair

For durability, the designers can aim for careful maintenance, meaning they would clean, maintain, and repair the goods when necessary (Mugge et al., 2005). More user-friendly repair and maintenance strategies contribute to sustainable consumption by extending product life and reducing material consumption (Ellen McArthur Foundation, 2013). However, ease of maintenance and repair can only contribute to the product's longevity if the consumer behavior tends to comply with it (Middleton, 2012). So, the designers need to be aware of the user perspective of technical limitations and individual motivations behind the product repair process and incorporate this key criterion into the design process (Terzioglu & Lockton, 2016).

2.2.2.3 Offering a Life-Long Guarantee

Manufacturers offering guarantees and covering the cost of repair advocate product longevity (Twigg-Flesner et al., 2020), because the limited availability of repair services restricts the consumers' tendency to maintain their products themselves (Mugge et al., 2005). Granting a lifetime warranty helps build a trustworthy brand image and increases reliability. The American backpack brand, JanSport, aims at promoting products that last over extended periods of use by offering a lifetime guarantee (Jansport, 2022). In case a JanSport backpack needs maintenance, the company repairs the product without requesting any charges.

Consumers tend to participate in maintenance activities more when the cost is covered by the manufacturer (Mugge et al., 2005). Also, manufacturers undertaking the responsibility of repair resolve the consumer repair limitations of finding an appropriate person for repair and seeking compatible spare parts (Twigg-Flesner et al., 2020). Another example is Hiut Denim, who promotes

sustainability by offering lifetime guarantees and repair services. With these strategies, the company reduces the environmental impact of its products and utilizes sustainability as a marketing strategy (Lofthouse & Prendeville, 2017).

2.2.2.4 Utilizing Modular or Adaptable Design Solutions

Modular design refers to dividing a product into smaller and self-reliant units (Newcomb et al., 1998). Modularity contributes to product longevity by simplifying the lifecycle process. Having independent units implies that each unit has its own lifecycle and that a certain interference to a unit doesn't affect the lifecycle of the whole product (Recchioni et al., 2007). Hence, modular products promote user interventions such as upgrading, modification, assembly, and disassembly, as well as enhancing product variety (Sonego et al., 2018).

Offering modular design solutions also enables product upgrades through integrating new technologies or changing the aesthetic appearance (Mugge et al., 2005). As shown in Figure 2.1, an example would be a kitchen mixer having multiple components for different purposes. The modular design strategy in the kitchen mixer enables each component to specialize in a certain task, thus improving the functionality and simplifying the processes of both product repair and maintenance.

Figure 2.1. KitchenAid Quart Tilt-Head Stand Mixer, an example of modular product design (KitchenAid, 2022)

2.2.2.5 Offering Variations of a Product

Product variations aim at nourishing the user's interest through versatility. Altering the product for different needs and aesthetic pleasures increases user involvement and results in vivid interest. With this motivation, allowing for different variations of a product without requiring additional parts brings the product longevity (Mugge et al., 2005). Figure 2.2. demonstrates a widely known example of enabling product variations. Consumers can create a new product by using the same parts each time they play with LEGO toys. This allows the consumers to retain their enthusiasm towards the product, build up loyalty, and delay disposal (Gauntlett, 2014).

Figure 2.2. Lego toys enable numerous product variations (Lego, 2022)

2.2.2.6 Detaching from Fashion Trends

Considering that all products are susceptible to fashion trends, aesthetic obsolescence is one of the major contributors to early product replacement (van Nes & Cramer, 2005). Styles that go out of fashion quickly tend to decrease product life and trigger replacement desire (Mugge et al., 2005). On the other hand, classical design features endure changes in time and achieve product longevity (Lobos, 2014). Consumers widely appreciate classical designs for their aesthetic appearance and therefore desire to own them for a long duration. Lobos (2014) suggests that designing for a universal aesthetic taste helps build classical products. For example, KitchenAid's kitchen utensils have been promoting the same Model K since the 1930s, which has become an iconic figure. The company has been using classic design as a marketing strategy ever since the design has been trademarked (Lidwell & Manacsa, 2009).

2.2.2.7 Strengthening the Consumer Product Relationship

Product attachment suggests that users tend to delay product replacement if they feel personally attached to a particular product (van Nes & Cramer, 2005). Chapman (2006) proposes that a certain relationship is formed between the product and the consumer during the use of a product. Product attachment suggests a user-centric perspective to product longevity by revealing the emotional exchanges between the product and the user (Haines-Gadd, 2019). Hence, researchers have suggested strengthening the attachment, assuming that users would embrace the cherished products for a longer duration (H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). As the product attachment strengthens, users deploy a certain value to the products from which they do not want to detach. As a result, they tend to protect and maintain their products for a longer duration (Mugge et al., 2005).

2.3 Product Attachment

Product lifetime is not primarily determined by technical constraints (Stahel, 1986), because many products are replaced while they are still functioning properly: Only 22% of the products are completely malfunctioning at the time of replacement (van Nes & Cramer, 2005). Therefore, sustainable consumption asks for changes in consumer behavior (Cooper, 2000). Consequently, designers interested in stimulating sustainable consumption need to understand “how product design can affect the strength of the emotional bond with a product” (Mugge, 2007, p. 22).

From this viewpoint, designers need to think beyond the materialistic properties of a product and focus on the ways of establishing a “deeper engagement” pattern (Chapman, 2015, p. xiii). Chapman (2015) defines emotionally durable design as the search for a deeper and more sustainable relationship between a product and the user, with the ambition to overcome the user's aspiration for a new product. If the

product is successful in building emotional durability, users postpone the replacement behavior and thus extend product life.

Alternatively, product attachment can also be defined as the degree of emotional bond between a person and a product (Mugge et al., 2004). In other words, the strength of the relationship, which influences the consumption pattern, is called product attachment (Haines-Gadd et al., 2018). When the products are able to demonstrate an emotional bond, the users become personally attached. This means that the user distinguishes that certain product from others because it exhibits a special value (H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). This value prevents product replacement because detaching from the current product would result in an emotional loss.

Aside from design studies, product attachment was also discussed by marketing studies focusing on consumer behavior. Ball & Tasaki (1992) highlighted the importance of post-purchase routines, developed by the user during ownership, in examining consumer behavior. Their study defines product attachment as the extent to which products are used to maintain or support a user's identity. Another marketing study defines product attachment as an attribute of the relationship product-user relationship and uses the term "material possession attachment" to refer to the concept (Kleine et al., 1995, p. 327).

For products associated with a special meaning, users relate the replacement behavior with the loss of personal value. Maclachlan (2011) defines product attachment as increased motivation for product maintenance. The study suggests that unless products convey an attachment, they are quickly replaced with new ones because the user lacks the motivation to take care of them. These protective behaviors show that a strong product attachment leads to products that last longer (Chapman, 2015). Table 2.1 presents an overview of researchers' definition of product attachment.

Table 2.1 Definitions of product attachment

Researcher	Definition
(Ball & Tasaki, 1992)	"The formal definition of attachment proposed here is the extent to which an object which is owned, expected to be owned, or previously owned by an individual, is used by that individual to maintain his or her self-concept." (p. 158)
(Kleine et al., 1995)	"Material possession attachment is a property of the relationship between a specific individual and a specific material possession. Possessions of strong attachment are more closely held to the proximal self, are more effectively charged or cathected, and are more positively valanced than objects of lesser attachment." (p. 327)
(Mugge et al., 2005)	"If a person feels attached to a product, detaching from and ultimately abandoning the old product seems undesirable because this implies that the product's special meaning is lost. As a result, a stronger person-product relationship is reflected in more protective behaviors and can ultimately postpone product replacement." (p. 40)
(H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008)	"We define the degree of consumer-product attachment as the strength of the emotional bond a consumer experiences with a durable product. Consumer-product attachment implies the existence of an emotional tie between a person and an object." (p. 1)
(Haines-Gadd, 2019)	"Emotionally durable design (EDD) is a user-focused approach to product longevity with which to explore this way of thinking. It examines and articulates the unspoken emotional experiences that occur between products and consumers, seeking to uncover the complex emotional drivers for why we use, consume and discard some products faster than others." (Haines-Gadd, 2019)

As demonstrated in Table 2.1, product attachment can be described either from the designer's or the user's perspective. However, researchers agree that product

attachment is related to the degree of the personal relationship between a product and its user. As the relationship between products and users strengthens, product disposal is postponed, and the consumption rate is ultimately reduced (H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). Chapman (2015) suggests that through product attachment, consumption of resources and the amount of generated waste can be reduced by close to 50 percent.

2.3.1 Determinants of Product Attachment

Although emotional durability can occur incidentally, design interventions can also influence its development. In an attempt to actualize product attachment, designers should understand the determinants of product–user relationships. This chapter investigates how product attachment is facilitated from the perspective of several researchers (Ball & Tasaki, 1992; Mugge, 2007; Savaş, 2002; H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008).

In their attempt to examine the role of product attachment in consumer behavior, Ball and Tasaki (1992) carried out research aiming the measure the level of attachment towards several consumer goods. Their research concluded the various elements that lead to product attachment as emotional significance, kind of object, the stage of ownership, social desirability, and trait materialism (p. 159).

The study carried out by Savaş (2002) explored how product attachment and detachment emerged with field studies on a sample group. Meanwhile, the study also took the age, gender, and socio-economic status of the users into consideration. The six product attachment motivation categories asserted by the study are the past, experience around a product, utilitarian features, personal being, social being, and form-related features of the product.

Mugge (2007) started by categorizing the user motivations for attributing meaning to products. These motivations are expressing a user's identity, association with a person or an event, appreciated product features, utilitarian functionalities, pleasure in use, monetary value, ability to convey cultural or religious meaning, and product personification. She later continues to propose determinants that result in product attachment. These determinants are self-expression, group affiliation, memories, and pleasure.

Schifferstein & Zwartkruis-Pelgrim's (2008) research was derived after observing that users were holding on to certain products for extended product life, whereas easily disposing of others. They start by suggesting that a product should be irreplaceable for the user, in order to build a strong attachment. The suggestion offers that although two products are the same, one of them is superior in value due to significance attributed by the user, resulting in irreplaceability. The researchers summarize the determinants of product attachment as enjoyment, individual autonomy, and group affiliation.

2.3.1.1 Shared History

The influence of shared history between a product and its user has been mentioned by Mugge (2007) and Savaş (2002) as an important determinant for product attachment. Belk (1990) suggested that users tend to utilize objects as a construct of history. In other words, people deploy cherished memories to objects to compose a visually apparent history. When associated with events, people, or places; products become indispensable. Through products, users carry on past experiences which collectively define a person's identity. As it is undesirable for people to disconnect from memories, so is disposing of products that carry past experiences.

Savaş (2002) comments that the relationship attained through the shared history with a product is irrelevant from product features, meaning product type or product characteristics doesn't affect the memory value. The researcher revealed products with a historic value, although no longer functioning, were kept and cherished. The study observed three types of this attachment including family heirloom, products associated with certain memories, and products that were kept for such a long time that they resulted in habitual ownership (Savaş, 2002). Furthermore, Mugge (2007) notes that souvenirs are appreciated because they remind people about past events and people.

2.3.1.2 Self-Expressive Abilities

User motivation to reflect unique self-identity and to be differentiated from others can be conveyed through products. Products we use, own, and dispose of are means of communicating our identities to the outer world. If a product is successful in defining and conveying user identity, users start approaching that product as a self-extent, which empowers the product attachment. Such kind of product attachment has been emphasized by Mugge (2007), Savaş (2002), and Schifferstein & Zwartkruis-Pelgrim (2008) as a noteworthy concept.

The literature raises the importance of a product's ability to support personal identity, which is the reflection of personal values, goals, and lifestyle through products (Savaş, 2002; H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). The values of a product should be coherent with the user's ideology to attain a long-term relationship. Users deploy a special meaning to such products. Hence, a product's ability to reflect identity, aspirations, and capabilities are critical in building a strong relationship.

Several determinants that elicit self-expression are suggested in the literature. First, products that are aimed to be perceived as individuals through personification tend to be deployed with deeper meaning because they are more easily relatable. Products with increased user involvement, such as self-made products, can also carry personal traces due to the investment of time and effort. Furthermore, if products embody a personal passion, they become successful in supporting personal being. For example, a user has had a passion for cars since he was a child. This passion triggered the attachment he feels to his currently owned car. This example illustrates developing attachment to a certain product, deriving from passion to a product type more holistically. Finally, products utilized in achieving a personal goal or pursuing a certain interest become instrumental in supporting personal being (Mugge, 2007; Savaş, 2002). Utilizing a graphic tablet for learning how to make animation movies deploys a certain value to the tablet itself. On the other hand, Mugge (2007) raises the matter of using one-off unique products to express individuality. Overall, users hold on to products that support self-fulfillment and help live up to personal goals.

Although the existing literature puts more emphasis on the semiotic abilities of a product in terms of self-expression, more solid means of supporting self-identity can be explored. For example, through product personalization, users can define the physical expression method of their values. By increasing their involvement, users can be provided with the opportunity to create their own unique products. The personal investment emerging during the involvement process would deploy products with extensive communication skills. An example of this idea is self-made products. Not all products are able to communicate user identity through all stages of life, because of the unstable nature of self-identity. To that extent, users' attachment towards a product may differ as the person undergoes life-changing experiences that shape their character (Mugge, 2007). With ways of user

intervention built-in to the product, products can transform to reflect the current values of the user and be prevented from going obsolete.

2.3.1.3 Social Benefits

Contribution to the user's social being influences product attachment by improving self-depiction towards society. Savaş (2002), highlights that users utilize products to reflect themselves to the society in the desired way as if preferred products were parts of a collage. Products that assist users in generating a social identity have a higher chance of establishing a strong product attachment as well.

Savaş (2002) raises several determinants for building product attachment through social benefits. The first determinant is the compatibility between a user and a product's social image. Users want to possess products that are appropriate for how they want to be perceived by others. A participant in Savaş' (2002) study claimed that she occasionally wore eyeglasses when she wants to appear more charismatic and smarter.

Another determinant is the product experience conveyed to the user's social surroundings. If products propose pleasurable interaction within the user's social circle, they become more successful in contributing to users' social being (Savaş, 2002).

Additionally, products can link people who have similar interests or aspirations. Certain products emphasize group affiliation more, meaning they portray a person's relationship with other people like family, friends, or social groups. Mugge (2007) exemplifies this trait by wearing university hoodies as a symbol of connection to that social group.

Finally, other people's opinions and the conversations revolving around products are instrumental for the user's social satisfaction (Savaş, 2002). Ball and Tasaki

(1992) investigate the role of products' social benefits in building attachment in terms of social desirability, which is the individuals' aspiration for a socially acceptable appearance. Schifferstein and Zwartkruis-Pelgrim (2008) also comment that the approval of others is a basic human aspiration. By appropriating products to reflect their identity, users seek public approval. Thus, socially visible products tend to reflect the user's roles, achievements and experiences so, are easily related to the user's identity. This connection develops product attachment.

2.3.1.4 Utilitarian Features

Building product attachment through utilitarian features is relevant to a product's instrumental properties. Product functionality and performance were repeated several times in Savaş's (2002) research as the participant's justification for a cherished product. Usefulness and performance of a product in satisfying a certain need is indicated in the study as a construct for attachment. Furthermore, products utilized for profession or derived financial value from were highlighted. The main motivation for such attachment was because discarding these products would cause the user to lose their job or income. Savaş (2002) suggests that although users emphasized utilitarian features for their valued products, the main motivation for attachment tends to differ with further analysis. Deriving on this elaboration, it can be inferred that superior product functionality may require additional motivations to be able to construct product attachment.

2.3.1.5 Formal Product Aspects

Savaş (2002) raises the effect of form-related qualities of a product in building product attachment. On one hand, the physical aspects of a product such as dimension, shape, or color can be influential in product attachment because the

user builds sympathy for the product. On the other hand, the overall style of the product can impress the user. The visual qualities or the characteristics of the product can cause the user to feel an attachment to the product. However, the kind of formal qualities influential in building product attachment has been left vague in the literature. A more in-depth study can be carried out investigating the aesthetic qualities that trigger the strongest product attachment.

2.3.1.6 Product Experience

Product communication can have a psychological and social impact on a user (Tromp et al., 2011). Different attributes of a product can trigger specific emotions and thoughts. As product experience can be a source of satisfaction, it can also be an important motivation for building product attachment.

Pleasure may derive from several product attributes including functional or aesthetic features. In support of this concept, Savaş (2002) acknowledges that a significant number of participants in the study value the nuances within the product communication. These nuances can elicit enjoyment either through product use or the aesthetic appeal of a product. Users tend to use products that elicit enjoyment repeatedly in their daily routines. The frequent pattern of use leads to increased user involvement which affects the fulfillment of product experience. These attributes distinguish a product from the others that translate to a high chance of building an attachment with the user. As a result, triggering enjoyment was suggested as a strategy to enrich the product experience.

Likewise, Schifferstein and Zwartkruis-Pelgrim (2008) highlight that if the user experiences a product through several senses or highly appreciates its appearance, that product becomes hard to dispose of. Consequently, triggering positive

emotions by stimulating sensory pleasure within product experience can lead to product attachment.

2.3.1.7 Stage of Ownership

Existing literature suggests a relationship between the stage of ownership and the strength of attachment (Ball & Tasaki, 1992). As users spend more time with a product, the product witnesses several events in the person's life. This means that over time, products incrementally make progress through stages of ownership. These stages are summarized as "pre-acquisition, early ownership, mature ownership, predisposal and post disposal" (p. 160). The user experiences different levels of attachment at each stage due to the nature of the product relationship.

From a different perspective, although the amount of time spent with a product is an important factor in product attachment, a complementary determinant may be necessary for building a product-user relationship. Users would need the motivation to continue utilizing a product, which is the necessary condition to progress on different stages of ownership. Hence, the stage of ownership can also be regarded as a quality of product attachment, rather than a determinant on its own.

2.3.1.8 Kind of Object

Kind of object is highlighted as a construct of product attachment because people tend to reflect their self-identity and social status better with certain types of products, which result in an attachment. Ball and Tasaki (1992) exemplify this concept with the American people's attachment towards their cars because it is the most obvious type of product that reflects social status. However, it would be unrealistic to assume that specific product types guarantee product attachment. The

mentioned example is highly related to user characteristics as well as their social setting. Users with different personalities may feel more comfortable communicating their characteristics through different product types. Moreover, users may need additional motivation to feel an attachment towards a product that exceeds its product category.

2.3.1.9 Emotional Significance

Ball & Tasaki (1992) suggest that emotional significance and product attachment are directly correlated. An increase in the emotional significance influences the degree of attachment, whereas product attachment can't exist without the emotional significance of a product. Emotional significance strengthens as users associate products with events and people. This also suggests that emotional significance is highly related to a product's stage of ownership (Ball & Tasaki, 1992). Although this concept was suggested as a determinant, emotional significance can also be approached as a prerequisite for a strong product-user relationship. However, in some cases, the motivation for product attachment can be based on rational decisions rather than emotional ones. Sustainability considerations, the financial worth of a product or product's unique utility may cause product attachment, without any emotional investment to the specific product.

2.3.2 Product Attachment Strategies

Knowledge of product attachment experience can contribute to the designer's goal of designing a product that users want to hold on to. The replacement behavior is prevented as the products start offering certain emotional incentives, which otherwise can't be satisfied with a similar product (Mugge, 2007). In the literature, the insights from user experiences have been offered as design strategies (Haines-

Gadd, 2019; Maclachlan, 2011; H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). These strategies help designers in utilizing product attachment as a sustainable design method.

Schifferstein and Zwartkruis-Pelgrim (2008) suggest utilizing product attachment to slow down consumption patterns. To further investigate the implications of product attachment, the researchers built a scale in which product attachment is seen as a measurable entity. The scale measures the impact of several determinants on building product attachment with different product categories. These determinants are enjoyment, memories to persons, places, and events, support of self-identity, life vision, utility, reliability, and market value. Later, the study makes associations in how these determinants affect the user's perception of irreplaceability, indispensability, and self-extension. In conclusion, the researchers derive specific strategies for designers to lay out the implications of product attachment on the design process. These strategies are enjoyment, surprise effect, memories, gift-giving, designing for social context, and material choice.

Maclachlan (2011) focused on generating an inspirational design tool that derives design strategies from designing for emotion philosophy for product attachment**.** The study outlines the importance of considering the emotional aspects of product interactions and later suggests strategies for designers to design emotionally rich products. The strategies are aimed at design educators, researchers, and design professionals. These strategies are pleasure, longevity, narrative, personality, self-expression, and sensory design.

Haines-Gadd (2019) constructed a study focusing on solutions for designing products that users would want to keep for longer. The study focused on the lighting industry and investigated areas in which designers can act upon. Conducted with Phillips Lighting product development team, the study derived nine themes and thirty-eight strategies. The Figure 2.3. presents the framework.

Figure 2.3. Snapshot from the framework developed at the end of the study carried out with Phillips product development team (Haines-Gadd, 2019)

The themes offered by the framework are are relationships, narratives, identity, imagination, conversations, consciousness, integrity, materiality, and evolvability.

2.3.2.1 Durability

A motivation for product replacement is product failure. Confidence in product durability leads to product attachment (Haines-Gadd, Aliakseyeu & Mason, 2018). If products are unable to perform their function, users start searching for alternatives. Designers aiming for an extended period of use, need to look for ways

in which products can be utilized repeatedly. Ensuring that products will provide the same benefits with repeated use for a long duration triggers a sense of trust. Besides, designing the means for users' product maintenance scenarios presents an opportunity in terms of durability. Thereby products can overcome several failures, and users can find areas of involvement.

2.3.2.2 Aesthetic Satisfaction

The pleasure derived from aesthetic beauty may lead to product attachment. Maclachlan (2011) carried out the PrEmo experiment which investigates the effect of perceived beauty on the user's desire to own a product in relation to functional properties. The research focused on five lamps. Participants were asked to label their approaches towards these five products among the given categories which are "desire, satisfaction, pride, hope, joy, fascination, disgust, dissatisfaction, shame, fear, sadness and boredom" (p. 43). The participants chose the most beautiful, the most desirable, and the most functional lamp. For example, the Ara Lamp by Philippe Starck, Figure 2.4, was chosen as the most beautiful alternative.

Figure 2.4. Ara Lamp by Philippe Starck

The study concluded that the aesthetical appeal and function of a product influences users' motivation to own a product. Products designed in an orderly manner, lack stimulating emotional response and cause boredom. Thus, if a product is novel the users would be more interested in owning, using, and keeping this product. On the other hand, users may perceive a product as functional when there is a balance between novelty and typicality. However, research emphasizing the aesthetic features appreciated by the user should be analyzed to understand how aesthetic appreciation leads to product attachment.

Correspondingly, Schifferstein and Zwartkruis-Pelgrim (2008) strategize pleasurable experiences as appealing to the user's aesthetic taste. To reflect on these studies, it is possible to say that carrying out a study on the most cherished aesthetic features is a highly complex task since it carries numerous measures such as product type, the context of use, or user group. So, studies with a precise focus on this topic can lead to more insightful outcomes.

2.3.2.3 Material Satisfaction

Products need to have the perseverance to endure time. Enduring time gracefully, motivates users to prolong the product's life cycle. Therefore, interpreting the choice of material is an influential strategy for obtaining product attachment. Schifferstein and Zwartkruis-Pelgrim (2008) introduce the idea that if products are able to demonstrate memorable occasions physically, users would appreciate being reminded of the cherished events. Users may also be encouraged to leave their mark on the product throughout product life. A scratch on a leather jacket may contribute to the aesthetical development of the product whereas reminding the user of the event that caused the mark. Figure 2.5 presents a gracefully aged leather

couch. With the use of such materials, products enrich aesthetics instead of wearing out.

Figure 2.5. A gracefully aged leather couch (Housebeautiful.com, 2022)

Similarly, the study conducted within the Philips product development team (Haines-Gadd, 2019) positively reapproaches aging. The research suggests that material properties which trigger satisfaction as the product ages, enable users to refrain from aging. Considering how a product's materiality changes over time, allows designers to approach consumption behaviors more holistically. Product appearances might improve over time and users may be advocated in appreciating the imperfections. Appealing to several senses can be considered so that users can relate past experiences or personality traits through appearance, smell, or sound.

Creative interpretations of product evolution over time can also facilitate stronger maintenance and ownership practices. Thereby, designers need to think in advance about how the products will age and handle aging. The study suggests embracing a product's irregularities as "asymmetry, roughness, irregularities, simplicity, economy or austerity" (Haines-Gadd, 2019, p. 119). If products were to welcome

the unique flaws and irregularities generated over time, they would embrace the flow of time.

Lastly, similar to other studies, Maclachlan (2011) advises designers to choose materials that can age more gracefully and durably while carrying the footprints of memories (Haines-Gadd, 2019; Haines-Gadd et al., 2018; H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). Wood and leather are highlighted as good material examples that degrade uniquely. By analyzing users' beloved childhood toys, the study deducts that incorporating comforting tactile properties to products brings out feelings of nostalgia.

2.3.2.4 Comprehensible Product Communication

Deriving pleasure from product experience can be highly influential in building product attachment. Designing pleasurable experiences requires the close examination of several pleasure types. Tiger (Tiger, 2000) categorizes pleasure as physical, social, psychological, and ideological. Psychological pleasure is associated with the cognitive processes involved in product interaction.

Maclachlan (2011) relates the cognitive processes involved in a product with usability and suggests that users can experience psychological pleasure if they complete a task smoothly. On the other hand, products that function well in response to user input can also elicit psychological pleasure. In Maclachlan's study, a participant claimed that iPod Nano, demonstrated in Figure 2.6, was a favored product because it was the easiest device to play music on. The user's contribution to the communication can be highly influential in building attachment. Designing the ways which strengthen the user's involvement in the conversation can lead to extended product life.

Figure 2.6. iPod Nano gave Maclachlan's participant psychological pleasure because it was easy to operate

The example suggests that a reciprocated conversation between the product and the user enriches the product experience. A two-way conversation is provided when products are successful in conveying messages and providing comprehensible feedback. Products reacting to their environment or changing status, offer a more dynamic and conversational relationship with a product. Through feedback mechanisms, products can facilitate stronger communication with users. Products that change status according to the environment, assist a more open relationship. Thus, thinking beyond the familiar on/off states and designing mechanisms in which products demonstrate more distinctive statuses deriving from their surroundings is suggested (Haines-Gadd, 2019). Anyhow, users may be intimidated by the different product statuses if they are unable to convey the reasoning behind changing modes. Products should be reflective of what they are responding to, as well as how they are responding to it (Maclachlan, 2011).

Haines-Gadd (2019) also suggests designing interactions that require the user's time and effort with periodic rewards. As users put more effort into constructing the function offered by the product, the user-product relationship is amplified. However, users need to be rewarded within short periods to be motivated to pursue product interaction (Haines-Gadd, 2019). With such an incremental approach, some product features would be concealed until the user achieves them. Multi-layered conversations help users regard product experiences as mutually beneficial

and evolutionary. This approach leads to the development of a relationship, which the user refrains from losing.

In response, Maclachlan (2011) proposes that strictly pre-determined product interactions may not be intriguing for the users because they wouldn't have any freedom to embed personal rituals. Enabling users to steer the product communication would allow them to feel more in control of the product.

From a different perspective, Schifferstein and Zwartkruis-Pelgrim (2008) mention the importance of surprise effect in offering enjoyable experiences. Users tend to be more interested in and satisfied with products that provide surprises in unexpected moments during product use. On the other hand, the importance of a balance between product familiarity and surprise effect is also highlighted.

2.3.2.5 Integrity

Haines-Gadd's study (2019) defines integrity as the product's intention to demonstrate physical composition and reflect certain values openly. Integrity allows for a more resilient attachment deriving from a trustworthy relationship. Transparency about product features eventually leads to reliability (Haines-Gadd, 2019).

On the other hand, transparent products foster repairability and maintenance, thus fostering user motivation to protect the product. When users are encouraged to explore and interfere with products, extending product life becomes an achievable aspiration. Users build confidence in making interventions such as personalization or fixings if the product can communicate its materials and production processes. The study also suggests reducing the pace of product use, so that users can find the time to experience and appreciate product features (Haines-Gadd, 2019).

2.3.2.6 Satisfactory Experiences

Satisfactory experiences inspire strong product attachment. Maclachlan (2011) discusses the influence of enjoyment on product attachment in terms of sensory and aesthetic pleasure. The study refers to Tiger's (2000) categorization of pleasure as physical, social, psychological, and ideological. Deriving from Tiger's work, the study later affirms Jordan (2000) who investigates the relation between pleasure and product relationship to reflect on the influence of pleasure on user's mood. Some examples in showcasing the relational effect are playing cards that trigger excitement and a vase that lures with its beauty. Another example is a vacuum cleaner that demonstrates pleasure through achievement attained by cleaning the floors. The study also highlights that deriving pleasure from a product is highly personal and can't be generalized to the whole product type (Jordan, 2000).

Based on these, Maclachlan (2011) suggests arousing physical pleasure through stimulation of five senses and demonstrating the feeling of joy through product experience. Examples are a pen which the user describes as "fun to play with", the smell of leather, and the sound of a closing door (p. 108). On the other hand, physical pleasure can also be elicited by comfort. For example, a very comfortable chair or an ergonomic kitchen utensil fits perfectly to the hand.

Meanwhile, products can explore imagination and offer excitement through interaction, resulting in sensual experiences. Allowing for ways in which users can interpret their imagination can lead to product attachment. This strategy aims to highlight product affection and excitement through a sense of discovery which would translate into product attachment (Haines-Gadd, 2019).

Exceeding the expected patterns in interaction triggers enthusiasm that leads to emotional attachment. Designers should aim to provide fulfilling interactions than just serving utilitarian purposes. By transcending the expectations with unique

methods of interaction, users experience enjoyment and pleasure (Haines-Gadd, 2019).

2.3.2.7 Product Personality

Users appreciate when products demonstrate their consciousness. By mimicking human behavior or assigning facial expressions to products, a character can be portrayed. Products with a unique character, enable unexpected interactions (Haines-Gadd, 2019; Haines-Gadd et al., 2018). Maclachlan (2011) also advocates adding facial expressions to products by studying the participants' beloved childhood toys. Products that express "aggressive" and "lively" feelings tend to be more interesting for the users (Maclachlan, 2011, p. 168). Users associate the sympathetic look of the product with the affection it requires. Anna, the corkscrew designed by Alessi as presented in Figure 2.7, can be given as an example of this strategy.

Figure 2.7. Alessi corkscrew Anna (Alessi, 2022)

Finally, Haines-Gadd (2019) raises that designers can feed temporal feedback mechanisms that highlight the product's personal voice. Such a strategy enables conversation between the product and the user to be more intuitive. These features would also remind of the product's "life beyond the user" (Haines-Gadd et al., 2018, p. 111).

2.3.2.8 Multi-Sensory Interaction

The sensory design addresses how a product is experienced through five senses. A captivating product experience can make use of consistent multisensory satisfaction. For example, car manufacturers consider the sound of the engine, the smell of materials, the aesthetics of the outer body, and the tactile properties of the steering wheel to offer an engaging experience. Schifferstein and Spence (2007) denote that stimulating multiple senses both coherently and incongruently results in pleasurable experiences.

Maclachlan (2011) highlights the impact of sensory design on building product attachment. After several studies with users, the importance of visionary and tactile stimulation is strongly emphasized. Stimulating alternating senses in unexpected instances offers an interesting user experience in which user engagement is relatively high.

2.3.2.9 Evolvement

If products could benefit from time, instead of being overwhelmed by it, the environmental impact of consumption practices could be reduced drastically. Maclachlan (2011) suggests two motives for products to improve over time. The first motive is related to the user's emotional investment. The time spent with a product is directly proportional to the comfort felt during use and thus product

confidence. A second motivation is related to a product's functional improvement. For example, users may start feeling more comfortable with a pair of shoes as they fit better to the feet. Building upon this framework, the study suggests designing for upgradeability for longer-lasting relationships with products. So, products that improve with use and time, present an opportunity for designers

Haines-Gadd (2019) mentions that evolvable products offer constant excitement during use while responding to users' changing needs. Designers should aim to move away from static products by taking the dynamism of time into account. This also suggests that designers should allow for ways in which users can intervene.

In a sense, evolvability allows the product to embrace the passing of time and transform it into a narrative that can be traced back. Static products prevent users from embedding personal stories into the interaction as they are reluctant to keep up with the user changes. Besides, users may also want to tweak products so that they fit better for their needs. Adaptable products, serve varying user needs and allow for personalization and expression. Documenting and displaying the advancements experienced by the product can be a creative method for designing unique products. In addition, products should be considerate about repeated life cycles. To resist technological obsolescence is a critical concern for products that evolve. Up-cycling components or designing strategies for technological transformation of products help extend life cycles through increased product attachment (Haines-Gadd, 2019; Haines-Gadd et al., 2018).

2.3.2.10 Personalization and Customization

Personalization is the user's act of making interventions to a product, either aesthetically or functionally, to adapt to personal needs (Blom, 2000). Through a

set of interventions, personalization increases user involvement. Ozan Avcı (2019, p. 20) defines personalization as:

> *"a process during which a product's aesthetic and functional attributes are defined adapted or modified by a person during design, use and/or post-use stages of product life span, to increase its personal relevance, and the person is involved in this process as co-designer and co-maker of the product."*

Meanwhile, customization is a producer-initiated process of providing product part alternatives for comprising based on user preferences (Sel, 2013). Customization allows producers to respond to more specific user needs and gain a competitive advantage in return.

Literature showcases the influence of personalization and customization on triggering product attachment. Haines-Gadd (2019) highlights providing users' the opportunity to express themselves by differentiating their products from the others. The self-reflective abilities of personalization and customization, ensure pleasure deriving from uniqueness (Avci, 2019). Such a strategy would bring about one-off products.

Maclachlan (2011) regards personalization as a means for product longevity. Personalized products represent user effort and thus offer a stronger attachment (Mugge et al., 2005). These features allow users to adjust products according to their needs, thus extending product life.

Users spend a considerable amount of time modifying the product which results in personal investment. Due to the highly personal process, the product use may signify the effort and a personal accomplishment (Avci, 2019; Mugge, 2007).

2.3.2.11 Capturing Memories

Through shared memories, products start conveying narratives. Such narratives become an integral part of the experience, resulting in the deployment of special meaning. Narratives accumulate over time to generate a shared history, where products frequently evoke memories. Haines-Gadd (2019) highlights the influence of nostalgia as an essential determinant for a strong product–user relationship. The ability to capture memories employs products as "markers in time" which connects us to cherished events, people, or important phases of life and helps in preserving valuable moments (Haines-Gadd, 2019, p. 96). Designing products that link users to past experiences increases the emotional significance of objects.

Schifferstein and Zwartkruis-Pelgrim (2008) claim that designing products that capture memories is the most effective strategy to achieve product attachment. The study also touches upon the user dependency of this strategy.

On the other hand, Maclachlan (2011) approaches products as symbols of past experiences as well as representatives of future aspirations. Thus, emphasize user's personal development over time. When designers reimagine products as companions for the users that witness important milestones, products attach to certain memories more profoundly. However, this strategy is perhaps the least actionable method for designers since it is more related to the event that occurs around the product and less about product features.

2.3.2.12 Gift-Giving

Emotional Durability Design Nine (Haines-Gadd, 2019) suggests that gifts are an effective way for initiating narratives by increasing a product's likelihood of capturing memories. By reminding users of the past events, gifts are able to capture

the essence of nostalgia. Furthermore, researchers highlight that the more the gift giver puts effort into finding a suitable gift, the more the receiver would value the product (H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). However, this strategy is less actionable by designers since product features are not influential in determining the value of gifts. Any product can attain a gift value if acquired through a loved person.

2.3.2.13 Social Pleasure

As products start appealing to a social group rather than a single user, product attachment strengthens. When products accompany the user's social context, they become a presentation of the engagement among a social group. The literature exemplifies this strategy with a Nintendo Wii console which reminds the user of the exciting experience with friends (H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). The Nintendo Wii, as presented in Figure 2.8, appeals to the user's social group and gathers people around the same practice. Haines-Gadd (2019) suggests that products that assist a social group in engaging, provide a stronger product attachment by enlarging the product context and increasing the product's impact on the user.

Figure 2.8. Nintendo Wii console which is used within a social group

Maclachlan (2011) interprets this strategy as deriving pleasure from the expression of belongingness to a larger group. For example, a Volkswagen Beetle shown in Figure 2.9, can trigger social pleasure because owning a Beetle entails inclusion in social clubs as well.

Figure 2.9. Volkswagen Beetle with the potential to elicit social pleasure (Unsplash, 2022)

2.3.2.14 User Involvement

Repositioning users as active participants in the various stages of product experience increases user engagement. As users invest time and effort in products, they refrain from quick disposal.

A method of ensuring long-lasting product-user relationships through user involvement is embedding means of creative user participation. A high potential lies in this strategy as designers can discover several possibilities creating user participation according to the product category. Haines-Gadd (2019) suggests designing systems where users can fix, reconfigure, or redesign a product. Another possible method is teaching users a new skill during product use. Finally, users can be responsible for product maintenance. With the help of such approaches, users can form personal product rituals. These rituals establish a stronger product-user relationship which eventually postpones product replacement.

2.3.2.15 Self-Expression

Users utilize products as a medium of expression. Users become more attached to products that support the communication of self-identity (Ball & Tasaki, 1992; Haines-Gadd et al., 2018).

Reflecting personality through products may require increasing user involvement. For example, through personalization, users find the opportunity to embed personal meaning in their products. Maclachlan (2011) exemplifies this situation with a workshop participant who chose to put a sport's team sticker on his phone. The participant contributed to the design by adding features that reflect an important element of his lifestyle. Meanwhile, he highlighted a symbol that expressed his

belongingness to a group. The resultant mobile phone is a one-off product that communicates with the user.

Products can also communicate personal beliefs. Users cherish products that symbolize their ideologies (Maclachlan, 2011). An example is prayer beads, as shown in Figure 2.10, which symbolize the carrier's religious faith.

Figure 2.10. Prayer beads exert ideological pleasure (Coleman, 2022)

On the other hand, if products accompany user development, they become representative of the user's progress. Thus, they become incrementally more valuable over time. Maclachlan's participant has described the significance of his guitar because "the more you play it and get used to it the better it sounds and the more attached you become." (Maclachlan, 2011, p. 139). Thus, Maclachlan advises interpreting products as an ally to the user with whom they can develop simultaneously. If users are able to improve with products, a stronger attachment is achieved. Triggering questions about how products can facilitate self-discovery would be a valuable contribution to extending product life.

2.3.3 Summary and Discussions

This chapter examined the product attachment determinants suggested in the design literature. Product relationship can be highly personal because it constitutes

intangible and emotional experiences. These experiences are not always triggered by the product itself but can be developed around the emotional significance deployed to that product (Desmet et al., 2001). For handling the data, the researcher tried to reconceptualize the determinants to support the research question. To do so, the determinants suggested in the literature were categorized as user-oriented determinants and product-oriented. The initial category, the user-oriented product attachment determinants included:

- Emotional significance
- Shared history
- Self-expressive abilities
- Social benefits
- Stage of ownership

On the other hand, the second category investigating product-oriented determinants included:

- Product experience
- Utilitarian features
- Formal product aspects
- Kind of object

However, following the categorization of product attachment determinants, the researcher realized there can't be a definite separation between the categories. The product attachment is derived from the interaction between the user and the product features. Thus, defining a product attachment narrative as only having a user or product-oriented nature wouldn't be sufficient, since both are equally influential.

For example, college sweatshirts with university logos are said to have created product attachment due to the social benefits (Mugge, 2007). Besides the personal employment on the product, product features like the logo, color and material are also influential in providing social prestige.

Another example worth mentioning here is a product attachment narrative deriving from self-expression. Savaş (2002), explains that some users establish product attachment with products they use in their hobbies or professions. For instance, a designer can reflect his/her aesthetic taste and professional capability through a digital tablet. Although the designer's ability is a key element for the attachment, without the tablet's technological capabilities and embedded software, the designer can't display his/her skills. Thus, product-oriented determinants accompany the user-oriented product attachment determinants.

From the counter standpoint, the user-oriented determinants can be influential in the so-called product-oriented product attachment determinants. For example, in product attachment through product experience (Savaş, 2002; H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008), the user also has a critical role as well as the product features. Although at first glance, forming attachment through the positive feelings elicited through product experience may seem dependent on the product features, without the user's curiosity in exploring product features or the engagement motivation for deepening the product communication, the product alone couldn't deliver such an experience. Considering these insights, the researcher concluded that product attachment determinants can't be categorized with this approach.

The categorization effort, although arriving at a dead-end, has had a judgmental effect on the thesis. During the categorization, the influential effect of user involvement on product attachment was realized. With this perspective, the researcher hypothesized that user involvement can be prominent in the overall attachment determinants.

This thesis suggests that enhancing users' involvement can strengthen product attachment, as supported by the literature and findings from the preliminary study (see Chapter 3, Section 3.2). With further investigation, this study aims to discover if user involvement is the backbone of product attachment. For this reason, the researcher builds a user involvement-oriented focus towards product attachment throughout the field study.

To justify the thesis' shift of focus, several examples can be mentioned. For example, the literature finds the self-expressive abilities of a product as very influential in attaining product attachment. Apart from self-expression derived from the attribution of semiotic meanings, user modifications on products, such as personalization, can also lead to increased self-expression. In literature, self-made (Savaş, 2002) and one-off (Mugge, 2007) products are suggested to lead to product attachment, due to their self-expressive nature.

On the other hand, Mugge (2007) mentions that many products lose their self-expressive nature due to their inability to adapt themselves to changing character of their users. Hence, they become obsolete. For products to continuously meet their user's expectations, they should allow their owners to interfere and involve with them.

Likewise, many researchers strongly underline the dominant effect of shared history on product attachment. However, the deployment of valued memories to a certain product requires extensive user involvement. Valuing a product due to recollection of the special memories is somehow a personal matter which requires the owner's strong interaction with the product.

Correspondingly, the product attachment strategies can also be re-approached with a focus on user involvement. Design literature offers that durable products can create better product attachment due to a sense of confidence and reliance (Haines-Gadd et al., 2018). With this in mind, designers aiming for long-term and repeated usage of

their products may deploy users with active roles in properly maintaining their products. Finding new means of designs to involve users more in the overall life cycle might be a valuable step in supporting a product's overall sustainability. Hence, by favoring active user involvement in the design, a new approach to products would be proposed as well as implementing sustainability requirements into the design process.

CHAPTER 3

METHODOLOGY

This chapter presents this thesis' research methodology. The research focus derived from preliminary user research findings and literature review. The research investigates the influence of user involvement on product attachment along with potential design directions for attaining product attachment. The chapter introduces the utilized data collection and analysis methods, along with their influences on the research.

The research starts with a preliminary phase where the participant awareness towards sustainable consumption and potential problem areas were investigated. Later, an online survey was utilized for sampling purposes. The following semi-structured interviews aimed at gaining in-depth insight about users' experience on user involvement and product attachment. Table 3.1 demonstrates the overall research phases.

Table 3.1 Overview of research phases

	Method	**Aim of the Method**
Preliminary Phase	Online survey	Measuring potential participant's awareness towards related topics and identifying problem areas
Field Study	Online Survey	Sampling
	Semi-Structured Interview	Gaining in-depth insight about user's experience on user involvement and product attachment
Data Analysis	Thematic Coding	Categorizing the data according to the research questions

3.1 Qualitative Research

Qualitative research concerns the interpretations of differing perspectives. The data in qualitative research is not standardized, but rather requires the researcher's interpretation to give meaningful insight. Dealing with materials like verbal or visual data, qualitative research has a broad arena left for interpretation in which the researcher can act upon (Schreier, 2012). Within qualitative research, the same materials can be interpreted from different perspectives, each emphasizing different aspects of what data may mean, which highlight the multi-layered characteristics of qualitative research (Gibbs, 2018). Additionally, qualitative research is reflective of its research questions (Schreier, 2012). Schreier (2012) highlights that researchers can modify the research as they collect and analyze data. Due to the adaptive nature, both concepts and tools aren't decisive but are refined throughout the process (Gibbs, 2018). To summarize, qualitative researchers are interested in accessing experiences, interactions, and documents in their natural context that gives room to particularities.

3.2 Preliminary Research

The main goal of the preliminary research was to examine the impact of the product-user relationship on consumption patterns from a broad perspective. This research phase included an online survey that had two motivations. The first motivation was to get acquainted with the potential sample group and to measure their knowledge on the topics related to sustainable consumption. Secondly, as this thesis study investigates the user perspective of consumption patterns, the survey also aimed at determining the problematic areas experienced by the participants. As a result of this phase, the research questions were formulated deriving from actual user data.

3.2.1 Data Collection and Sampling

Questionnaires are one of the most commonly used data gathering techniques in qualitative research, intended for the self-completion of the participant (Bolton & Brace, 2022). Online surveys are able to provide qualified data in a wide range of topics with the advantage of fast distribution among participants (Fife-Shaw, 2012).

The online survey was prepared using Google Forms, an online surveying tool. The study utilized checkboxes and open-ended questions. The survey started with explaining the purpose of the study and information on ethical considerations.

The preliminary study utilized convenience sampling (Frey, 2018). The participants were required to have carried out a certain involvement on a cherished product. The participants were recruited through social media, primarily through Facebook and LinkedIn groups. The survey had 113 participants. Among the participants, there were 24 students, 55 employed, and 44 unemployed users. There were 16 participants who lived by themselves, 95 participants who shared houses with friends, families, or a partner, and the remaining two lived in dorm rooms.

The survey consisted of ten questions divided into five question-sets, as shown in Table 3.2. The first question set asked for basic information about the participants. The second question set focused on product attachment by questioning the products to which the users felt emotionally connected along with their motivation. The remaining questions investigated the users' familiarity with post-use and evolving products. The survey also differentiated among the transfer of use of products that completed their lifecycle and the user interventions for transforming products. The survey concluded with an invitation for potential further studies and a kind request to send photos of the given product examples. The online survey questions are presented in Appendix A and B.

Table 3.2 Question sets from preliminary study online survey

Question Set	**Aim**
Question Set 1	Demographics
Question Set 2	Product Attachment
Question Set 3	Early Product Replacement
Question Set 4	Post-Use
Question Set 5	Evolving Products

The questions in the survey aim to touch upon various themes within sustainable design literature. The provided themes came from a brief literature review around the social aspect of sustainable design where user behavior is highly important. Due to the exploratory nature of the preliminary research, the researcher collected feedback on various fields.

3.2.2 Analysis and Findings

The data from the survey was analyzed using the Thematic Coding technique. Thematic Coding is a qualitative analysis method where the obtained data is categorized in search of links between concepts (Gibbs, 2018). The Thematic Coding method is further explained in the following sections (see Chapter 3, Section 3.3.3). The codes used at this stage were obtained from the literature review. In addition, when a new code emerged from the participant's answers, this finding was added to the code tree as well.

The analysis process focused on the product attachment theme for several reasons. First of all, the product attachment theme presented the most saturated data among the answers. Although there were interesting and important findings related to other themes, the participants provided the richest data about product attachment. Secondly, product attachment was regarded as a broader topic compared to the rest, which could be an underlying concept for the other themes in the survey. Finally,

the researcher found the product-attachment-related data as the most inspiring ones. So, it was decided that product attachment was the most promising area for a deeper analysis.

The analysis of the complete data set from the survey presented the multi-faceted nature of product attachment. Accordingly, examining users' motivation to establish product attachment should be the focus of both research questions and preliminary research analysis, as it is also considered as a primary source of information on other themes in the survey.

Two different approaches were developed in the analysis of the survey results. The first approach was to group user responses by product type. The goal of the first categorization was to see if there was a potential correlation about the product type to which the users felt attached. In other words, the categorization searched for a prominent product feature, common within the product type, which allowed for product attachment. Table 3.3 demonstrates the main product categories from the survey with their frequency of repetition.

Table 3.3 Categorization of survey results according to product type

Product Category	**Frequency of Repetition**	**Product Category**	**Frequency of Repetition**
Electronics	24	Flowers	3
Furniture	15	Handmade Objects	3
Clothes	11	Hobby Related Objects	3
Books	9	Personal Accessories	3
Kitchen Utensils	9	Property	3
Photographs	8	Souvenirs	3
Family Inheritances	5	Stationary	3
Bedding	4	Antique Goods	2

Decorative Objects	4	Household Goods	2
Jewelry	4	Journals	2
Toys	4	Painting	2
Automobile	3	White Goods	2
Collection Pieces	3	Healthcare Products	1

The most frequently mentioned product type was electronics. Among the participants, 24 participants regarded their electronic products as irreplaceable. Within this category, cell phones were most frequently mentioned. Participants were attached to their cell phones because they could use them for many purposes and because they dedicated a considerable amount of time to the product every day. One participant expressed his motivation as “my cell phone helps me with various aspects of my life”, whereas another participant stated that the cell phone occupies most of their free time, so they never get bored.

Following electronics, furniture was the second most mentioned product type. Beds were the most frequently mentioned furniture type followed by chairs. The users commented on how comfortable their beds were and how relaxed they felt once they lay in them. A participant indicated that he associated his bed’s comfort with the coziness of home. This insight points out that attachment isn’t only related to the product utility. The positive feelings associated with the home were deployed to the product. On the other hand, he admitted he could easily replace it with the same model once it wears out. In such a case, the value isn’t deployed specifically to the product but to a product variant (H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008).

Further analysis of the data had discouraged categorizing the data according to product types. Participants who cherished similar products had differing motivations to build attachment. Some participants have formed an attachment on a more emotional level whereas others are attached to the product due to utilitarian

features. Several other examples marked that an investigation based on motivations, instead of product type, would result in much richer data.

Thus, the second approach was to analyze the responses in terms of their motivations over product attachment. Regardless of product type, the answers were converged to why and how the product attachment phenomenon occurs. During this categorization, product attachment motivations in the literature were generously utilized in terms of codes for analysis. The main themes point to the product attachment motivation, and the sub-themes further narrowed the concept. The code tree used during the analysis is given below.

- Utility
- Aesthetics
- Product Use
    - Pleasure during use
        - Comfort during use
        - Sense of routine
- Personal Association
    - Recall of memory
    - Attribution to person
    - Attribution to concept or ideology
    - Attribution to favored activity and hobby
- Acquisition Story
    - User effort for acquisition
    - Makers effort for production
    - High monetary value
- Self-actualization

3.2.3 Conclusions and Implications of Preliminary Research on the Field Study

After reviewing the survey data, the researcher decided it was more inspiring to examine product attachment on actively used product samples with which the user had some level of interaction. Because the main motivation for examining product attachment within the scope of this thesis is its contribution to sustainable consumption. By extending product life, users can reduce the overall consumption rate. Based on this, the researcher focused on actively used products in the field study because those products are expected to be replaced when they expire. For example, one of the participants suggested her wedding ring as an item to which he had formed an attachment due to its spiritual value and uniqueness. Although this example is very valuable for design practice, it does not contribute to sustainability research. For this reason, in the structuring of the fieldwork, the focus was on products that the users used extensively in their daily lives and interacted with at a certain level.

In addition, the survey pointed out that the provided examples of product attachment were unintentional and were initiated by the user. The examples didn't suggest product features that allowed for product attachment to occur. Thus, the product attachment narratives were coincidental and weren't planned during the initial design phase. Hence, this thesis study focused on how designers can influence the degree of attachment. Several visual examples from participants, Figure 3.1, are provided below.

Figure 3.1. Product images from preliminary research: pencil holder from a coffee cup, repurposed outdoor lighting, and a painted coffee table

The first example is a coffee cup converted into a pencil holder. The participant kept the coffee cup because she liked the illustration, and then decided to turn this cup into a pencil holder. The second example is outdoor lighting made by the user by recycling different pieces. The third example is a repainted old coffee table. As can be understood from these examples, designers of these products did not make any preparations on the products as they did not foresee such a use. Therefore, it can be said that the product attachment is left to the discretion of these users.

On the other hand, when these samples are carefully examined, another prominent finding is revealed such as there is a certain level of user involvement in most of the products cherished by the users. Users have put a certain effort into these products they have bonded with, and as a result, they have created a unique product. In other words, in the given examples, it can be stated that what is linked to attachment is not the products themselves, but the value that users place onto them after the user involvement. It was concluded that user involvement is an important factor in building product attachment. Thus, in the field study, it was decided to examine the product examples in which the users had built product attachment through user involvement.

The preliminary study enabled the modification of the aim, goal, and research questions of the thesis. It also helped make this study more focused. Before the preliminary research, the thesis aimed to provide a guideline for designers, who are motivated in pursuing sustainable design methods, to achieve a strong product-user relationship. Based on the insights gained in this phase, it was decided to reveal the ways designers can provide product attachment by enhancing users' involvement.

As can be deducted from Table 3.4, the research process was conducted iteratively. As studies were carried out, the findings guided the remaining study and changed the initial research questions. Furthermore, it was concluded that many product attachment determinants from the literature can be associated with user involvement, and product attachment can be viewed from a user involvement perspective.

Table 3.4 Contribution of research phases on establishing research questions

	Preliminary Research	**Literature Review**
Main Outcome	Most product attachment narratives occur coincidentally and are initiated by the user. Product attachment can be initiated by designers and considered early in the design process.	User involvement is apparent in most of the product attachment determinants and strategies. By designing the ways for user involvement, product attachment can be attained.

Thus, the aim, goal, and research questions were updated and revised to include these findings.

3.2.4 Limitations of the Preliminary Research

The data collection method in the preliminary study posed several limitations. As opposed to user interviews, the researcher couldn't ask further questions to the participants regarding their answers. Thus, the given answers could be elaborated on to a limited extent. Hence, the commentaries beyond the analysis of given examples relied on the researcher's understanding.

In addition, the broad focus of the survey prevented asking in-depth questions about a certain topic. Since the survey investigated several topics, the number of questions related to product attachment was insufficient to gain qualified insights about user behavior. These limitations brought about the necessity for more detailed research with users, particularly focusing on the products they have built an attachment with.

Furthermore, the lack of photographs in each of the answers also posed a limitation. Only a limited number of participants shared photographs to define their explanations. So, for the answers without photographs inferences were harder to make.

3.3 Field Study

This section clarifies the second part of the research. After finalizing the research questions, a field study was planned. The second part of the research starts with an online survey for sampling purposes followed by semi-structured interviews. The semi-structured interviews were carried out with 14 participants. The sessions were recorded and transcribed. Finally, the obtained data were analyzed. This section describes the qualities of each utilized method along with their contribution to the study.

Before initializing the field research, the required approval from the Applied Ethics Research Centre of the Middle East Technical University was granted. The study was approved with 430-ODTU-2021 code.

3.3.1 Sampling and Recruitment for the Field Study

An online survey was utilized for sampling purposes. Google Forms, an online surveying tool, was preferred. The survey was distributed through social media and included 4 open-ended questions. The field study utilized convenience sampling, in which participants are selected according to availability (Frey, 2018). Thirty-seven people have participated in the survey. The selection among the volunteers focused on the extent of involvement narratives.

The brief survey started by stating the required information one purpose of the study, ethical notifications, and contact details. The survey questioned the products with which the participants have formed an attachment after performing an involvement. Table 3.5 demonstrates the questions included in the survey. The survey questions can also be found in Appendix C and D.

Table 3.5 Online survey questions

Question	
Question 1	What are the items that are valuable for you, on which you have intervened/changed? (Examples of such items can be: a pencil holder made of a coffee cup that you like, a sneaker that you love with the lace color changed, a food processor that you love to use and have it repaired, wooden furniture on which you paint patterns, a t-shirt that you like with patterns on it, your computer that you stick stickers on and use every day)
Question 2	What is your motivation for not giving up on the product you mentioned?

Question 3	Please briefly describe the intervention/change you have made to the product.
Question 4	Please share your e-mail address with us if you would like to participate in a discussion of approximately 45 minutes regarding your answers. *Interviews will be held on the internet at the date and time that the participant deems appropriate.

In the final question of the survey, the participants were asked to share their e-mail addresses provided that they were willing to take part in semi-structured interviews. Among the answers, 24 participants have shared their contact information.

The recruitment was carried out among the 24 willing participants according to convenience sampling (Frey, 2018). The main objective of sampling was diversity in terms of involvement type. The consent form delivered to the willing participants can be found in Appendix E & F.

3.3.2 Data Collection Method: Semi-Structured Interviews

Typically, a semi-structured interview is an activity conducted conversationally with one respondent at a time, and it employs a blend of closed and open-ended questions, often accompanied by follow-up with “why” or “how” questions (Adams, 2015). The dialogue can meander around the topics on the agenda, rather than adhering blindly to common questions as in a standardized survey and may deep dive into totally unexpected issues (Adams, 2015). Adams (2015) also notes that although the semi-structured interviews are relaxed, engaging, and in-person; interviewers need to be alert, smart, sensitive, agile, and quick thinking, as well as knowledgeable about the most relevant substantive problems.

In this study, semi-structured interviews were scheduled to collect more in-depth insight about participants' cherished objects on which they have performed a certain involvement. In terms of preparation, an interview guide was prepared (see Appendix G & H). The main topics of the interview guide were:

- The story of the cherished product
- User intervention
- Product attachment determinants
    - Shared history
    - Self-expressive abilities
    - Social benefits
    - Product experience & comprehensible product communication
    - Utilitarian features
    - Formal aspects

The interview guide was prepared considering the research questions and the existing literature. The first two question sets are aimed at gaining more insight into the user's story with the product. In this part, the participants shared the details on the story of the cherished product, the occasion which demanded the user involvement, the motivation, and methods for user involvement. Furthermore, the drivers, motivations, barriers, and results of the user intervention were also discussed.

The third question topics investigated the determinants which led to product attachment. For the sub-questions, the topics from existing literature were utilized. Participants were asked about their motivation for product attachment and the influence of mentioned user involvement on the attachment.

Fourteen semi-structured interviews were carried out. The interviews took about 30-45 minutes. Due to COVID-19 precautions, the interviews were carried out

online through Zoom. To overcome the limitations of online meetings, the participants were asked to share an image of their products. The meetings were recorded, after the participant's approval. Later, the recordings were transcribed using Transkriptor, an online tool that converts audio files into text. The transcription files were later imported to Excel for Thematic Coding.

3.3.2.1 Pilot Study

To confirm the validity of the interview questions, a pilot study was carried out. The participant for the pilot study was selected according to the ease of access and appropriateness of the product example. The pilot study was carried out face-to-face which allowed the researcher to physically examine the product. The interview was recorded and transcribed. The pilot study aimed at confirming whether the questions were comprehensible by participants without a design background. Besides, the structure of the interview guide and the flow of questions were examined. The pilot study also provided an approximate time estimation for the interviews. Figure 3.2 shows the product example from the pilot study.

Figure 3.2. Product photo from the pilot study: personalized tablecloths

After the pilot study, the structure of the interview and the wording of some questions were improved. During the pilot study, the researcher observed that certain questions utilized design terms that were hardly understood by the participant. Therefore, such questions were altered. For example, a question in the draft interview guide was:

"What social benefits do you associate with this product?"

After observing that this question was too technical and challenged the participant, the question was rephrased as:

"How do your close family and friends respond to this product?"

Furthermore, some questions were found to be unnecessary, since the participant already mentioned these details while explaining the product story. In addition, certain questions were removed from the interview guide as they didn't contribute to the thesis' research area. The researcher also realized that not all of the questions would apply to each product type. Therefore, the researcher decided to ask the applicable questions to each participant regarding their product example.

The most challenging question was related to the product's material qualities. The participant had a hard time understanding what material qualities referred to. Thus, the question was altered so the researcher could ask this question by relating to the product of each participant. Finally, to improve the structure of the interview, the determinants became prompt questions so that they wouldn't interrupt the participant while talking about other themes. As a result, the sequence of certain questions changed, and the researcher decided to embrace a much more flexible approach to the interview guide.

3.3.3 Overview of User Narratives

The participants in the field study explained their experiences of user involvement and its influence on the degree of attachment. This section introduces user

characteristics and gives brief information about the participant's narratives so that readers can make sense of the following chapters.

Table 3.6 demonstrates certain participant characteristics including age, gender, occupation, and familiarity with related involvement type. Within the familiarity parameter, participants are categorized as low, medium, and high. High familiarity denotes that the participant has extensive knowledge and experience on the related involvement type. These participants can carry out the intervention independently. For example, the pilot study participant had several previous experiences with sewing. She was capable of reimagining her product within the scope of related involvement types. Therefore, she was able to complete the involvement by herself at a great depth. Participants with medium familiarity have limited knowledge on the related involvement, but no experience. These participants can perform the intervention with little help or research. For instance, when he experienced deficiency on his laptop, Participant 3 needed to make some research to figure out what he was going to do. Although he didn't have a high level of technical knowledge or prior experience, the participant was able to perform the involvement by himself after learning all the necessary information. Finally, participants with low familiarity with the related involvement type have no experience or knowledge and can't carry out the intervention on his/her own. For instance, Participant 10 didn't have any knowledge or experience about the related involvement type. If the tailor didn't suggest the mentioned repair method, his jacket would have been disposed of. These characteristics are influential in the interpretation of findings. Thus, the presented data should be assessed within this scope.

Table 3.6 Field study participant characteristics

	Age	**Gender**	**Occupation**	**Familiarity with related involvement type**
Participant 1	60	F	Retired	High

Participant 2	63	M	Aeronautical Engineer	Medium
Participant 3	28	M	Entrepreneur	Medium
Participant 4	28	F	Photographer	High
Participant 5	28	F	Product Designer	Low
Participant 6	28	F	UX Researcher	Low
Participant 7	32	M	Mechanical Engineer	High
Participant 8	26	F	Research Assistant	High
Participant 9	28	M	Product Designer	High
Participant 10	26	M	Research Assistant	Low
Participant 11	27	F	UX Researcher	Low
Participant 12	28	M	Product Designer	High
Participant 13	30	M	Mechanical Engineer	High
Participant 14	25	F	Student	Low

Participants from the field study shared several interesting narratives. The pilot study participant, shown in Figure 3.3, was facing challenges in finding an appropriate tablecloth for her dining table because of its uncommon dimensions. Later, she found a large tablecloth she likes a lot. She altered the large tablecloth so that she was able to make one appropriately sized tablecloth and an additional runner for her table. She was able to tailor a ready-made product, shown in Figure 3.3, according to her needs.

Figure 3.3. Tablecloth from Participant 1

The second participant has been using his stereo for 36 years. When he moved to an urban part of the city, he started losing satellite reception. To overcome the performance problem, he changed the product's antenna with a different type that would allow him to continue listening to good quality music. Furthermore, he changed the configuration of the speakers because they didn't fit in his living room.

Participant 3, in Figure 3.4, replaced the Hard Disc Drive of his laptop with Solid State Drive, which has more advanced technology because the storage space was no longer satisfying his needs. He had been using the laptop for a while but as he started university, his needs changed, and he needed to perform an involvement.

Figure 3.4. Participant 3 replacing the HDD card on his laptop

Furthermore, he experienced product mastery while he was trying to figure out the product features. Once he learned all the product-specific gestures, he was able to create his own personalized workflow.

Participant 4, in Figure 3.5, had decorated her car with certain cherished products to increase her sense of ownership. She collected photos of her friends and hung them at the sunshade. The figure shows how she decorated the car with photos. Her interest in photography, along with her desire to feel as if her friends are always with her in the car, initiated the act of personalization. She admits the car felt cozier and nicer once she hung the photos. Also, she needed to take her car to the repair shop several times due to failures.

Figure 3.5. Participant 4’s car decorated with photos from friends

Participant 5, in Figure 3.6, mentioned the repetitive repair activities performed on his most favored product, his glasses, with the help of a repairman. He shared several occasions where different parts of the glasses broke, and he repaired each failure with dedication.

Figure 3.6. Participant 5's glasses

Participant 6 talked about the sweater, as presented in Figure 3.7, that her mother knitted for her. They have experienced a collaborative making process where they chose the color, material, and model of the product.

Figure 3.7. Hand-knit sweater from Participant 6

The sweater was also the first piece of clothing her mother knit. Later, as the sweater started to wear out, her mother made knitted patches on the elbows of her handmade sweater.

Participant 7 has been longing for a high-quality earphone when he was a student and he was able to buy one, Figure 3.8, with his first paycheck. During his product use of six years, he experienced some product failures on his earphones. He repaired several broken parts and made part replacement up to a point where the earphone went technologically obsolete.

Figure 3.8. Participant 7's headphones

Participant 8 had bought an agenda a while ago because she thought the layout of the pages was very useful. The cover of the agenda wrote "Girl Boss", which she found sexist. So, she performed an involvement where she changed the cover of the notebook completely and changed it to an illustration from her favorite movie. She printed the illustration she prepared on a sticker and applied it onto the cover. Figure 3.9 below shows the personalized agenda cover. By the time the agenda ran out of pages, she had liked the cover so much that she didn't want to replace it. So, she bought a new agenda with a similar page layout and loaded the blank pages on her currently owned agenda.

Figure 3.9. Agenda cover personalized by Participant 8

Participant 9 built an arbor for his garden, Figure 3.10, from scratch. His family needed an outdoor sitting unit. They made research and found out that buying a new product would cost less. The describes the production process in detail. First, he decided on the design of the final product. Later, he supplied the necessary materials. In the following, they assembled the materials as a family. He feels satisfied that he was a part of the product from the beginning to the end. Since then, they have been pursuing maintenance activities on the arbor as a family. They put on a new layer of varnish to protect the product from outdoor conditions. They also make repetitive personalization as they realize a need, such as adding lighting, storage space, and decoration to the arbor.

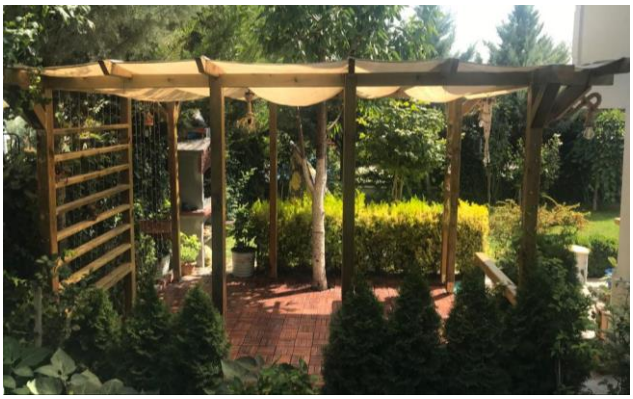

Figure 3.10. The self-made arbor by Participant 9

Participant 10 had bought a jacket when he started university. He liked the jacket a lot because it had a distinctive color and he felt good in it. Figure 3.11 presents his cherished jacket. Later, he experienced an unpleasant occasion when parts of his favorite jacket melted near a bonfire. The participant asked a tailor to make patches on the burnt marks by utilizing the material of the jacket's hoodie.

Figure 3.11. Participant 10's cherished jacket

Participant 11 bought a cocktail dress when she was a high school student to wear at a wedding. She later found a method to wear the dress repetitively. She personalized her dress so that the product can continue serving her changing needs. She altered the product size and changed the ornaments on her dress repetitively. The dress evolved several times in line with user changes. Due to her frequent

personalization practices, she was able to wear the dress on several occasions and the dress had responded to her current taste although she had grown from being a young adult to an adult.

Participant 12 upgraded his 3D printer because its performance wasn't technologically competent. The user was able to afford an amateur printer at the time of purchase, as shown in Figure 3.12, but as he started mastering in 3D printing technique, he demanded more intelligent features from his printer. First, he made small fixtures to improve the stability of the product. Later, he changed the material and the size of the printing plate because the initial version was damaging the printed parts.

Figure 3.12. Participant 12's upgraded 3D printer

At last, he completely changed the material of structural parts from plastic to metal. As a result of his upgrade activities, the amateur printer transformed into a professional product.

Participant 13 assembled his computer according to his preferences. He collected each piece after an immense research phase. When he had all the necessary components, he assembled the product which was a highly personalized outcome. Figure 3.13 shows the self-assembled computer.

Figure 3.13. Self-assembled computer from Participant 13

Finally, Participant 14 had been wearing her cherished sneakers, Figure 3.14, for a very long time. She even carried the shoes as she moved between countries. But as she started observing the effects of wear and tear, she performed maintenance activities and replaced the laces of the shoe with new ones.

Figure 3.14. Participant 14’s sneakers

3.3.4 Data Analysis: Thematic Coding

Coding is a key element of qualitative content analysis. Thematic coding is the strategy by which data are segmented and categorized for analysis (Saldana, 2015). In other words, thematic coding is a form of qualitative analysis which involves recording or identifying passages of text or images that are linked by a common theme, to establish a framework of concepts (Gibbs, 2018). Gibbs (2018) suggests that thematic analysis helps researchers understand the aspects of a phenomenon that participants talk about frequently or in-depth and how those aspects of a phenomenon may be connected.

Once the interview transcriptions were completed, the raw text was transferred to Microsoft Excel for Thematic Coding. Later, the data was analyzed to find relational patterns between product examples. The data was categorized under appropriate codes.

For Thematic coding, each participant had a dedicated spreadsheet for analysis. The transcriptions were transferred to the file in a way that each sentence would be placed in a single cell. Each row in the file began with the related participant's number. Next to the quotes, there was a column for the main categories, followed by another cell for sub-categories. Finally, the researcher added a blank cell for notetaking.

The code structure evolved as the analysis carried on. The final version of the coding structure touched upon different aspects of the research questions. The main categories are:

- User Involvement
    - Types of User Involvement
    - Motivations for User Involvement
    - Drivers for User Involvement
    - Barriers for User Involvement
    - Results of User Involvement

The coding structure was based on the user involvement perspective due to the focus of the study. So, the findings were regarded with their influence on user involvement. Types of user involvement investigate the range of activities performed by participants on their cherished products. Motivations for user involvement, on the other hand, investigate the encouraging factors for users to pursue user involvement. The drivers for user involvement are the facilitators for the intervention. Barriers for user involvement act as the inhibiting factors for involvement. Finally, results of involvement display the outcomes of the performed involvement.

The initial structure of the coding approached findings from both product attachment and user involvement perspectives. For example, the initial coding structure included:

- Cherished Product Feature
- Product Attachment Determinant
- User Involvement
- Effect of User Involvement on Product Attachment
- Suggestions for Product Attachment Strategy
- Product Initiated Changes
- Product Stage Narrative

The initial layout of the code structure used to be disorderly and lacked focus. The hierarchy among the categories was also problematic. As a consequence, the categories were rearranged to better align with the interview guide and the goal of the research question. The detailed version of finalized code structure can be found in Appendix I.

3.3.5 Data Analysis: Affinity Diagram

Affinity Diagram is a tool for visually organizing and analyzing data. The method allows for the categorization of large amounts of data into common themes where the relationship between those themes is also apparent (Gkatzidou et al., 2021). By utilizing an Affinity Diagram, revealing relations and patterns among categories is much more efficient.

Within the scope of this study, the Affinity Diagram was utilized to combine user data with researcher notes, as well as reveal the relations between the categories in the coding structure. For this process, Figma, an online graphics editor tool. An individual affinity map was prepared for each participant where codes, the user quotes, and the researcher notes were combined. The coding structure from the Thematic Coding process was transferred to the diagrams and each main category was assigned a color. The color-labeled coding structure is shown in Figure 3.15.

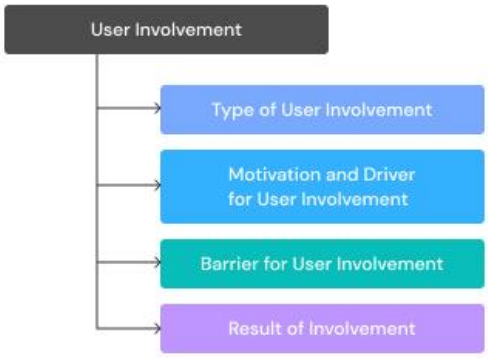

Figure 3.15. Color-coded coding structure from Affinity Map

Figure 3.16 presents a section from Affinity Diagram 10, in which the analysis of Participant 10's session was laid out visually. As can be seen from the figure, the researcher's notes were associated with participants' quotes as well as codes from the code structure. Then, the associations about their relations were formed.

Figure 3.16. Section from Affinity Diagram 10

The Affinity Diagram contributed to the study by demonstrating the relationships between previously determined codes. The visual layout of the analysis and relationships among the codes enables the comprehensible compilation of each participant's experience. Thus, more tangible associations among codes were achieved. For instance, a more holistic approach was facilitated among the type, result of user involvement along with their motivations and drivers. By reviewing the researcher can make inferences if certain motivations and drivers are only valid for certain types of user involvement.

Furthermore, the diagram also yields the potential areas where designers can look for inspiration to enhance product attachment through user involvement. The researcher realized that several design directions for product attachment can be driven by analyzing the type of user involvement and user involvement motivations. The participants have shared the most insightful data within these categories. So, the deeper inspection of the areas relating to the type of user involvement and user involvement motivations within the Affinity Diagram will provide enriched insight for the guideline aimed at this thesis study.

Ultimately, the barriers for user involvement presented a more valuable significance after the Affinity Map. Without seeing their contribution to other themes, barriers for user involvement wouldn't contribute to the research question effectively. After the Affinity Diagram, the barriers for user involvement started posing a potential for

design directions. The researcher also deduced that detachment scenarios were one of the most common motives for performing user involvement. The users were inclined to make a user involvement when they felt a decrease in attachment towards their cherished products.

CHAPTER 4

FINDINGS AND DISCUSSIONS

This chapter includes findings from the field study. The findings are explained from a user involvement perspective. Within user involvement, the study presents types, motivations, drivers, barriers, and results of user involvement.

4.1 User Involvement

This study is investigating the user-initiated interventions during the consumption process. Prahalad and Ramaswamy (2004) define this type of involvement as the user's intention to create unique and personalized experiences. User involvement employs active roles to users. In summary, this study defines user involvement as (Sinclair et al., 2018, p. 1):

> *"Points within a product's lifecycle where stakeholders are able to intervene in the product's expected journey."*

In their studies, to investigate the intervention areas, the researchers have demonstrated potential areas throughout product life where users can actively be involved (Sinclair et al., 2018). Figure 4.1 demonstrates the intervention areas throughout product life.

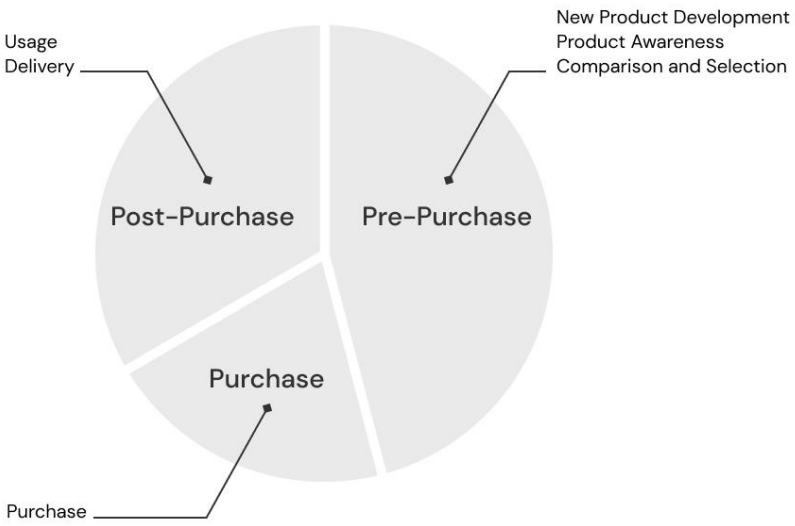

Figure 4.1. User intervention areas (Sinclair et al., 2018)

Ranging from product research, acquisition, maintenance, and post-use, the researchers suggest that user involvement can be enhanced in a number of stages in product life. Allowing users to intervene with products on several stages of product life, will result in more sustainable consumption practices.

Furthermore, in this study user intervention is associated with product attachment. To support this theory, several participants in the field study have mentioned how their involvement has strengthened their attachment level. To give a few examples, Participant 12 explained:

> *"I spent as much time on it and I can't easily lose sight of something I worked this hard for."*

Whereas Participant 6 suggested:

> *"It came out as a result of a big effort. For example, when you buy merchandise from the internet, you don't even see the money. You pay by card. It seems to me that everything has become even more worthless now. You can access anything you want right*

now. But at that time, my mother went and chose the rope in the market, worked hard, and knitted it next to me. She even knitted it wrong then she knitted all over from the beginning again. Seeing those tedious stages made the final product more valuable and meaningful to me."

The invested time and effort increase the product's personal relevance. As a result, the product becomes unique and irreplaceable.

4.1.1 Types of Involvement

The field study analyzed a number of user narratives where users performed a user involvement on a product and developed an attachment. The intervention types mentioned by the participants were grouped under categories. The categories are:

- Repair and Maintenance
- Personalization
- Upgrade
- Handmade Products
- Product Mastery

4.1.1.1 Repair and Maintenance

Repair is restoring a product's faulty or broken features. Middleton (2012) raises the importance of easily repairable products in decreasing the environmental impact of consumption. Furthermore, research also suggests understanding the user's perspective on repair activities during early design phases for preventing early product replacement (Terzioglu & Lockton, 2016).

Participant 5 needed to repair his glasses several times. Participant 6 talked about how her mother made knitted patches, shown in Figure 4.2, on the elbows of her handmade sweater. Participant 10 experienced a product failure when he accidentally burnt the jacket. A tailor repaired the jacket by using the material on the hoodie. These examples include another person's skills and effort in repairing the product.

Figure 4.2. Patches on the hand-knit sweater

On the contrary, several participants have repaired their product by themselves. Participant 7 repaired the broken parts and replaced parts before the product went technologically obsolete. Participant 9 talked about the periodic maintenance activities they adopted as a family resulting from protective behaviors. Every year the family renews the varnish and repairs the defects from weather conditions. Meanwhile, Participant 13 repaired the processor of the computer he assembled himself because it was giving out too much heat.

4.1.1.2 Personalization

Personalization is defined as the alterations which a product undergoes, either aesthetic or functional, to increase its relevance to the user (Blom, 2000). Ozan (2019) defines the user activities of adapting product features to better suit themselves during various stages of product life as personalization.

The field study provided examples for personalization activities on cherished products. For instance, the Pilot Study Participant altered the tablecloth so that it fits the dimensions of her dining table.

Participant 3 had intervened in his laptop's system during a time when he played a lot of games, but the laptop didn't satisfy his needs. He later removed several integral parts of the laptop to reduce its weight, because his lifestyle had changed along with his expectations from the product. Similarly, Participant 12 made modifications to his 3D printer so that the product becomes compatible with how he uses the product. Participant 11 personalized her dress several times according to her changing needs. She made changes to the size and model of the dress so that she would be able to wear it on several special occasions. Participant 13, on the other hand, preferred semi-transparent materials while he was building his computer from scratch, so that he would easily change any part, in case he wanted to alter a computer part.

4.1.1.3 Upgrade

Designing for product upgrade, demands designers to allow for changes in performance due to user needs (Watanabe et al., 2007). By replacing related product parts, product performance can be adjusted to serve the changing needs of the user. From the sustainability perspective, product upgrades minimize the

environmental impact of products by preventing the manufacturing of excess products (Ishigami et al., 2003). Upgrading already owned products according to changing user needs result in overall reduced consumption. Product upgrade also serves for extending product life by preventing products from becoming technologically obsolete (Ishigami et al., 2003). Thus, product upgrades allow for more considerate consumption of energy sources.

A few of the participants shared stories of product upgrades. Some of the participants needed product upgrades due to their changing needs. For instance, Participant 2 upgraded the satellite on his music set to improve the product's performance after moving to a more urban area of the city. Whereas Participant 3 replaced the Hard Disc Drive of his laptop with Solid State Drive. Additionally, Participant 9 had performed continuous product upgrades to his arbor, as he observed deficiencies in product use. For example, they realized they needed a storage area, so they built shelves. Later, when they started using the arbor at night, they incorporated lighting fixtures. They also added a shade to protect themselves from sunlight. The family has had continuous discussions about potential improvements and upgraded the product to their changing needs.

On the other hand, Participant 12 made several technical upgrades to his 3D printer to increase its performance. Over the years, he transformed an amateur printer into a high-quality one. As he improved in 3D printing technique, he demanded his product perform better so he made numerous involvements to improve the product.

Participant 4 decorated her car with photos she collected from her friends to create a more personalized space. Likewise, Participant 10 appropriates certain accessories like scarves and jewelry to wear with his cherished jacket, to reflect himself in the most desired way.

4.1.1.4 Handmade Products

During the field study, some participants shared the story of their hand-made products. Hand-made products present an engaged involvement during the making process. Once the users start utilizing the product, they have already established an attachment deriving from the effort invested in the product.

For example, the pilot study participant created her tablecloths by using another product as a material. The planning process, supply of material, and the making process are involved within the product interaction. The sense of achievement and pride involved in transforming an object, also contribute to the strength of attachment.

Participant 9 built an arbor for his family. He was deeply involved in various production stages and finally felt proud in accomplishing such a product. Whereas Participant 13 proudly mentions his computer which he assembled. Similarly, he was highly involved in the production process as well. He even describes the material supply process as very challenging:

> *"It took almost four months for me to research and finally assemble this computer. First, I made a list of the pieces I needed. If certain pieces were at certain affordable prices, I would buy them immediately. I followed this routine for all of the components one by one."*

Having invested this much effort in the product before starting using it, results in an enhanced attachment as users feel personally involved.

4.1.1.5 Product Mastery

This thesis describes product mastery as the user's enhanced knowledge about product use, product features, and product maintenance. The researcher defines product mastery as a type of involvement because gaining a certain level of intelligence about product experience, a user needs to perform an enriched engagement. A user's curiosity and determination are also influential in the degree of mastery.

For example, Participant 3 explains how he has been using his Apple Laptop in a very orderly manner for almost four years. Such a product use resulted in an unexceptional experience. After engaging with distinctive gestures and learning about product features, he became a product like a power user.

> *"I think it took me 4-5 years to become a power user. Before that, I was using the laptop more superficially. I never knew the finger gestures before. I wouldn't use the touch pad much. I was using it like a Windows-based system. Other than that, I could never access finder, applications, etc. options of the keypad."*

As mentioned, the user improved in product use over the years. He was deeply engaged with the product to learn all its features, which can be interpreted as user involvement. After achieving product mastery, his experience with the product transformed from a very commonplace product use into a unique experience. Once he was able to distinguish his product use from any other laptop, the product became irreplaceable. He started enjoying the specific product capabilities. Hence, the user started appreciating the product more and enjoying the experience to a greater extent.

On the other hand, Participant 12 also experienced a similar involvement. After buying his 3D printer, they were trying to figure out the method of 3D printing

with his friend. They even damaged the product while trying to figure out the basics of the printing method.

> *"We watched many videos and tried several things with the product. You learn to drive a car in an accident. Right? That's what happened to me. For example, it has a tip that melts plastic. I played with it many times and finally, I figured out how to make the best use of it. (...) Now, I can adjust the machine in all aspects because there is nothing left I haven't tried with it. (...)Of course, everything comes better with experience."*

The user regards the experimental studies as the effort he invested in the product. Thus, the product is much more valuable due to his effort in product mastery, and feels like he is actualizing the product.

4.1.2 Motivations for User Involvement

During the field study, the researcher observed several factors which influenced users' motivation to pursue user involvement. These motivations acted as encouraging factors for the users to carry out the involvement on their cherished products. In other words, due to these factors, the users were willing to extend the product life of their cherished products through user involvement, instead of replacing them. The motivations for user involvement were categorized under several concepts. These concepts are:

- Changes in Lifestyle
- Extending Product Life
- Financial Gain
- Satisfying Special Needs

- Product Longing Before Acquisition
- Shared History and Emotional Significance
- Social Benefits
- Customization and Personalization
- Utilitarian Features

4.1.2.1 Changes in Lifestyle

Lifestyle changes can be an influential factor in how the user approaches the product. Critical lifestyle changes affect the product routine. Products are suggested to respond to changes in user to achieve an extended product life and strong product attachment.

Within the scope of this study, two of the participants have mentioned changes in their lifestyle as a driver for user involvement. For instance, Participant 2 has been using his music set smoothly for almost 30 years. Then, he moved to a more urban area of the city which caused complications in the satellite reception. To overcome the decline in product performance, the participant changed the music set's antenna type.

Whereas Participant 3, needed to switch his laptop's component to a different technology because he was starting university and would use the product more intensely. The participants decided to overcome the deficiencies caused by this change by performing a user involvement. Thus, incorporating a certain level of adaptation to the product during the design phase, allows the users to satisfy their changing needs without product replacement.

4.1.2.2 Extending Product Life

Another motivation for participants for user involvement is extending product life. When participants observed a situation that would result in the termination of product life, they decided to take action. For example, Participant 7 claimed he repeatedly extended the product life of his earphones with repair activities. He explained:

> *"It was almost unusable. I resurrected it. It was literally dying; it was becoming unusable."*

Without his user involvement, the product would have to be disposed of and replaced with a newer model. He also stated that he acknowledges the earphone's performance decay over the years. The repair activities weren't sufficient in returning the product to its initial state but allowed a slight increase in performance which enabled him to continue using the product.

On the other hand, several participants have performed certain activities to extend product life, as a cautionary action, before any product failure. For example, Participant 8 shares that her protective behaviors to extend product life has altered her product use.

> *"I don't like to use pencils on my agenda, because they leave a lot of stains. Those stains wear out the paper. I like looking back, and seeing, what I did that day. But when there is a pencil stain, it becomes so dirty that it cannot be easily read. I think, since I use it with a ballpoint pen, my agenda's aging is quite minimal. Since I use it carefully, the pages do not wrinkle that much."*

Similar to this example, Participant 9, who repetitively performed maintenance activities on his arbor, suggested that all of his interventions were aimed at

prolonging product life. Participant 12 also aimed for an extended product life while upgrading his 3D printer. He mentioned that once he started upgrading the printer, he got ambitious about creating a product that he could use all his life. Due to this motivation, he constantly made interventions to increase the product's durability.

Besides, Participant 11 proposed that by making several changes to her dress, she was able to wear the dress repetitively. At purchase, she thought she could wear the dress only on a couple of special occasions. However, regarding her renewal interventions, the dress was utilized more frequently than expected.

4.1.2.3 Financial Gain

Studies show that users are willing to pay up to %20 of the replacement cost on product repair (Adler & Hlavacek, 1976). In other words, users have an expectancy for financial gain during user involvement. Exceeding the user's desired cost results in discouragement for intervention. Several participants from the field study declared that their motivation for performing the user involvement was financial gain. Those users felt reluctant to pay a higher price for a new product. Thus, extending the life of the cherished product.

For example, before starting making his arbor, Participant 9 made a research on products on the market. He learned that buying a product off-the-shelf would cost him five or six thousand liras. Seeing the financial gain of making his own product, encouraged him even more.

Participant 7, needed to buy a number of tools and replacement parts to repair his earphone throughout the years. Each repair made sense for him because buying a new product would cost him even more.

"Then the sponges of the earphone broke down. Because of that, would you throw away a thousand-lira worth of earphones, while its sound quality hasn't been lost? You say "I'll buy a new sponge for this". Something breaks down, the parts cost one hundred and fifty liras. Okay? But if you've already tried to renew the whole set, it costs you two thousand liras. Because of this, you try to pass it off with little things."

To conclude, Participant 11 admitted that one of the motivations for modifying her dress was because it prevented her from having to buy another one.

"It was also a time when consumption was relatively moderate because of financial concerns. Therefore, it made more sense for me and my family to evaluate an already existing product."

Reviewing these examples demonstrate the importance of accessibility of product resources such as repair services. Meanwhile, designers can consider the market opportunities in designing after-sales systems (Hernandez et al., 2020). Designing such services would also increase users' appreciation of the brand and increase product attachment.

4.1.2.4 Satisfying Special Needs

Some of the participants from the field study, performed a user involvement because the available products in the market didn't satisfy their needs. After reviewing several product options, they decided to alter their products.

For example, the pilot study participant was searching for a tablecloth with the appropriate dimensions for her dining table. Moreover, the patterns and colors

didn’t match her aesthetical taste. As a result, she bought a very large tablecloth which she liked aesthetically and personalized her own tablecloth.

Besides, Participant 12 aimed at satisfying the technical needs for his desired printing quality, while upgrading his 3D printer. First, he decided to replace the material of the printing plate because of the insufficient heat qualities of the original plate. He prepared a glass plate to incorporate on the printer. Then, he felt the need for a clipping structure to fix the glass plate. Thus, he made his own clipping apparatus by utilizing his 3D printer.

The participant suggested that as he improved in product use and learned more about the 3D printing technique, new challenges and opportunities emerged. In order to respond to these challenges, he needed to appropriate new product solutions by himself. Following the previous involvements, the user decided that he wants to increase the print rate. To achieve that, the user needed to replace the roller structure.

As it can be inferred from the given examples, users tried to appropriate the available tools, materials, and skills to satisfy their special needs. Mass-produced products don’t always meet individual user requirements. So, allowing for the user’s involvement to create solutions for their problems, poses a very democratic and sustainable design strategy.

4.1.2.5 Product Longing Before Acquisition

The findings of the field study yield that the amount of product longing before the acquisition may lead to user involvement due to emotional significance. The findings revealed product narratives in which either the users had longed for the product for a very long time, or the acquisition process was a little fuzzy and demanded the user’s effort.

For instance, Participant 3 has aspired for the new Apple laptop before buying it. He made online research and watched several product videos. The admiration for the product's technical details, resulted in him imagining the product use before even buying the product. When he finally bought it, the laptop was regarded as the award of his longing. Similarly, Participant 7 has felt envious of the high-tech cordless earphones while he was studying in university. He recollects:

> *"For years, I said, "That brand has headphones for a hundred liras". Then you eventually get it yourself. Because of that, remembering the excitement it gives you back then makes you smile. It's valuable in that respect."*

Likewise, Participant 2 has been longing for a quality music set when he was a student and he bought one for himself with his first paycheck. For both of these examples, during the pre-purchase time, the user may overestimate the product value.

The accumulation of desire for the product results in an investment of personal meaning at the moment of purchase. The user may also be imposing a sense of achievement on the product. The emotional significance of the product increases within such a context. Therefore, both of these participants continued making interventions on their products during the use phase of consumption instead of replacing them with new models.

From a different standpoint, the field study contained two cases where the required effort for acquisition enhanced the dept of involvement performed on the product. Participant 12, before starting upgrading his 3D printer with various techniques, struggled in the product's acquisition process.

> *"This printer was stuck in customs when I first bought it. We contacted so many people, we had a lot of trouble, so I must have*

been connected to the printer due to all these troubled times. In the end, I achieved bringing the printer to Turkey."

As the narrative suggests, the participant experienced an extensive involvement process before the acquisition and was already attached to the product due to hard times he needed to overcome.

On the other hand, Participant 13 experienced an extended production phase while was trying to assemble his computer. He needed to supply each component, following an individual research phase for each part. He later needed to assemble the pieces which demanded quite a lot of effort. Finally, he realized some of the components had broken down. So, he disassembled and acquire the necessary pieces all over again.

The involvement process deriving from the challenging acquisition became representative of his determination, effort, and hard work. Thus, that computer is regarded as irreplaceable and much more valuable than any other technological device. As a result, the product longing has become the main motivation for user involvement.

4.1.2.6 Shared History and Emotional Significance

The findings denote that product attachment attained through the influence of shared history and emotional significance can encourage user involvement, thus extending product life.

The narratives in the field study, related to the means of achieving a historical product value that leads to user involvement, can be examined under four concepts. First, a number of users have been *utilizing products for marking important events in the past*. For example, Participant 2 regards his stereo as a signifier for his first paycheck. He defines the stereo as an artifact of his efforts and achievement.

Furthermore, the stereo was the first piece of electronic equipment in his house after getting married. He recollects listening to music with his wife during their first days as a married couple. Also, Participant 4 reveals:

"And of course, it's my first car. I think it's an emotional thing."

The participant touches upon how much she enjoyed the time she spent with her car either. The positive memories she has of the car with cherished people are an important factor in determining the user's motivation for involvement.

In both of these examples, the products gain an emotional value regarding the important event they mark. They remind their users of very specific memories from the past. Both of these users wouldn't regard a similar product, although being the same, in the same manner, because the mentioned products have gained significance within the context of those memories.

Secondly, further user involvement can be encouraged by the current *user involvement process building emotional and historical* value. In other words, as well as encouraging user involvement, a product's emotional value can also be attained through involvement as well. In other words, apart from initiating an involvement process, involvement can also result in building historical value with the product Users can also deploy a memory value to the product with their own effort. For example, Participant 8 says about her agenda:

"I really feel like I'm writing my own memories. For example, if a friend of mine has a birthday party, or if I am meeting someone, I write it. (...) Looking back on the pages, I can see how much time had passed. I say, 'What a day it was.' ".

The user is gradually building a historical product value with each use. She is collecting and recording new memories over time. The repetitive and frequent product use, which demonstrates increased user involvement, is influential in

preserving the product value. This narrative is a good example of building product attachment through shared history and emotional significance with the influence of user involvement.

As a third concept, products can also have *historical significance by highlighting the maker's effort*. Participant 6 values the knitted sweater gifted by her mother it is the first piece of clothing that her mother had knit. She shared:

> *"It was the first time she had accomplished something by knitting. She was hesitant about the (sweater's) success, but she took up knitting because I wanted such a sweater. It means a lot to me."*

The depth of the maker's involvement in the product proposes an emotional significance that any other product can't provide. Wearing the sweater reminds the user of the maker's effort and the intimate production process.

In support of this topic, Participant 12 discusses that he spent so much time and effort on his 3D printer, that now they share a common history. He said:

> *"I worked hard on that plastic case for so long, we now have a history together."*

In other words, the product didn't only passively witness important events in the user's life, but the user involvement created a memory on its own. The user recollects the involvement process, which includes several upgrade practices that resulted in product mastery, created pleasurable experiences on its own.

Lastly, Participant 9 is appreciating the aesthetic value of wood because of the *graceful display of time*.

> *"It will be a bit of a philosophical comment, but it's nice that wood is a living thing, something natural. That's why it's my*

favorite material. It doesn't look artificial in the garden but gives the feeling that it is something special and that is naturally there. Because its texture changes every year. Cracks come out of the corners, and we say "whoaa". It has such an interesting life cycle of its own, it's also fun to watch its new formation."

The user appreciates witnessing the changes in the material. He also started regarding the product as having its own personality. He explains he puts on a layer of varnish each year for maintenance.

"Also, this feature of wood is very nice: as long as you take care, you may use it. You put a varnish on it, it shines. Nice as a painting. In other words, since it is an outdoor material, it stays in a harmony with the color and texture of the environment. It doesn't have a disturbing look. That's why we chose it at first anyways."

The user is experiencing a satisfaction material choice through user involvement. The user's narrative demonstrates a material evolvement as a response to user involvement. Perhaps, when users are encouraged to interact with the material and leave personal traces, attachment can be promoted.

4.1.2.7 Social Benefits

Products that enhance a users' depiction within their social environment provide social benefits (Ball & Tasaki, 1992; Mugge, 2007; Savaş, 2002; H. N. J. Schifferstein & Zwartkruis-Pelgrim, 2008). The field study yielded examples in which participants valued the social benefits of their products so much that the product's social value led to user involvement. The participant from the pilot study shared the influence of her family in personalizing her tablecloths. She shared that

the enjoyable family breakfast activities when she puts up a colorful breakfast table, triggered her to seek variety and personal touches on the tablecloths. Meanwhile, Participant 2 appreciates that his music set proposes opportunities for his social circle, so his engagement with the product increases. He explains:

> *"It can play different media. For example, someone brings their own tape, you can play it. Someone else is bringing a CD; you play that too. So, others have a chance to listen as they wish."*

The user appreciates that his cherished product can entertain his friends as well, providing a suitable context for his social identity. He also mentions he used to play music for his colleagues at the office. Everyone appreciated it and got curious about his music set. The product use that took shape around the user's social circle, increased his involvement in the experience.

Participant 4, who admired her car decorated with photos of her friends, mentioned how there was a time when she was using the car with a group of five people of her best friends. They used to drive everywhere together. They even kept pillows and blankets in the trunk in case they wanted to spend the night out drinking outdoors. She even enjoys being cramped up in the car when they are too crowded inside the small car. She recollects these times as a very enjoyable period and admits the collective use of the car influenced her attachment experience. Her social experiences resulted in personalization activities.

Furthermore, Participant 4 mentioned how much she appreciated the conversation initiator aspect of her car. Her car didn't have a proper music system, so she needed to appropriate several gadgets to play music. She explains:

> *"Since the car does not have an AUX connection, it has a conversation-starter feature. "Who will turn on the music?",*

"Someone turn on the music", "Put the phone here". I think it's cute."

She also suggests how the photos she hung up had a conversational property as well:

"Every person who gets in the car will say something about my decoration. It becomes a topic of conversation. All of them were like conversation starters, but they are all memories. It makes me love the car more."

Similarly, Participant 5 also benefited from his cherished glasses in terms of starting a conversation. He describes:

"It started a conversation a few times. It even started a flirt. A girl said, "Your glasses are cool". Then we started typically chatting it turned to an "I like your style" thing then it turns out to be a real date."

On the other hand, Participant 9 involved his family in the production process of the arbor so that they could all feel a sense of ownership once they start using the product. He explains:

"I prepared all the materials. Then we assembled it all with my brothers, my mother, my father, etc. So, it was a fun and memorable process. Then, everyone started having an opinion to share for the final product. "Should we change that place a little bit? Should we add a shelf here and there" or something like that. It was a process where everyone had an opinion on and contributed to."

Elaborating on his experience, it can be concluded that the product has become a medium for family interaction. It benefits the user by increasing his communication with his family. Furthermore, the participatory production process increased each family member's attachment to the product.

Participant 12, who upgraded his 3D printer, similarly experienced cases where people who didn't have any knowledge of 3D printing got amazed by his machine and initiated a conversation about his process. They were also curious about having such a production capability at home and asked several questions related to it.

Besides, the car allowed to expand Participant 4's social group. She remembers how she used to drive people around who didn't have a car. During those car rides, she was able to bond with people she would normally struggle to find a common context with. In the same way, Participant 12 was also able to strengthen his bond with his niece when she got curious about 3D printing and asked the participant to teach her the method. He shares:

> *"Two or three years ago, I had just assembled the printer when my sister and her daughter came to my house. They were both shocked. We printed something with her. It has turned into a context where we can spend some quality time together. It positively affected my social environment because it was something interesting which I made myself."*

The product's invitation for a shared interaction enabled these participants' involvement with the product within a social environment by acting as a medium in which users can depict themselves.

4.1.2.8 Customization and Personalization

According to some participants in the field study, the need for customization and personalization is an important motivation for initiating user involvement. For example, Participant 2 has raised his music set's ability to personalize the sound qualities to the user's preferences.

> *"You can adjust the frequency of the sounds. The three keys here - one of them is for the human voice, the other one is for violin sound and the other for wind instruments. If you want to hear the violin sound loud in a violin concerto, you can adjust it manually."*

As a user who is highly interested in music, the participant appreciates that the product's abilities respond to his need for personalization. The user can perform an involvement on the product by altering the product features to enjoy a personalized experience. Similarly, Participant 6 explains her hand-knitted sweater:

> *"Everything was just as I wanted it because she knitted it for me. The hat, the sewing, the size, the model…"*

Since the sweater was made especially for her, the user had a very personalized product. Such a personalized product demanded the user's involvement during the production phase. As a result, she enjoyed how each product dimension serves her. Furthermore, she mentions:

> *"Also, since I used it a lot, it took the shape of my body."*

The product adjusted itself further to its user with use. The final product is highly personal. Due to the duplication of her body shape, the user may be regarding the product as an extension of the self.

Although already personalizing her agenda, Participant 8 is searching for ways to increase the product's relevance.

> *"Maybe I can create the papers inside its cover myself. Because I have a lot of paper and I can do this. (...) I want fully personalized page layouts, in a time when I'm not this busy."*

The user wishes the freedom to operate however she wants within the product experience. She is excited about the possibilities of intervention to make the agenda more her own. Therefore, she is benefiting from her desire for personalization as a motivation for user involvement.

Besides, Participant 9 is content with having the opportunity to personalize his self-made arbor as new ideas emerge.

> *"We can put an ornament or something else to our taste. It's purely personal, it just feels good because we can constantly change it to our liking."*

He also suggested that the family started spending more time on the arbor as a result of personalization.

As a result of the involvements deriving from the motivation of personalization, a number of participants felt their products became more successful in reflecting their identities, aspirations, and beliefs.

Participant 4, who decorated her car with photos of her closest friends, points out that his car has become her signature. By hanging those photos, she feels as if she made the car her own. Through her involvement, she was able to transform her car into a medium where she expresses her character. Besides, considering that she values the effort and motivation of the maker more than the product itself,

Participant 6 thinks that her hand-made sweater with knitted patches is truly communicating what she appreciates essentially.

From a different perspective, Participant 8 was experiencing product detachment because the product ideology wasn't compatible with her beliefs. There was a motto on the cover of her agenda which she found sexist. So, through her involvement, she put an illustration on the cover from her favorite movie. She concludes:

> *"The figure on its cover irritated me. I love it now because I removed that figure and replaced it with a better object, a character from a movie. And because I really like the movie, I remember how happy I was every time I watched that movie."*

The increased harmony between the reflected images of the product and the user allowed for an increased product attachment. The participant was able to increase the self-expressive abilities of the product through user involvement. Figure 4.3 shows the cover of her agenda after the involvement.

Figure 4.3. New agenda cover from Participant 8

Participant 12 had been involved in upgrade practices on his 3D printer throughout the years. Now that he was able to transform a very basic product into an almost professional 3D printer, the participant is feeling that his motivation to improve the product and ability to upgrade the printer is highly reflective of himself. He also enjoys that his upgrade techniques and the final product communicate his career-related abilities as well.

Finally, the findings suggested that self-made products which involved extensive user involvement, are highly successful in achieving product attachment. Participant 13 and Participant 9 claimed that since they invested a considerable amount of effort, their products are inseparable for them. They suggested that they have reflected themselves with the product choices they made during the production process. Participant 13 had assembled his computer on his own from scratch, whereas Participant 9 had built an arbor for his backyard. The user's determination and highly personal production process resulted in a unique product that highly represents its maker. These examples suggest user involvement can lead to self-expression and eventually product attachment.

4.1.2.9 Utilitarian Features

Users can be encouraged to perform user involvement due to a product's utilitarian features. For example, the pilot study participant preferred to personalize her tablecloth because its material was of good quality. Participant 2 was also very fond of the sound quality of his music set. He was enjoying the multi-sensory interaction derived from the technical performance of the speakers. He immersed himself into the product experience through auditory qualities. When he experienced a depreciation of product utility, he looked for ways of repairing the antenna, instead of replacing the music set.

On the other hand, Participant 8 is valuing her personalized agenda because the page layout suits her needs, and she developed a routine based on the structure of the agenda. She was so satisfied with the agenda's utility, that she bared to continue using the notepad although she hated the original cover. The utility of the agenda also enabled the user to repetitive product engagement. Currently, she checks her agenda first thing in the morning.

On the other hand, she is extremely content with the paper quality of her personalized agenda. In this case, the material quality enables user involvement. If the paper quality was lower, the user couldn't have changed the page orders according to her preference and write on the pages as she liked without worrying.

> *"The quality of the paper has a major effect. The thickness of the paper also constituted an excessive use of this planner. I personally like thick covers and I can use most of my pens on the paper without worrying."*

It is safe to say that both of her involvement processes are motivated through product function.

4.1.3 Drivers for User Involvement

The researcher investigated the drivers for user involvement within the scope of the field study. Drivers are described as the facilitators for user involvement which helps users continue user involvement once they decide to perform one. The drivers for user involvement obtained from the field study are:

- Skills and Availability
- Appropriate Material Choice
- Availability of Product Resources

- Amount of Time and Practice
- Evolvement
- Ease of Maintenance

4.1.3.1 Skills and Availability

In designing for behavior change, knowing the user has the utmost importance. The use of a product is highly dependent on user characteristics (Mccalley & Midden, 2002). Considering user profiles during design phases, help determine how users will respond to the particular design strategy (Lockton et al., 2010). Users with different profiles may react to the same design strategy differently. Choosing the appropriate design strategy for the given user characteristics results in positive behavior change (Coskun & Erbug, 2014).

In this manner, skills and availability were seen as important drivers for users' involvement process. Within this driver, the level of user skill and the availability of tools or processes required to intervene with the product has been inspected.

During the field study, participants' skill levels varied. Some users were confident in intervening in their cherished products, whereas, for others, the lack of skills acted as a barrier for involvement. For example, pilot study participant expressed:

> *"Sometimes the things I like are too expensive. So sometimes when I find the appropriate fabric, I make it myself because I can sew it myself. These are simple things. I also had a sewing machine at home. No need to buy anything extra."*

The participant was highly skilled in crafts. Therefore, she could imagine the ways of personalizing her products as well as easily implementing those. She preferred

making interventions to existing products, instead of buying a new product because she has the necessary skills and tools.

Whereas Participant 3 had a familiarity with technological products from his previous experiences, before changing the hard disc of his laptop. Combined with the research he made before intervening, he was confident that he could achieve such a modification.

Besides, although not having the required skills for repairing his glasses, Participant 5 had access to a skilled repairman who he could frequently visit. Having such a skilled person within his reach increased his confidence in product repair. He mentioned:

> *"I established a friendship with an excellent repairman. He would let me know his new contacts if he is relocated. I was looking for such a man I'd refer to in for emergencies."*

On the other hand, Participant 9 had struggled in the making process of the arbor, due to a lack of necessary skills. Due to the scale of his project, it was challenging for him to complete the production process by himself. He explains:

> *"When we did something on such a large scale, of course, it was difficult to produce or make changes later on. For example; while holding a two-meter plank upright, three other wooden corners needed to fit together with a wooden insert detailing the corner. But these aren't such precisely calculated details that we couldn't do them properly with what we have as basic tools. We had some difficulties in such products in that sense."*

Not all of the participants had performed the involvement themselves. There were a considerable number of users who benefited from the skills of other people in making product interventions. Perhaps designers shouldn't only consider the

individual skills of the users, but also the skills of other people within the user's reach.

Moreover, the availability of tools and materials is another influencing factor. Participant 3 mentioned that he needed to replace the screws of his laptop with different ones because he was unable to find more of the same screws. Figure 4.4 shows the missing screws from the participant's laptop.

Figure 4.4. The missing screws from the participant's laptop

From a different perspective, Participant 7 highlights the importance of localization by explaining the struggles he experienced during material supply.

"The parts have a lead time of one month. It comes from America or China because they don't have parts in Turkey."

The pilot study participant admitted already owning a sewing machine was a driver for personalizing her tablecloth. Participant 3 mentioned he needed to buy a piece

of specialized equipment to unscrew the back cover of his laptop because the regular screwdrivers didn't suit the design. Besides, Participant 8 envisions the potential for her personalized agenda because she has the necessary equipment. She explains:

> *"Maybe I can create the papers inside its cover, by myself. Because I have a lot of paper and I can do this. I just have to go and get it holed. And, since I have a printer, maybe I can print papers myself. I'm doing this for my cookbook."*

On the contrary, Participant 5 regarded the required tools and involved complicated processes as a negative aspect of product experience:

> *"It is repaired by hand only, which requires welding and other hand tools."*

4.1.3.2 Appropriate Material Choice

User's approach to user involvement may differ according to the product's material qualities. The choice of material may enable users to make interventions more confidently. For example, Participant 5 also discussed the influence of his glasses' material choice in the repetitive repair processes. He explained:

> *"I think they couldn't have done this much repair if the frame was metal. The repairman can play a bit better with this product using heat because it's made of plastic."*

Besides, Participant 10 is considering the advantages and disadvantages of his favorite jacket's material quality.

"It still has burn marks on some parts. It's just recently that cigarette ash spilled over the internal vest. Even though I intervened promptly in a second, there happened a small hole right there. But other than that, polyester also has some advantages. So yes, this material interacts very badly with the heat but, at the same time, it endures well the rain, mud or water. Because it is a waterproof material."

Although the participant is satisfied with the material's aging-resistant properties and interaction with water, he is extremely disappointed with the heat properties of the material. Since the jacket easily burns when in proximity to a heat source, as demonstrated in Figure 4.5, the user almost discarded the product. Therefore, finding appropriate materials for the product's use context is highly important for satisfying the users.

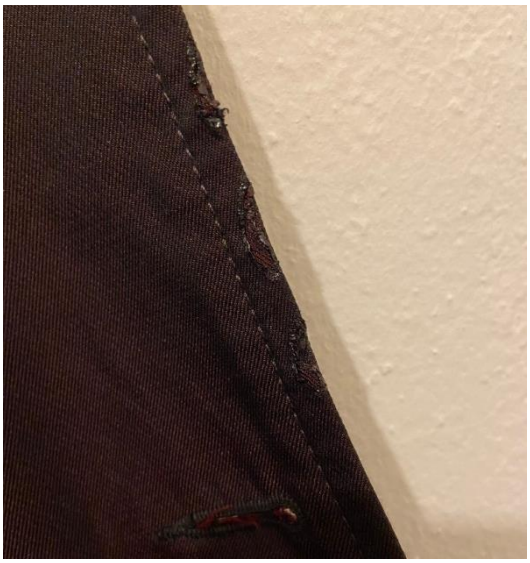

Figure 4.5. Participant 10's jacket with burn marks

From a different perspective, Participant 11, who altered her dress several times to wear at different occasions, proposes that the timelessness of her dress' material, allowed her to make interventions. She bought the dress when she was a young adult and the material of the dress allowed her to continue wearing it as she got older. She expresses:

> *"The fabric can go in any age group. The color doesn't stand out or it's not shimmery. As you get older, you're still in a situation where you can fit and wear that color. For example, if the fabric was a very hard, solid fabric, maybe the dress would not fit me after putting on a few kilos over the years. It has a definite effect."*

On the contrary, a product's material properties can also pose a barrier to user involvement. For example, Participant 10, whose jacket caught on fire and used the material from its hoodie to repair the stains, expressed how challenging it was to find a repair method because the polyester materials didn't allow for much intervention.

After making utility-oriented upgrades to his 3D printer, Participant 12 aimed at making aesthetic improvements to the product as well. However, he was discouraged because the product's structural material didn't allow for such a modification. He describes:

> *"I've also tried switching from plastic parts to all metal. Here, I tried to create a closed structure instead of an open one, but that was not possible with my product. It would be like turning Tofaş into a Formula One car which is impossible."*

Finally, Participant 14 mentions the influence of her shoes' material on her approach to involvement.

"But at the same time, there would be some interventions that I would be reluctant to do like sewing disintegrated stitches by myself. Since these pieces are in the functional areas of the shoes, I'd have some reservations about sewing because I would be worried about further damaging the remaining fabrics. It's not a kind of material you can glue to fix. That's why I couldn't glue it myself and if I did, what I sewed might not be enough to carry the loads upon the piece."

In this example, the participant is talking about the lack of confidence towards material qualities and the assembly methods. Furthermore, the participant also shared she refrains from making functional interventions and prefers simpler modifications in the scope of personalization. This is because the user is hesitant about damaging the product integrity and causing a decline in product performance.

4.1.3.3 Availability of Product Resources

In guiding users during the after-sales operations, product resources can play an important role. The participants of the field study benefited from online sources to gain knowledge about products and methods for involvement. For example, Participant 3 read several online guidelines before changing his laptop's hard disc. Whereas Participant 7 utilized visual resources before repairing his earphones:

"I did almost all of my research online. Because headphones are very well-known gadgets and brands are on YouTube. When you Google it, you get from its disassembly video to the battery replacement videos. I watched and applied the methods. During disassembly, I take pictures of the components step by step to

make the assembly easier. Because, in those videos, you can't see those details much."

On the other hand, Participant 8 utilized online communities while personalizing her agenda. She studied what others have done to their agendas. Reviewing these examples also enabled her to envision future involvement potentials as well. In designing systems where users are encouraged for user involvement, the design of product guides, communities, and other relevant materials can also be influential for attaining product attachment.

4.1.3.4 Amount of Time and Practice

The participants suggested several opinions where the amount of time, as well as the entailed practice they have spent with their cherished products, was influential in the user involvement process. Product use occurs within a context. The context can include several other products and other activities. Holistically, these elements create the product experience. Users may value a product because they are enjoying the activities entailed by the product use. Furthermore, products may be enhancing the already existing experiences.

For example, Participant 4 mentioned that although her car is causing frequent problems, the process of repair has created an enjoyable routine. She described how she tried to fix the music set in her car as:

"It became a part of the experience. I did a lot of research. Too many people tried to help. We went to the workshops, we went here and there, always with my friends. A shortcoming of the car actually created a lot of memories unintentionally."

In this example, although having to constantly repair the car, the process started becoming an experience on its own. The user started deriving humor out of the unpleasant situation. The repair rituals have become an integral part of the product experience and required the extensive involvement of the user.

Participant 2 mentions how his cherished music set had accompanied him through many other activities. As a student, he used to play classical music while studying. Later, when he got married, the music set started accompanying dinners with his wife. And then, he started playing music to his colleagues when he was working late at the office. So, the user is benefiting from the music set as an instrument for enhancing other activities. These activities become the context in which the user determines the value of the product.

While narrating how he decided to buy the cordless earphones, Participant 7 mentioned:

> *"You use the headset for five-six hours a day. If it's something that I use for a very long time, it will be a big part of my life."*

The participant is stating that by accompanying a considerable amount of his time throughout the day, the product starts acting as a companion. The participant determines the value of the product according to how much time he spends with it every day. Since the user associates the earphones with various other activities, the product becomes irreplaceable.

Similarly, Participant 9 described the amount of time they spend as a family at the arbor he built. Furthermore, due to the many activities followed by the product, the arbor has almost become the main attraction of their garden. He mentions:

> *"It has become something like the center of the garden. We are also there when there is tea or something to serve for all. Also,*

it’s where we're going to eat when guests come. We all sit there altogether. So, we spend most of our time there.”

More interestingly, Participant 12 talks about his 3D printer and explains how his engaged product use turned out to be a hobby.

“I realized that after working hard on it, it started to feel like a hobby. I was already spending a lot of time on it, and at the same time having fun. (…) I started regarding the machine as my hobby and not like work.”

In this example, the practice provided by the product was so intriguing for the user that, he ended up valuing the activity more than the product itself. Once bought for utilitarian purposes, the 3D printer created a new hobby for its user, a way for him to spend quality time.

When users are able to position products in their lifestyle, those products gain a deeper value. Because users start generating deeper personal relevance with products. Apart from the product itself, the entailed involvement becomes an important determinant for designating product value.

4.1.3.5 Evolvement

Several user narratives indicated a desire for product evolvement. A product’s potential for evolvement encourages user involvement and postpones product replacement. First, some participants valued that their cherished products responded to their changing needs. The pilot study participant approaches this from an aesthetic-oriented perspective and mentioned that she sometimes gets bored of using the same products, so she tailored several tablecloth alternatives to use. She is highlighting a psychological need for the "new". Some users may need frequent

changes in their consumption practices. This situation may cause the shortening of the product's psychological lifetime.

Whereas Participant 2 experienced a more utilitarian change of needs. After moving, he couldn't fit his cherished but bulky music set anywhere, so he disassembled the speakers from the other parts and continue using the music set in a more vertical layout. The product may have been discarded if the user had failed in adapting the product to its new environment. So, products should have certain adaptability about the possible user needs. Designers can think in advance about the different settings to which the product may need to adapt to.

On the other hand, some of the participants appreciated their product's evolvability in terms of technical features. Participant 2 explains how the diversity in his music set's technological features, allowed the product to stay relevant through several technological advancements.

> *"My usage hasn't changed much. I have always used this at home as I am very fond of music. I used it as a cassette player when there were cassettes. Then the CDs came out. I used it as a CD player."*

The product's most prioritized function stayed relevant regardless of many technological innovations. Also, the product allows product use in different ways. Hence, the user was mostly impressed by the product's adaptiveness to new technologies.

> *"The house I live in now is in high elevation, so the radio signals sounded a little cluttered. So, I bought a T-shaped copper antenna for it. Behind the music set, are antenna inputs. Against such a possibility, they placed some additional antenna inputs*

behind the deck. A well-thought-out idea against any reception problems. This is a very good feature."

The music set had a preliminary design feature to enable product evolvement. Without those features, the product may have gone obsolete because it wouldn't satisfy the changing user needs.

Similarly, Participant 3 enjoyed the utilitarian versatility of his laptop. The laptop offered an apparatus so that users can utilize the CD driver as extra storage space. The adaptation to supplementary parts extended the laptop's product life.

Besides, Participant 11 has figured out a way for her dress to continue to respond to her changing aesthetic taste.

"Normally, you don't wear the same dress in special events. But this dress prevented that situation. (...) At least I felt like I was wearing something different as its model had changed. In terms of usefulness, the dress appeals to the general public rationale, not just to the taste of a specific time. So, I think you can use it for a long time. Also, it's easy to convert."

The user enjoys the product's evolvement due to her involvement. She appreciates the sense of newness that comes with each modification. As in this example, designers can design the means for easy adaptation and evolvement.

Versatility was appreciated by other participants as well. Participant 6 regards her hand-knitted sweater as versatile and adaptable to various circumstances. Such a perspective may also increase product confidence. However, she realizes the aging of the sweater, so she doesn't prefer wearing it at work. Therefore, product evolvement should also consider lifestyle changes. Because as time goes by, the evolved version of the product will eventually be used by a different persona due to

the changing needs. Designers can also work on foreseeing probable changes in the user characteristics.

Furthermore, the user discussed how her mother knitted the sweater in a method that is very open for versatility.

> *"If the sleeves were ripped off and became useless, I think we would have taken the sleeves off and made a vest or something. In fact, maybe it would be a pleasure to use it because it takes on a different form."*

In this example, the user is talking about evolving only the necessary product parts. Not all of the parts of a product should complete their lifecycle at the same time. Instead of discarding a product, the user can discard the obsolete parts and the remaining product can offer a new use and value to the user. She goes on to explain the advantage of the production method:

> *"We could just take off the sleeves because my mother knitted each part separately. She had knitted the front and the back separately. Then he sewed them together like a jigsaw puzzle."*

Therefore, considering modularity in the production can influence extending product life and trigger further user involvement. Designers might ask themselves "How can different part configurations can be utilized?" and the answers might contribute to sustainable consumption.

Whereas Participant 2 commented on the evolvement of product parts:

> *"If standard parts were used in production, or if they designed new parts in a way that I could utilize the old parts as well, older products would also still be utilized."*

With this quote, the participant is asking the designers to consider adaptability on the part scale. Designing interchangeable or standardized parts would contribute to the evolvement of older products.

In terms of evolving a product's technical features, Participant 9 touches upon the evolvement of his self-made arbor:

> *"We are constantly adding something every year. (…) You know, "Should we change that place a little bit? Should we do something like a shelf here and there". Because it's made of wood. We can do it easily. If we don't like it, we can undo it."*

In this example, the production method and the choice of material is encouraging for evolvement. He also states:

> *"And of course, it's better because these things happen over time. Because we can't think of everything at first. Then, as we get used to it, we realize that more things are actually needed. It also feels good because we can do what we think of."*

The user appreciates that they can evolve and alter the product as new needs emerge. Finally, Participant 8 explains how her involvement on her agenda has increased the possibility for further product evolvement:

> *"This is now a black and white picture. And if I get bored, I'll paint it. I left such a door for future use. It actually encourages me to continue using it, as I see it as something that can happen later. Because I feel like this work hasn't still finished."*

The user is experiencing an enhanced attachment towards her personalized agenda because she can foresee the evolving nature of the product. This gives her a sense

of an incomplete lifecycle. Therefore, she is more motivated to continue using the notepad and seek ways of user involvement.

4.1.3.6 Ease of Maintenance

Product maintenance is an important part of the product experience and one of the most prominent user involvement activities. Product maintenance can influence the degree of attachment. Furthermore, ease of maintenance can trigger user involvement by increasing the user's sense of ownership. Therefore, product maintenance is an important driver for user involvement and maintainability should be considered during the early phases of design.

The pilot study participant was highly considerate about product maintenance in her consumption practices. For her tailored tablecloth, she emphasized the ease of maintenance either. She explained:

> *"I buy the covers according to their care. For example, I do not use hard-to-iron and linen daily. Because their maintenance is more expensive. You spend a lot of electricity, detergent, water to remove tea stains from linen. Smaller pieces are also more effective in use. Instead of washing a big one, you are washing and ironing a small one. That's why I use these fabrics again and again."*

In this example, ease of maintenance was achieved through modularity. The participant prefers using smaller tablecloths for everyone, instead of a large tablecloth, because cleaning the smaller mats is easier. In other words, the participant is cleaning only the necessary part, instead of the whole. She goes on to explain how the maintenance of the tablecloths affects her product use.

"So, I don't have to be afraid of tea, coffee, oil stains. If it was linen or lace, I would be stressed about the stains. This doesn't stress me out. Because I can throw it away and wash it right away when becomes dirty."

The ease of maintenance results in product confidence. Therefore, the user enjoys the product experience even more. Furthermore, Participant 14 mentioned the influence of color on product maintainability. She mentioned how certain colors are not as durable as lighter colors. The user doesn't prefer buying dark-colored tablecloth fabrics because the color drains easily.

Similarly, Participant 14 claims that color is an important aspect of product durability because it interferes with her involvement. Figure 4.6 presents the participant's shoes depicting color changes.

"This shoe is black, but it's made up of different materials. That's why the black color of some parts after washing does not match with that of the other parts. Some parts are worn out more than the others. That's why I don't wear it much anymore."

Figure 4.6. Participant 14's sneakers showing the change of color in different materials

The user is experiencing a detachment from her cherished sneakers because the same color responds differently to the user's interventions in different materials, as presented in the figure. The aesthetic considerations limit the context of product use. Besides, she shares:

> *"While cleaning, there are transparent areas on the sole that displays air-filled technology called "Airmax". I never intervene with them during the cleaning process because they might scratch or stain much faster. Now, after all these years, it has become too opaque anyhow indicating quite strong signs of tampering with."*

Figure 4.7. The transparent parts under the sneaker after maintenance

As shown in Figure 4.7, different materials' responses to maintenance activities, discouraged the user from performing the involvement activities.

4.1.3.7 After-Sales and Support Systems

The confidence users have towards the manufacturer and the product can be an influencing driver for user involvement. Within the scope of the field study, two participants have mentioned the importance of brands towards the value attributed

to their cherished products, because for them, the brand is the reflection of reliability and durability. For instance, Participant 7 expressed:

> *"If it's something that I use for a very long time, that is, it will be a big part of your life. Then, you tend to buy the most intense technology, the best product, and the best as a brand. That's what I did. I chose a company that can stand behind its product. There were also very good headphones from the Chinese market, but when you buy them there is no service or possibility for repair. Therefore, what I paid attention to was finding the most mature product in terms of technology and being able to see the brand could stand behind that product."*

The user values the quality of the brand due to after-sales support systems. He wants to rely on the brand when he comes across a negative experience. Once seeing the brand supports the user in case of a product failure, he builds confidence in that company and is more tuned to prefer the same brand for his following purchases.

Likewise, Participant 2 has preferred Sony while he was evaluating options for a music set. His decisions were based on the image of durability presented by the brand. The participant felt confident with his product after learning that the preferred brand has been using only the original and best quality components in their products. These circumstances resulted in enhanced product confidence which acted as drivers for user involvement.

Both of these examples demonstrate the importance of after-sales and support systems provided by the products in pursuing user involvement and attaining product attachment. Users feel more secure about product use once its

manufacturer guarantees support. The participants appreciate finding a respondent in case the product fails.

In both of these examples, after-sales and support systems increased users' confidence in the product and the brand. Therefore, these brands generated value with their after-sales mechanisms. Participant 7, as well as several others, value confidence in the manufacturer's after-sales operations also for part availability.

> *"And all the parts are available in the markets, in America, in China. Since all parts are available, you can directly replace the broken part. It could be the battery or else. It could be the external surface or ear sponges that touches your skin. So, I could replace all these parts myself."*

Participant 2, Participant 5, and Participant 7 raise their prioritization for part availability. When making a purchase, they want to be assured that replacement parts will be accessible. The manufacturer's approach to providing part replacement is also a critical factor for enhancing user involvement. Local availability of parts increases the user's motivation for intervention.

From a different perspective, product sources and product communities can be influential strategies for product attachment because they act as a support system for the users. Participant 14 said about her cherished sneakers:

> *"You know on the internet, there's a huge culture about cleaning the sneakers similar to mine. When you look around, there is a lot of information on shoe care."*

Whereas Participant 3 suggested:

> *"You can do different things. People provide a lot of resources you can succeed in a lot of things. I had an aptitude for*

computers that came from these sources. At least I've learned how to research and learn. I continued the same system here."

The importance of easily available product sources satisfies the user due to increased product confidence. Whether the information available to the user is provided by the manufacturer or by independent content creators, learning more about the product encourages users more user involvement.

Product communities can also be an important part of the support systems. Having access to people with similar experiences creates a much more engaging and holistic experience for the user. Thus, product communities can play an important role during product maintenance. However, two of the participants experienced the impact of product communities during product acquisition. Participant 12 explained:

"The number of good reviews was very high with this product and it was a new brand the people had praised very much. (...) That's why we got this right away. The comments were very effective for us.."

Whereas Participant 13 said about his self-assembled computer:

"Back then, there was Amazon Germany. It was not in Turkey yet. I entered various groups such as; discount groups, the parts groups etc. in order to buy pieces which are best for my purpose."

He utilized the product community to learn about and access product parts. In both of these examples, being involved in a product community enabled an enriched product experience.

4.1.4 Barriers for User Involvement

Regardless of the users' motivation to pursue user involvement, the researcher observed a number of inhibiting factors. These factors acted as barriers which either prevented or complicated the intervention process. The barriers of user involvement explained in this chapter are:

- Part Availability
- Black Box Design Approach
- Modularity
- Cost
- Planned Obsolescence
- Loss of Product Confidence
- Technological Obsolescence
- Inadaptability to Changes in Lifestyle

4.1.4.1 Part Availability

Design for repair, enables products to return to their original state through maintenance (Bocken et al., 2016). Repair is considered an important activity towards sustainable consumption because it prevents the manufacture of new products. Among the barriers to product repair, part availability is a critical constraint (Hernandez et al., 2020). The participants of the field study also faced challenges regarding part availability for their repair practices.

For example, Participant 2 was facing difficulties using the CD driver of his music set. The driver had broken due to frequent exposure to dust. But by the time the

user needed part replacement, the product was already 30 years old. So, the product's components have become obsolete. Thus, he couldn't find any spare parts and couldn't repair the music set.

Participant 7 experienced a struggle due to part availability. Since his purchase decision relied on brand confidence, he was certain he would use the product for a very long time. He explained:

> *"I said 'I would use this product for ten years, but only as long as replacement parts are available in the market."*

So, the user depended on the availability of parts to extend product life. However, he had to wait for a couple of months each time he purchased a part and sometimes couldn't find the part he was looking for. Later, after purchasing a new battery to fix his earphone's performance, he couldn't find the replacement for the original part and had to buy from a third party. He recollects as:

> *"I lastly ordered the battery. The battery has a code for purchase. When I replaced the battery, it didn't sound like it used to. Because the voltage of the new battery was lower than it should apparently. So, this upset me. I had to throw it away. When I order a new battery, how can I trust that it will deliver the same performance?"*

Participant 13 also aimed at part replacement for increasing the performance of his self-assembled computer.

> *"It would be still good for me if I renew a piece which is chip in shortage right now. Some of the parts don't come to Turkey and sometimes is not even available in Europe. (...) I would like to buy the parts I want right away, frankly, without all this intense*

research. I would like to buy parts without worrying about both its stock and price."

Due to the development in technology, the computer's performance remained average. The user wanted to upgrade certain parts so as not to buy a new computer. But to the shortage of parts, he couldn't upgrade his computer.

4.1.4.2 Black Box Design Approach

The open design suggests a system-based approach to the product in which consumers can view, modify and use design sources (Avital, 2011). The approach aims for consumer empowerment through accessibility. Manzini (2015) suggests that open design is a more democratic alternative for manufacturing systems. On the contrary, some products are black-boxed, meaning the potential for user intervention is restricted. Such an approach prevents products from being reconfigurable. Participants of the field study expressed their dissatisfaction with their limited intervention scope.

Participant 3 complained that his new laptop had a sealed component structure which limits him from making any repairs or modifications.

"Some things can be changed in the old one, but not in the new one because all parts are fixed as an integrated computer system."

Due to such a design strategy, the user is encouraged for product replacement, in case of a part failure. Similarly, Participant 7 also feels restricted about product repair on his earphones. In his case, the use of highly special joining techniques and sealing prevents him from making a part replacement.

"I needed to disassemble each part, remove the soldering on cables and then assemble them all over again. It was the most challenging process. (...) The cables and the soldering there was a very special kind. They also used some special adhesives in it. I couldn't find that adhesive myself, so I had to use some kind of tape to put the pieces together."

Designers should be aware that the use of highly specialized techniques and a black-boxing approach limits user involvement and promotes early product replacement.

4.1.4.3 Modularity

The modular design suggests a more simplified lifecycle process. By dividing the product into smaller and autonomous units, extending product life becomes much easier (Newcomb et al., 1998). This is because the termination of any part's lifecycle doesn't affect the longevity of the product as a whole (Recchioni et al., 2007). Moreover, modular products are much more inviting towards user interventions (Sonego et al., 2018). Otherwise, users face difficulties in responding to their needs.

For example, Participant 3 complains about the component structure of his laptop:

"My brother's computer was also Apple and I accidentally spilled coke on it. His computer has all the electronics mounted on a motherboard. When there is a slightest problem, the whole part needs to be changed. That's why that computer went to garbage, unfortunately. It took a lot of effort to get it done, but they almost asked for a new laptop price to repair."

The lack of modularity causes difficulties during repair and prevents users to extend product life. Users are encouraged to replace their functioning products, because of restrictions in modularity. Moreover, Participant 5 also thinks that his glasses aren't prone to repair.

> *"It is not an easy-to-repair product. Because most of its parts are embedded in its frame. You can't separate its hinges or anything else. They are all tied with casting. They must have melted the material and put them in while producing the whole frame. So, there is no such thing as spare parts. It is repaired by hand only, which requires welding and other hand tools."*

The user explains how the repairman melts and molds the glasses during each repair which damages the product integrity. Designing for a single product life may cause problems during repeated product lifecycles. In both of these examples, integration of modularity would increase the means of user involvement.

4.1.4.4 Cost

The financial cost is a critical constraint in repair processes. Terzioğlu, and Lockton (2015) suggest that users consider the cost, as well as the amount of required time and effort during the repair decision process. Thus, users prefer repairing their products, if buying a new product demands more effort and money.

To support this concept, Participant 3 mentions how he was asked almost the cost of a new laptop to repair a small component because the product didn't allow for disassembly.

Furthermore, Participant 7, who upgraded his amateur 3D printer into a professional one, explains how demanding the supply process has been in terms of financial cost:

> *"It all comes down to the money I spend on the machine to do more. I could add many more features, but I should spend more than the machine's actual value. I already spent three times more than what I paid for the machine."*

Several other participants have mentioned the influence of part and repair costs as a barrier for performing a user involvement.

4.1.4.5 Planned Obsolescence

Packard (2011) describes planned obsolescence as the manufacturer-initiated processes in which product life is intentionally accelerated. Planned obsolescence aims to encourage users to dispose of their products and replace them with newer models (Guiltinan, 2009). In certain cases, planned obsolescence can prevent user involvement because the user loses his/her access to product longevity.

Participant 13 complained about Apple's strategy for planned obsolescence. He explains how the brand's new approach to accelerating product replacement is affecting his product use:

> *"With the new electronic M1 chip, and they encourage people to buy new computers. In the software, they specifically exclude some features. That's why I stay away from software updates, to extend the life of my current computer. Because they seem to have sacrificed the old computers with the new updates. I'm not updating my computer to protect it."*

In this example, the participant is assuming that the manufacturer has limited product features purposefully so that users buy new upgraded products. The manufacturer's approach results in the protective behaviors of the participant. Moreover, the protective instinct limits the user's engagement level.

From a different perspective, technological obsolescence is another strategy utilized by manufacturers to encourage users for early product replacement. By introducing new products features and suggesting technological improvements, manufacturers are aiming for shortening product life (Mugge et al., 2005). Such an approach acts as an inhibitor for user involvement.

Participant 2, explains his experience of buying a new music set due to the improved technological features it offers, compared to his initial product.

> *"The product I recently bought uses a different sound technology. Plus, my new purchase that's a little bit better suited to current technology. It connects wirelessly and it has Bluetooth. I also bought it so that it can be used with current phones and other devices. It's a more compact device."*

The technical features have allured him into buying another music set. Similarly, Participant 3 started observing his laptop's incapabilities within technological advancements. Although upgrading his initial laptop to a certain point, the user realized he needed a new product to satisfy his needs:

> *"The screen is not Retina. It is now a computer far from the era. It was good for me to make that transition."*

Whereas Participant 7 couldn't resist buying a new earphone. He was used to repairing his earphones patiently each time it failed, but after a certain point, he was tempted to buy a new one.

"There's been a lot of wear and tear on this headphone. Like five months ago, the battery died. You couldn't use it unless wired. So, I ordered a new battery. When the battery arrived, the technology had changed. My new headset automatically distinguishes outside sounds such as horns from its main source, and with artificial intelligence, it gives off only the main sound. (…) Somehow as the technology advanced, it was all of a sudden easy to give up on."

The new technological features were prioritized by him compared to the attachment he felt to the initial earphones.

Furthermore, technological obsolescence may result in a problematic part replacement experience. For instance, Participant 13 shared that he experienced a detachment from his self-assembled computer when the technology advanced. Initially, he aimed at upgrading the product by replacing some of its components. However, due to the advanced technology and the changing manufacturing systems along with it, the user was no longer able to find the necessary parts.

"It's below the average now. But if I could renew some parts, the computer would be good enough for me. Some of the parts don't come to Turkey and sometimes are not even available in Europe. I couldn't make this renewal right away. Frankly, I don't think much about renewing the pieces anymore."

In terms of technological obsolescence, the introduction of new features makes users question their existing products. By seeing the shortages of their cherished products, users experience an attachment with may result in the abundance of the previously attached object and feel more attached to a new product.

4.1.4.6 Loss of Product Confidence

A participant in the field study expressed how his loss of confidence in the product influenced his motivation to continue using the product and finally gave up on performing the involvement. During the numerous product failures, the user condemned the product. Although his motivation to repair the earphones was relatively high, after a certain point he started feeling nervous during product use.

> *"The tough repair process made me say "How did they design like this?" I first criticized them. Secondly, I did not enjoy the difficulty, frankly, at that time."*

The participant was dissatisfied with the repair process as well. Due to the unavailability of local parts, the user was deprived of the product while waiting for a replacement, each time the earphones failed.

> *"In the end, I didn't want to stop listening to music for two months, regardless of the cost of a new headphone."*

This process resulted in the replacement of earphones. The laborious and demanding repair process weakened the participant's attachment towards his earphones.

From a different perspective, building product confidence can be a motivating factor for initiating user involvement. For example, Participant 11, who kept personalizing her dress differently for different occasions, values the dress because she knows she can count on it regardless of the occasion. The material quality is an influential determinant in building this kind of attachment through user involvement.

> *"Everyone has an outfit that comes to mind first. I depended on it whenever I needed to attend an event because I feel comfortable*

in it. This dress puts my mind at ease. I know I could wear that dress everywhere. I can make changes on it again and again."

Deriving from the previous experiences with this dress, the user is so satisfied with the product performance, that she approached it as irreplaceable.

4.1.4.7 Inadaptability to Changes in Lifestyle

Routines and rituals play an important role in the product experience. Therefore, changes in users' lifestyles may result in the weakening of attachment. If products are unable to adapt to changing user needs, products may be disposed of while still functioning. Products incapable of undergoing user involvement may fail in attaining product attachment.

For instance, Participant 6 has enjoyed her hand-knit sweater during her stressful high school years. She used to continuously wear it at school and when she was feeling anxious, she used to wear it at the house. But when she graduated and got a job, her daily routine changed completely.

"I started to spend less time at home after I got a job. When I arrived home, the sleep phase begins by wearing pajamas. Actually, it's because my lifestyle has changed. I started wearing the sweater less and less every day."

The quote demonstrates that the changes in the user's lifestyle affected her consumption practices. Due to the new lifestyle, her cherished sweater depreciated.

A similar narrative was described by Participant 13. He mentions his self-assembled computer:

“I used to play a lot of games before. We were constantly doing projects. I was doing many analyses. It was everything to me in my university life. But it's not like that right now”

The participant assembled his computer by selecting each piece according to his needs. He used to utilize the computer immensely while studying, but later his lifestyle changed.

“It's not my dream computer right now. As I said, it's below average. And I can say that my standard has changed, my prioritization has changed a bit towards upper models.”

Whereas Participant 11 mentions her once-beloved bedroom furniture as being discarded because it had a childish name. The user now recollects that furniture as very temporal. She suggests that if they had a more long-lasting color, she would have still used them.

“The furniture in my room was lilac. It was my favorite color back at that time. But the next period knocked me out. That's why I couldn't use it. You can't change the color of your dress either. To be useful, it must be something that appeals to the general rationale, not just to the taste of a specific time.”

The participant states that she has learned from that experience. In the purchase decision of her currently attached dress, she argues the importance of its color. Since the color is timeless, she can easily continue wearing it, regardless of her changing aesthetic taste.

4.1.5 Results of User Involvement

Finally, the field study explored the results of user involvement. These results include both product-oriented and user-oriented outcomes. Hence, the participants' performed user involvement was approached regarding its influence on the product as well as the user's approach to the product experience. The results emerged from the field study are:

- Extended Product Life
- Change of Use Context
- Increased Personalization
- Improving in Product Use
- Developing Protective Behaviors
- Aesthetic Changes
- Product Wear or Part Fatigue
- Change in Product Performance

4.1.5.1 Extended Product Life

User involvements in cherished products have resulted in extended product life. Some participants of the field study were aiming for a prolonged lifecycle, whereas others experienced this result unintentionally. For example, the pilot study participant was very content with her personalization activity because it allowed her to use the material's full potential. Participant 3 commented on his upgrade method as:

"Some people who bought computers after I did, have already replaced their computers. I almost went through a double life cycle with it."

His involvement allowed the laptop to continue satisfying his changing needs. Thus, there was no need to buy another product. The user prolonged the lifecycle and prevented early product replacement.

By decorating her car with photos of her loved ones, Participant 4 admitted she has been using the car for this long because of the attachment towards her involvement.

Whereas Participant 10 stated:

"It died sometime after the damage. Then it came alive again."

So, if he hadn't fixed the stain, he wouldn't be able to wear the jacket. Without his involvement, the jacket would have gone obsolete.

Finally, Participant 11 also described her efforts in personalization as reviving the dress. She couldn't have used the dress for that long if she wasn't able to modify it to her changing taste. She says:

"I wouldn't use it of course. I may not be a fashion icon, but everything has its place and time."

In other words, the dress would fail to satisfy her changing needs and aesthetic taste if she didn't make any interventions. Due to her attempts at personalization, she was able to extend product life and wear the dress repetitively.

4.1.5.2 Change of Use Context

A finding from the field study, not mentioned in the literature, is cherished products experience a change of use context after user involvement. The users feel

very invested in their cherished products, especially if they have spent effort and time on them, so the product becomes inseparable. In case of a change in user needs, or if users realize that they won't use the product for a certain time, they appropriate a change of use context. They refrain from the product going to waste or they wish for it to be utilized by someone. For example, Participant 10 mentions the time how he gained a little weight, and the jacket wouldn't fit him anymore. During that time, she lent the jacket to her mother, so that the jacket wouldn't sit uselessly in his wardrobe.

> *"There was also a vest inside the jacket that could be worn when it was extra cold. I had my mother use it for a while when I couldn't wear the jacket. Then, while I was moving to Istanbul, I got the vest back from my mom. So, I brought it with me."*

Participant 11, similarly, argued that she started sharing the dress with her cousin because she knew it would also look good on her and the dress deserved to be worn frequently.

On the other hand, Participant 3 realized he wouldn't be able to use his laptop for some of his schoolwork because the project demanded much more durability from the hardware. As a result, he lent the laptop to his parents.

> *"This computer has been with me for almost 8 years and my parents still use it because they don't need a high RAM speed. They still use it for word processing, spreadsheets, internet surfing, etc."*

Finally, Participant 7 shared that after repetitive part replacement and repairs, his earphones broke again. Repairing the earphones would reduce its sound quality considerably. Since audio quality was important for him, he decided to buy a new earphone. However, he couldn't bear to dispose of the initial product.

"I repaired the earphones anyway. Now, my wife started using it at the office. So, it's still in use."

The user's wife is a low-performance user so the final state of the earphones would satisfy her needs. The participant knew that the earphone was too precious to dispose of, so he repaired the product for his wife's benefit. Thus, the product changed its use context and started another lifecycle. The effort for the change in use context reflects the value attributed to the product.

4.1.5.3 Increased Personalization

The field study showed that users' involvement has increased the product's relevance and strengthened product attachment. Thus, an important result of these attempts is increased personalization. For instance, Participant 8 said:

"It becomes something that belongs to me only. The fact that it's something I created makes me feel that "it's me"."

The user experiences a strong sense of ownership because of the effort she invested in the product. Meanwhile, Participant 13 is also enjoying the increased personalization provided by his self-assembled product.

"If you're building yourself, you are adding exactly what you want piece by piece. With ready-made products, if there is some piece you don't want, you still have to accept what's installed. But here in my case, because you choose even its smallest cable, it is becoming something completely special to you. You can get exactly what you want. My practice is really very good in this respect."

He appreciates that he determined each product feature according to his personal needs and he will be able to make modifications in case of changing needs. Since he supplied and assembled each component himself, the computer responds to his specific needs due to increased personalization.

4.1.5.4 Improving in Product Use

User involvement may also require the user's deep engagement with the product. For example, users generally go through a research phase before performing the intervention. Whereas users learn a lot about a product's features while engaging with it.

While researching component alternatives and methods of assembly, Participant 13 learned a lot about computers. His depth of knowledge also enabled him to improve in product maintenance.

> *"It is necessary to constantly follow, watch, and read. At that time, I was a geek of all these kinds of work. I could have been employed by an IT department."*

Correspondingly, during the engagements with his laptop, Participant 3 also learned a lot about product features. His involvement resulted in his improved product use. He started working more efficiently, benefiting from various product features and creating his own workflow on his laptop. Through his involvement, he became a power user.

4.1.5.5 Developing Protective Behaviors

Carrying out user involvement increases the strength of product attachment. Due to increased personal relevance, users experience a stronger sense of ownership. As a

result, they develop protective behaviors towards their cherished products. For example, Participant 5's approach towards his glasses has changed after the repair activities.

"These glasses have survived a lot of trouble. I'm talking about serious breaking issues. I started using the glasses a little more carefully and cautiously now."

The level of attachment and involvement influenced the user's rituals in product use. Similarly, Participant 13 has been very careful about his self-assembled computer.

"These days, I'm afraid of the slightest failure, even a single cable failure. (…) I was looking after it like the apple of my eye at that time. I was really taking good care of it."

Users are trying to prevent unfortunate occasions as well as trying to extend product life as much as possible.

4.1.5.6 Aesthetic Changes

The user involvement performed by the users can have aesthetical results. A modification on the product can influence its appearance and divert it from its original state. For example, Participant 8 was unsatisfied with the appearance of her agenda's cover page. She wasn't aesthetically content with the notepad during product use. She later covered the illustration with a sketch from her favorite movie.

"It was in such bad condition and after I intervened with it, now in contrary, it is in a very, very good condition."

After completing the cover, the user started receiving appraisals for it.

> *"When people look at it, they don't realize that it was something you have made yourself. Actually, it makes me feel so good. Because it does not appear to have any interference. People's first reaction is the "it's nice" shock. But the second shock is usually "Did you do it yourself?". I really like the second one."*

Hand-made products may have an amateur appearance that isn't appreciated by everyone. The user feels pride her involvement doesn't appear crafty.

On the contrary, a more common reaction from the participants was about their involvement's negative influence on product aesthetics. For example, Participant 9 doesn't appreciate the aesthetic changes that come from the maintenance activities. To protect the arbor from weather conditions, they used a plastic cover. The addition of such a protective cover diverted the product's aesthetics from its original state. He states:

> *"Since I care more about the aesthetic properties, I am not pleased with the parts that were added later."*

Participant 12, had to add a bunch of cables to his 3D printer to improve its functionality. However, the user started feeling less satisfied with its appearance.

> *"I was doing something new every time I had trouble, and in the end, a device that worked really well came out. But there were the places where the cables didn't properly go through since they're plastic. For storing the cables there was no place in and the cables get stuck all the time and all in places. When looked from the back, it still looks a disgrace."*

Participant 3 described how his laptop now has three screws to assemble the back cover, as opposed to the ten screws in the original design. During repair, he couldn't find enough appropriate screws to replace the original ones. So, he used what he could find to complete the upgrade process. Similarly, Participant 7 mentioned the aesthetic changes on his earphones due to part availability.

> *"That metal part used to be completely black. But I could only find a new metal part in gray. It spoils the image."*

A few of the participants experienced a short period of detachment after the involvement. After repairing the burnt stains on his favorite jacket, Participant 10 didn't appreciate the imperfections.

> *"At first, this situation demotivated me. Because I wanted it to look perfectly fine after repair but burn marks were visible on the fabric. But then, I experienced a sense of domestication in terms of the value or consciousness I place on products in general. Considering that I valued the jacket or that it was still worth wearing because it was not old enough, I continued wearing it."*

The change of aesthetics resulted in the user's increased environmental consciousness as well. The user decided to be more appreciative of his products.

Finally, Participant 5 describes his nervousness towards repair because of the potential aesthetic changes.

> *"I've become more worried about the product. Because in such cases, the products never look as original. (...) For example, these metal parts didn't exist before. They brought a very distinct effect. I was very pessimistic and worried if I could use it comfortably. But then it didn't bother me anymore."*

4.1.5.7 Product Wear or Part Fatigue

User involvement scenarios may also have a negative impact on the product as well. The field study demonstrated examples where user's intervention resulted in product wear or part fatigue. For example, during the frequent visits to the repairman, Participant 5 realized certain parts of his glasses started wearing out.

> *"Once, its hinge was broken and the mechanic welded it together. I think he's poking a hole and playing with the springing of the frame. Of course, when it is exposed to heat its shape and original parts all deteriorate."*

In this case, although repair activities extend the product life, they may have a negative influence on the product life of certain parts. Similarly, Participant 7 also faced challenges about product wear while he was trying to repair a broken part.

> *"Those bolts were stuck in plastic. When you unscrew the bolt, that plastic may crack. You may actually be endangering its life because the headset is already six years old. I try to count on the remaining bolts."*

Participant 7 is less worried about part fatigue as he is able to utilize the product in the same manner. Still, he has recognized the negative impact of his repair activities. Participant 8, who reloads empty papers to her personalized agenda, realized that repetitive product disassembly and assembly, cause the papers to wrinkle a lot. Although this may seem like minor product wear, it influences the user's degree of attachment.

Finally, Participant 12's 3D printer experienced fatigue while the user was trying to learn the printing method. His extensive involvement with the product, researching

and trying new things by pushing the boundaries of the product, resulted in product failure.

> *"For example, it has a tip that melts plastic. I played with it many times and finally, I figured out how to best use it. (…) What I did with it was so problematic that the machine has become inoperable. I was so mad when I realized my mistakes."*

It can be inferred that designers should also think of the limits of intervention. Although user involvement is highly encouraged within the scope of this thesis, exceeding certain boundaries that damage product integrity may also cause product detachment. Designing the means for product repair, personalization, or upgrade, should account for taking cautionary actions for problematic situations as well.

4.1.5.8 Changes in Product Performance

Participants evaluated the influence of their involvement on product performance. Some participants mentioned the increase in performance after their interventions. Participant 3 suggested:

> *"Before I installed the SSD, the computer was processing very slowly. It was taking too long to turn it on. There's been a real momentum. I felt better connected with the computer again. I started enjoying it more when I was using it. Because, as I said, its slow speed was making my job difficult no matter what I was dealing with."*

Similarly, Participant 13 was content with his self-assembled product's increase in product performance after part replacement.

On the contrary, participants also experience a deterioration in product performance after their involvement. Participant 5 struggled with each repair because he felt like the chances of his glasses' failure risk increased as more interventions were made to it. Whereas Participant 12 explained:

> *"I got rid of plastic part and made from the metal. Its weight increased by ten kilos. Unfortunately, I had to give up mobility, but I got something much better in the end."*

In other words, the participant had to sacrifice important product features to enhance the print quality on his 3D printer.

4.1.6 Discussions on User Involvement

This study approaches product attachment from the user involvement standpoint. The researcher investigates how designers can build product attachment through user involvement. Considering this, participants in the field study have admitted the role of their involvement on the level of product attachment they are experiencing. The participants have mentioned various types of involvement practices including *repair, personalization, upgrade, handmade products, and product mastery.* In these involvement practices, users were influenced by some motivations and drivers.

The motivations for user involvement included *changes in lifestyle, extending product life, financial gain, satisfying special needs, product longing before the acquisition, shared history and emotional significance, social benefits, customization and personalization,* and finally *utilitarian features*. These factors acted as the initiators of involvement.

Changes in users' lifestyles acted as a motivator for user involvement. When products failed to respond to user needs, they decided to perform an involvement to adjust the product features to their new routine. Designers can consider the user's role in adapting products to their setting if they aim for product attachment. Similarly, extending product life was a critical initiator of user involvement.

From a different perspective, users evaluated the financial gain derived from involvement before interfering with the product. If the involvement cost too much, users abandon the process. The cost may include any required skills, tools, or materials. Therefore, if designers aim for users to interfere with their products, the financial dimension of the process shouldn't be underestimated.

Furthermore, drivers for user involvement included skills and availability, appropriate material choice, availability of product resources, amount of time and practice, evolvement, ease of maintenance, and after-sales and support systems. These drivers enabled the progression of the involvement.

Within the field study, some users were very confident about pursuing the involvement practice, whereas others were reluctant because they were hesitant about the quality of the result. Therefore, designers need to be critical about matching the appropriate design strategies with the target user group. The user's background knowledge and access to product information were also found influential in the involvement process.

On the other hand, the type and access to the required tools have an impact on the involvement process. In this manner, users were critical about the localization of necessary tools and materials because they determined the degree of intervention that the user could perform.

The products' material choice was considered important for the users who decided to carry out an involvement process. With appropriate material choices, users can

be encouraged for interventions. However, a product's material choice can both act as a driver and a barrier. Thus, the choice of material affects the user's confidence while carrying out an intervention. Finally, the availability of product resources influenced the degree of involvement by acting on the user's confidence.

The study also revealed the existing barriers to involvement. These barriers can be summarized as *part availability, black box design approach, modularity, cost, planned obsolescence, loss of product confidence, and inadaptability to changes in lifestyle.* Due to the unavailability of product parts, users may be discouraged from pursuing their interventions. Not considering the use of existing product parts during the design of new parts and the local access to replacement parts discouraged the participants' repair activities. Considering the product life extension of existing parts while designing new products can provide a creative challenge for the designers and prevent considerable waste from going to landfills.

On the other hand, if designers intend users to interfere with their products, they should refrain from designing black boxes to which the user can't act upon. In response to this, a product's modularity can complicate its lifecycle and result in the early replacement of products. If designers don't incorporate the necessary amount of modularity into the product's structure, a problem in a single part can determine the product life of the whole product.

Furthermore, too demanding costs for involvement may discourage users from pursuing the practice. The manufacturer's approach to planned obsolescence is also highly critical. If products go obsolete, users would be prevented from carrying out the intervention to extend product life. Whereas loss of product confidence can discourage users to carry out the involvement and dispose of the product instead. Finally, products that are incapable of keeping up with the changes in the user's lifestyle, may be discarded while they are still functioning due to the user's lack of motivation to intervene with them.

The scope of the field research included the results of user involvements which can be summarized as *extended product life, change of use context, increased personalization, improving in product use, developing protective behaviors, aesthetic changes, product wear, or part fatigue, and change in product performance*. Extended product life suggests a potential for sustainable consumption. This outcome implies that designers can determine roles for the user while designing for product life extension. However, it is also worth noting that extending product life wasn't the primary concern for all the participants' involvement experience. Instead, the extended product life was usually a coincidental outcome of the involvement. Therefore, an increase in consciousness towards sustainable consumption is crucial. Another result of the involvements was the change of use context. The participants either appropriated the product's setting or the product gained a new user depending on the involvement. In this outcome, the users' reluctance to dispose of their cherished products was influential.

Furthermore, user involvement can result in increased personalization. With the user's unique effort, the one-off product triggers an increased sense of ownership. Additionally, the field study also presented two user narratives where the participants' engagement to learn deeply about their products' features, led to increased product knowledge. Participants also mentioned they had developed protective behaviors after their involvement. Perhaps the users are regarding a product after their intervention as more fragile and in need of protection. Thus, they establish protective behaviors to maintain the product that is representative of their efforts.

On the other hand, user involvement can result in the product's aesthetic change. The field study included satisfied and dissatisfied participants with the changes in their product's appearance. Designers can design protective means to respond to the users who, refrain from the aesthetic changes. User involvement can cause

product wear or part fatigue as a negative outcome. Designers can critically determine the mechanical strength of parts. Parts that are more prone to be interfered with, can have enhanced mechanical features. Finally, user involvement can cause a change in product performance. Both results, demand designers to take cautionary action to prevent the potential negative outcomes.

CHAPTER 5

CONCLUSIONS

This chapter discusses the conclusions derived from the study. The chapter starts by revisiting the research questions and continues with the limitations of the study as well as recommendations for further studies.

5.1 Overview of the Study

This study aims to bring a new perspective to product attachment. By investigating the influence of user involvement on product attachment, the study aims to strengthen the product-user relationship through user involvement.

The study started with a broad literature review. The literature review includes early product replacement, product longevity, and continues with product attachment. Within the analysis of product attachment, the study explores the determinants and strategies. Aside from providing in-depth knowledge on the topic, the literature review has contributed to the finalization of research questions. Together with the preliminary research, the existing literature revealed the impact of user involvement on product attachment and the necessity for a shift of focus. Thus, the study continued investigating the means of triggering product attachment through user involvement.

Later, the researcher carried out a field study that included semi-structured interviews and an online survey. The researcher interviewed 14 participants and examined their product narratives. The focus of the field study was to understand the influence of user involvement on product attachment. Furthermore, the motivations and barriers of user involvement were highlighted. Finally, the

researcher reconceptualized the findings into design directions that would empower the role of designers.

5.2 Research Questions Revisited

The research was shaped around two main research questions. The following research aimed at answering these respectively. These questions are:

- **What are the effects of user involvement on product attachment?**
    - What are the motivations and drivers for user involvement?
    - What are the barriers to user involvement?
- **What are the potential design directions for product attachment with a specific focus on user involvement?**

The first research question had a more exploratory nature. Whereas the second research question aimed at offering a new perspective. The studies related to the first research question provided in-depth knowledge about product attachment and user involvement. With the help of these findings, a novel approach to product attachment emerged which also answered the second research question. In other words, the first research question was supported with specific areas from the field study, whereas the second research question presents an overall deduction from the study.

i. What are the effects of user involvement on product attachment?

User involvement is defined as the user's intervention practices in various stages within the product experience (Davis et al, 1986; Franz & Robey, 1986; Ives & Olson, 1984; Sinclair et al, 2018). The user involvement depicts a personal relevance and an attributed value. Following the hypothesis formed during the literature review and the preliminary study, participants in the field study confirmed that their involvement process has contributed to the strength of attachment they experience towards their products. Due to user involvement, the products become unique because no other product, although exactly the same, can

represent the personal relevance attributed by the users. As a result of the invested time and effort, the products become irreplaceable.

i.i. What are the motivations and drivers for user involvement?

The field study presented several motivations and drivers for user involvement. These topics were either the initiating incentive for performing the involvement or the facilitators that enabled the completion of the involvement. The examination of motivations and drivers is critical because they present the foundation for why users perform interventions. Understanding these enable designers to define the problem areas in their own design processes and learn how they can apply similar approaches to their products. Table 5.1 summarizes the user involvement motivations.

Table 5.1 Overview of user involvement motivations

Motivations for User Involvement	**Definition**
Changes in Lifestyle	Certain changes in the users' lifestyles can influence how the product is utilized. Users may alter their demands from their products and perform an involvement with this motivation.
Extending Product Life	The motivation for user involvement can be extending product life. Users can extend product life either because they don't want to dispose of their cherished objects or due to increased environmental awareness. Designers can put more emphasis on product attachment during the design phase if they are aware of the user groups who are motivated in extending product life.
Financial Gain	Financial gain, especially for repair and maintenance, is influential in initiating user involvement. Users expect a financial advantage while repairing their products instead of replacing them. The literature suggests that the optimum rate of repair cost should be %20 of the product price (Adler & Hlavacek, 1976). Determining the cost of repair can affect the design process because it would affect the choice of material and production methods.

Satisfying Special Needs	Mass-produced products may not be sufficient in satisfying special user needs. However, users can make involvements on their products to meet their needs. Designers may not appeal to each user with a single product. The user may demand certain alterations in product features, technical properties, aesthetics, or product use. Thus, designers can design the means for altering product features. As a result, each user can have a personalized experience that satisfies their needs.
Product Longing Before Acquisition	The user's experience prior to acquiring a product can influence their desire for user involvement. The desire accumulated before the purchase, the effort put into the product at acquisition, or the involvement related to the making of the product can trigger attachment and encourage a user for involvement.
Shared History and Emotional Significance	A user may be motivated to pursue an involvement due to the attachment deriving from a product's memory value. Users may be utilizing a product to signify important events, the passing of time, or the user's effort through product use. Each emotional significance can encourage a user to perform user involvement to extend the life of a cherished product.
Social Benefits	A product can depict a user's social environment. Therefore, a product's social value can be an influencing factor in the desire for extending product life through user involvement. Product use in a social gathering, enlarging social circle through a product, and a product's conversational properties were prominent among the findings as examples of social benefits.
Customization and Personalization	Users may be performing a user involvement because they demand a certain level of customization or personalization. The request for a more personalized experience can result in users' intervention and thus extend product life through product attachment.

As a continuum of the answer to the first research questions, Table 5.2 summarizes the drivers for user involvement.

Table 5.2 Overview of drivers for user involvement

Drivers for User Involvement	**Definition**
Skills and Availability	This item depicts the users' level of skills and the available resources in their surroundings which they appropriate for performing the involvement. Some users are more confident about carrying out an involvement, whereas others are more reluctant. Furthermore, the depth of involvement can vary from minor product changes to complete product transformations. The user characteristics determine how the users will respond to the product features (Lockton, Harrison & Stanton, 2009). As a result, designers need to be critical of this matter.
Appropriate Material Choice	A product's material choice is influential for product attachment because the user's involvement may differ as a result of the material properties. The type, depth, and methods of involvement are determined by the product's material choice. Designers should make material choices by considering the user's involvement process so that the product's material properties comply with the designer's intention for encouraging user involvement.
Availability of Product Resources	The easy access to information about products, encourages users to perform involvement. Therefore, assisting the users after the purchase is critical. Product guides and communities where people make discussions about products are beneficial in motivating users for making interventions.
Amount of Time and Practice	A user's amount of time invested in the product and the entailed practices developed over time can strengthen the attachment and encourage involvement. The users may refrain from being deprived of the product context by disposing of the product. By emerging new experiences from the involvement process, the amount of time and practice can be a driver for user involvement.
Evolvement	Product's that are prone to evolvement may enable user involvement. Responding to changing needs, technical upgradeability and aesthetical evolvement were the prominent topics in which products can evolve within. Through a product's

	evolvement capabilities, users may find more areas to act upon and perform an involvement.
Ease of Maintenance	Product maintenance was one of the most mentioned involvement types. Therefore, a product's maintainability increases the possibility for user involvement. Designers should put enough emphasis on product maintenance as it is as important as product use.
After-Sales and Support Systems	The manufacturer's support systems are important while the users are carrying out a user involvement. Manufacturers should supply the users with the necessary tools and knowledge during the involvement process. Furthermore, users are more prone to perform an involvement when the manufacturer provides after-sales and support systems due to increased confidence.

i.ii. What are the barriers to user involvement?

Within the field study, participants have mentioned several factors which posed a barrier for carrying out the desired involvement. The barriers to user involvement are summarized in Table 5.2.

Table 5.3 Overview of barriers for user involvement

Barriers for User Involvement	**Definition**
Part Availability	Part availability can restrict user involvement. Users are discouraged from product intervention if the product parts aren't easily accessible. Parts that went obsolete, challenging access to sale points, or the high costs can act as a barrier towards involvement.
Black Box Design Approach	Certain design features restrict the user's involvement. Designers should offer accessible products for consumer empowerment. Such an approach would provide a more democratic alternative to the black box manufacturing systems (Manzini, 2015). Reconfigurable products that allow for the user's intervention, present a more sustainable approach towards products.

Modularity	Products without a certain degree of modularity inhibit user involvement because the user can't disassemble the product. Therefore, a failure in a certain part terminates the overall product life. Dividing products into easily disassembled autonomous units encourages user involvement.
Cost	The demanding involvement costs prevent users from performing the involvement. The users' motivation for pursuing the intervention increases if replacing the product demands more effort and money.
Planned Obsolescence	Planned obsolescence intentionally accelerates product life so that users replace their products with new ones (Guiltinan, 2008). Planned obsolescence influences user involvement because users have difficulty accessing the necessary resources for obsolete products.
Loss of Product Confidence	If users lost confidence in the product's performance or functionality, they may not have enough motivation to pursue an involvement. The repetitive product failures, unavailability of product parts, or impractical repair processes can result in loss of product confidence.
Inadaptability to Changes in Lifestyle	If products are incapable of adapting to changes in users' lifestyles, users may be reluctant to pursue an involvement because the product is no longer relevant.

ii. What are the potential design directions for product attachment with a specific focus on user involvement?

This research question is the main focus of this thesis study. The answer to this question is the novel approach generated by the researcher. To come up with an answer, the researcher reconceptualized the findings from the field study into design directions that enable product attachment through user involvement (Appendix J). The design directions were grouped into six categories. Each category includes several suggestions on how to incorporate user involvement for enhancing product attachment. The main categories are:

- Offer practices

- Consider materiality
- Incorporate personal relevance
- Evolve the product
- Reimagine time
- Assist the user

In the construction of design directions, different topics from the field study findings were reconceptualized. Each topic influenced the directions in different manners. Figure 5.1 displays the contribution of topics from the findings to the design direction categories.

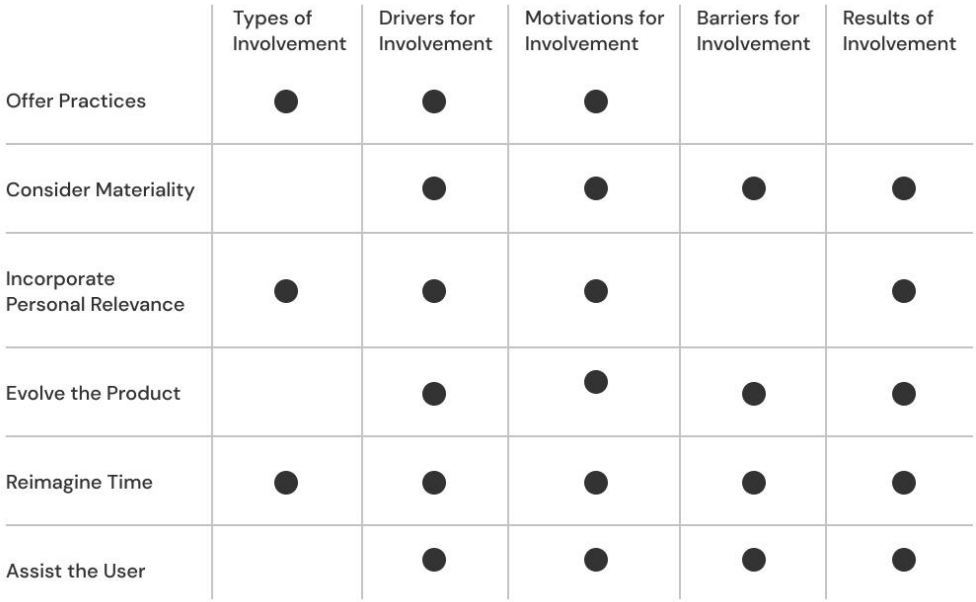

Figure 5.1. Reconceptualization of field study findings into design directions

As the figure depicts, each design direction category utilized different topics from the field study to suggest potential methods to attain product attachment and sustainability through user involvement. Figure 5.2 depicts the detailed version of the reconceptualization method, including the specific sub-categories of findings associated with design directions.

Figure 5.2. Reconceptualization of field study findings into design directions in detail

The first design direction is about *offering practices*. This set of directions was influenced by drivers and motivations of user involvement, as well as types of involvement. The user involvement drivers, compiled after the field study, suggested that the amount of time and the practices that revolve around the product were influential in the strength of attachment. The complementary practices constitute the product context and users position these practices within their routines. Therefore, products that entail satisfactory practices, tend to be kept for longer.

The second design direction is *considering materiality* derived from drivers, motivations, and barriers for and results of user involvement. In the emergence of this category, especially barriers for user involvement played a vital role. Loss of product confidence, deriving from product material failure, prevents user involvement. Similarly, malfunctioning product parts and deficient physical features of a product causes users to dispose of their cherished products. On the contrary, a product's appropriate material choice, suitable for user involvement, motivates users for intervention and enhances the attachment. Moreover, the observed results of user involvement assisted in this set of strategies. The inappropriate material choices and the consequent physical features result in product wear or part fatigue after the involvement. Similarly, a product can depreciate in product performance. Furthermore, the involvement can result in aesthetical changes if the product isn't prone to intervention. Finally, the user involvement motivations that involve the product's durability due to material choice, were considered in compiling the design guides within this category.

The third design direction is *incorporating personal relevance* which is influenced by motivations, drivers for, results, and types of involvement. The main contributor to this set of design directions was the user involvement motivation involving a product's self-expressive abilities. Users are more strongly attached to products that communicate their identities. On the other hand, the incompatible product and user ideology may cause detachment from the product. Furthermore, user involvement can result in increased personalization. The users enjoy the increased

personalization because products tend to be unique. Therefore, the design directions also advocate for customization and personalization.

The fourth design direction suggests *evolving the product*. User involvement barriers, results of user involvement, and motivations for user involvement were mainly utilized for this set of design guides. A product's inadaptability towards changes in the user's lifestyle can cause detachment because the products lose their relevance to the user. Therefore, product attachment suggests a certain degree of evolvement for products. With such an approach, the users are encouraged to extend product life. From a different perspective, the product should also comply with the changes demanded by the user's involvement. For example, a product may experience a change in use context as a result of the involvement. To stay in use, the product should respond appropriately to such changes.

The fifth design direction offers *reimagining time*. Several findings from the field study assisted in these design directions. User involvement motivations suggest that the shared history and the emotional significance triggers product attachment. Similarly, the product attachment strategies highlight the importance of capturing memories for enhancing attachment. Therefore, a product's ability to create a memory value was emphasized in this study. Furthermore, the findings of user involvement demanded a new perspective from products towards time. The users may perform an involvement with the motivation to extend product life. Additionally, a product may experience a change of use context or have a new user. So, the product life should be approached with a new perspective than to conventional consumption patterns that start with product acquisition and end with product disposal.

The final design direction is about *assisting the user*. This design direction initially derived from the barrier of user involvement named loss of product confidence concerning brand attachment. Users who build confidence in certain brands because they stand behind their products are more motivated to pursue the intervention. Correspondingly, when users can access product resources feel more

confident in performing the involvement. Finally, the user involvement driver which suggests after-sales and support systems were influential for this category.

The design directions generated as a result of this thesis study benefited both from the literature review and the field study findings. Some of the directions emerged from the field study but they were already supported by the literature on product attachment. On the other hand, some of the directions which emerged from the field study were novel and haven't been mentioned in the product attachment literature before. Figure 5.3 shows the detailed presentation of the resources for design directions.

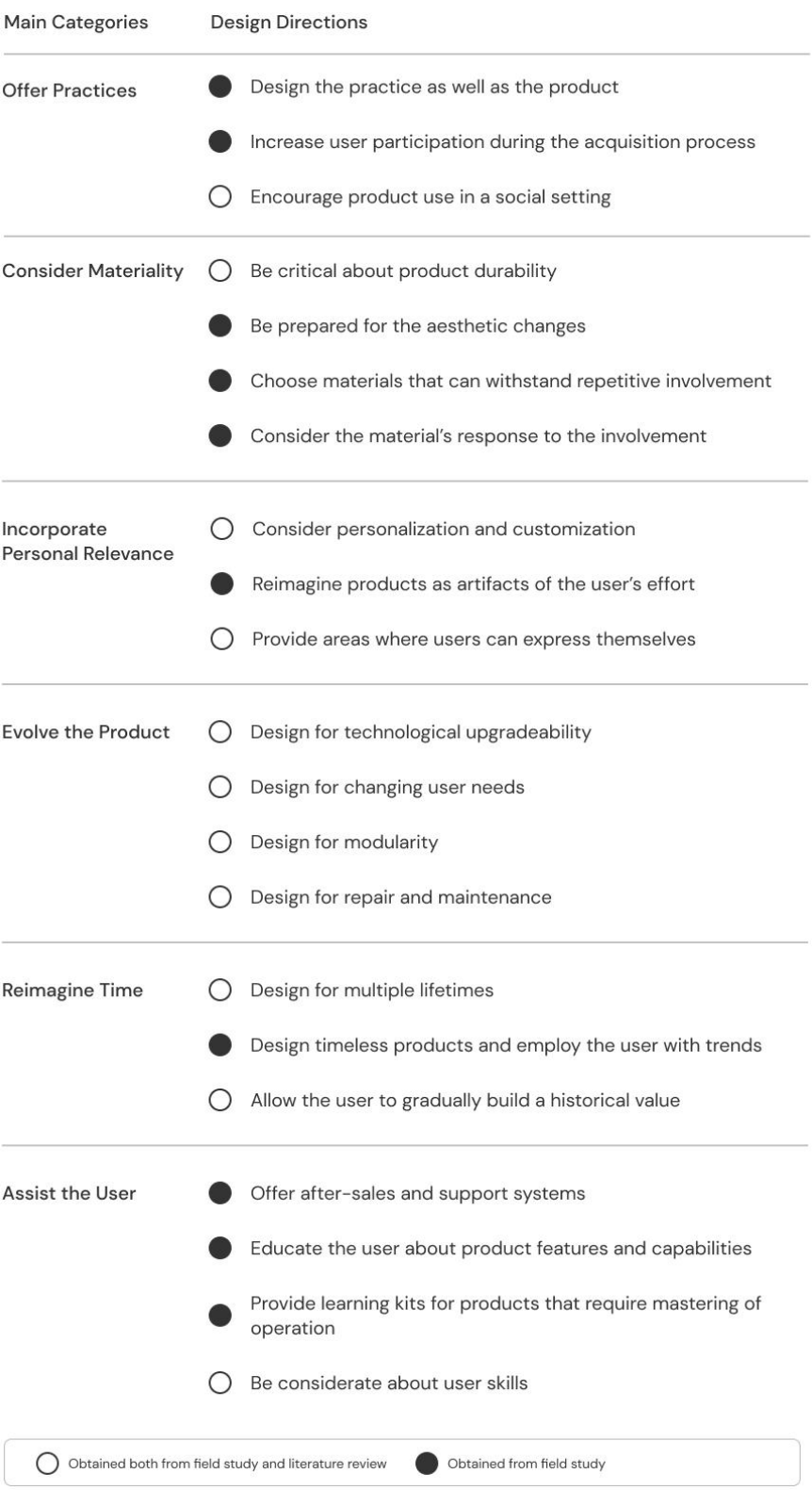

Figure 5.3. Resources for design directions

5.2.1 Offer Practices

The first category includes the experience-oriented strategies for product attachment. The directions within this category involve the user's involvement within the several practices around the product. This category includes:

- **Design the practice as well as the product:**

Designers should consider the subsidiary practices that revolve around the product. Designers can come up with creative interpretations of these practices. Designers should also consider a product's relationship to other products and other practices so users can position their products in their routines. Practice-oriented design decisions can result in irreplaceable products which users don't want to remove from daily routines. Thus, users would find the opportunity to create routines and rituals with their cherished products. Participant 4 mentions how repair processes on her car have created its ritual because it has become a repetitive process which she pursues with her friends. For example, a coffee machine that prepares the coffee before the user wakes up considers the user's morning routine and incorporates an involvement, setting up the preferred preparation time as the routine changes, into the product.

- **Increase user participation during the acquisition process:**

Designers should seek ways to incorporate the user during the acquisition process. Allowing for participation within the product ecosystem through product resources or product communities can result in an increased sense of ownership. Users can also make choices about product features or invest effort in the making of the product. Examples can be DIY products, self-assembly products, or products that allow for customization during purchase.

- **Encourage product use in a social setting:**

Inviting the user's social circle to the product experience can trigger a more engaging product use. Considering how products and users interact with each other in a shared setting can provide social pleasure. Electronic products that pair with each other or

products that invite the effort of several users for thriving can be given as examples. Other users can be invited into the product experience in various stages within consumption such as the acquisition process.

5.2.2 Consider Materiality

This set of strategies is related to the material properties of a product. The physical features of a product should complement the user involvement perspective to prevent early product replacement. In cases where the product's material properties can't keep up with the user's motivation for extending product life, users may experience detachment.

- **Be critical about product durability**

Investing in high-quality materials and trustworthy manufacturing methods are influential in product attachment because products should be able to physically keep up with the extended use. However, not all product parts should perform the same level of durability. Chapman (2015, p.13) suggests that designing highly durable products may result in "highly durable waste" in some cases. Therefore, providing an adequate level of durability to the demands of the product poses a more sustainable approach. Increasing product durability only on the required parts would result in the efficient use of resources. For example, repetitively moving parts or the parts related to the assembly and disassembly, are expected to provide the same performance with each intervention. Enhancing the product's durability on such parts would prevent product wear and part fatigue during user involvement processes.

- **Be prepared for the aesthetic changes**

Users have varying skill levels. The user's skills level is influential in the product's aesthetic changes after an involvement. As a result of the involvement, the original aesthetic quality of the product may diminish, or the product may have a more crafty appearance. Not all users would appreciate such a change in aesthetics.

Therefore, designers need to take preparatory action to protect product aesthetics. Designing involvement methods that match the skill level of the user group or providing the necessary tools and materials for the involvement so that product aesthetics is preserved can also be influential in preventing products to stay in their original state.

- **Choose materials that can withstand repetitive involvement:**

A product's choice of material should comply with the targeted frequency of user involvement. The field study yield that a product's material choice can either encourage or prevent user involvement. A product's material should withstand and allow for user involvement. Some materials are more appropriate for intervention by nature. For example, woven textiles or wood are easier to process than hard-cast plastic.

- **Consider the material's response to the involvement**

Designers can consider the use of materials that elicit satisfaction. Some materials are more suitable for reflecting the involvement process. For example, wood and leather reflect user intervention profoundly due to the physical changes they undergo. Also, some materials thrive in aesthetic quality after time and maintenance. For example, applying varnish on wood enhances its appearance. Similarly, designers can think of how users can leave their trace on the cherished products. Such material features can be incorporated into the products as pleasant surprises in response to user involvement. These surprises would result in enriched user involvement. Furthermore, the material's response to the involvement should also be considered. Different materials within a product can respond differently during involvement and can age at different speeds. Designers should act accordingly and come up with creative solutions to this problem. For example, materials can reveal different colors of textures as a response to user involvement. Thus, product wear would be perceived positively.

5.2.3 Incorporate Personal Relevance

Products that have high personal relevance to the user trigger a stronger attachment because such an attribute makes a product unique. Therefore, the user's contributions to the product make it irreplaceable. The reconceptualization of related findings resulted in the following design guides.

- **Consider personalization and customization**

Designers should allow users to allow the user to interpret their own preferences to the product where applicable. Several product features can be constituted with the user's choices. Being able to adjust the product aspects to the specific routines of the users would also increase the sense of ownership. Furthermore, designers can look for personalization or customization opportunities through various stages of consumption. Personalization and customization may be applied to the product experience from acquisition to post-use.

- **Reimagine products as artifacts of the user's effort**

Users take pride in seeing their efforts being utilized. Seeing that the invested time and effort during the involvement is serving a purpose results in an increased sense of ownership. Incorporating users into the making or maintenance processes can contribute to the sense of achievement. From a different perspective, products can offer incremental product evolvement through the user's involvement. As users spend more time and effort in the experience, products may reveal different or upgraded offerings. This would result in a more engaged interaction as well as an increased attachment.

- **Provide areas where users can express themselves**

Designers should provide freedom areas within the product to increase and encourage the user's self-reflection. Users can regard these areas as a blank canvas to express themselves. Designers can approach product features as a medium for self-expression and employ the users for the completion of these features. Giving

users the freedom to apply their own choices to the product would also increase self-reflection. By reflecting personal aspirations and beliefs through their involvement, users can experience an increased sense of ownership.

5.2.4 Evolve the Product

Evolvement is an important aspect of products that will be used for an extended period. The product should evolve according to the changing environment, the user needs, or technological advancements. The incorporation of the design guides provided in this category is vital.

- **Design for technological upgradeability**

To prevent technological obsolescence, designers should consider technological upgradeability. Allowing products to keep up with technological improvements can be achieved through part upgrades. Designing with a system approach, in which newer products don't cause the disposal of older products, can reduce the environmental impact of consumption. Designing interchangeable parts that are compatible across various products, can prevent users to replace their products due to the more attractive technological features of products in the market.

- **Design for changing user needs**

Designers should keep in mind that users' needs may differ throughout the extended product life. Changes in users' lifestyles may alter their demands from products. Product evolvement and the degree of adaptability are critical in staying relevant for the user. Products may be required to change either functionally or aesthetically. Designers can employ products with differing purposes over time. Besides, they can seek ways to provide upgrades to prevent early product replacement. Furthermore, products should also respond to their changing environment. Products should be adaptable to their use context to a certain degree in case there is a change in the environment. Finally, adaptable products can also

prevent product replacements because they would postpone the termination of psychological product life.

- **Design for modularity**

Adopting a modular approach during the product development process enables the increased opportunity for user involvement. Applying modular design strategies at various scales can allow users to maintain, repair, disassemble, upgrade, or personalize products. Applying modularity on a part scale can be beneficial because it allows the users to replace only the broken parts in case of failure. Hence, failure in a certain part wouldn't affect the overall product life. Material selection or manufacturing processes should also be in line with the modularity approach. Designers can also consider employing different responsibilities to various part configurations.

- **Design for repair and maintenance**

Designers should be critical about repair and maintenance in two aspects. First, the physical product features should comply with repairing and maintenance. In doing so several strategies such as modularity or appropriate material selection can be applied. Accessibility of parts, ease of disassembly, or the material choice for the parts are critical in attaining repairability. Second, designers should design the processes for repair and maintenance to encourage users. Designing the repair services, tools, and materials required to carry out these practices is important. Finally, the cost of these activities should be regarded as a costly process might discourage users.

5.2.5 Reimagine Time

Striping away from the conventional product life approach demands designers to reimagine the passing of time. A product's interaction with time can be an inspiring playground for designers who are aiming to extend product life through user involvement.

- **Design for multiple lifetimes**

The users' intervention may cause the products to repeat the product cycle or extend product life. Therefore, designers should consider how the product will respond under these circumstances. During the design process, designers can make reflections on the future projections of a product after achieving product attachment and make the necessary preparations.

- **Design timeless products and employ the user with trends**

Trends are a major threat to aesthetic obsolescence. Users may be tempted to replace products because of attractive trends. Timeless objects can withstand the passing of time however aesthetic obsolescence can cause the termination of psychological product life. Detaching product aesthetics from trends and employing users with the application of these trends can be a potential solution. Timeless products can appeal to the user's taste for an extended period and improvisation of the changing trends can offer a personalization area. Users can have the freedom to adapt their products repetitively and approach them as up-to-date.

- **Allow the user to gradually build a historical value**

A product's historical value can be attributed to the user's involvement. A gradually building historical value would reflect the amount of time invested by the user. Incremental product evolvement, such as newly emerging product features over time, would enable users to share a common history with their cherished products. Thus, memories are built with the user's effort and time.

5.2.6 Assist the User

The manufacturer's presence during product use helps extend product life by increasing users' confidence. The confidence towards the product and the manufacturer encourages users to perform several interventions that would prevent early product replacement.

- **Offer after-sales and support systems**

The after-sales and support systems can cover a wide range of designers' interpretations. Some examples of this strategy can be providing repair services, part replacements, the necessary tools for maintenance, and adequate product knowledge. The local availability of these services also contributes to increasing user involvement. Furthermore, the existence of product communities can encourage interventions because users would find the opportunity for collaboration and exchange knowledge.

- **Educate the user about product features and capabilities**

Educating users about product features, manufacturing methods, and maintenance process would increase their confidence in intervening. Designers can find creative manners for reimagining the conventional product manuals and educate the user with engaging methods. Being transparent about the manufacturing process is an important criterion for the users' education as well. Inherent feedback mechanisms that communicate product failures or support systems could also foster product confidence.

- **Provide learning kits for products that require mastering of operation**

Designers can provide educational kits to encourage users in mastering the product use. The learning kit can be interpreted in many creative ways. For example, if a designer is aiming for users to meddle with product features at the expense of risking certain parts, s/he can provide buffer solutions. To prevent product failure with misjudged actions while learning product use, designers can provide buffer parts that can be fixated on the fragile parts. These parts can be removed later. With the support of the designer, users can be encouraged for involving with the product and experience stronger product confidence. Education learning kits can be interpreted in many different ways according to the product category.

- **Be considerate about user skills**

Users' skill levels vary. Designers should consider the skill level of the target user while determining the scope of user involvement. For user groups with lower skill

levels related to the involvement, more guidance and enhanced support systems can be provided. Designers can also benefit from the availability of local skills in the proximity of the user. The local workforce can be incorporated into the involvement processes as a means for empowering communities.

5.3 Limitations of the Study

The field study of this thesis was carried out during the pandemics. Therefore, the restrictions have posed certain limitations on the study. The pandemics have complicated the sampling process, so it was difficult to reach a wider audience due to the hesitations regarding social distancing. The interviews were carried out online. Thus, the products explained by the participants were analyzed to the extent of the shared photos. The product features and the use context weren't able to be observed in detail. Furthermore, since the study already reached a limited number of volunteers, the researcher couldn't make any preferences on the user types. In other words, the researcher didn't have the freedom to choose among the volunteers. This situation resulted in a very diverse user group. The sample group enabled diversified design directions. However, it was challenging to obtain consistent data which is verified across a majority of the participants. Without the limitations of the pandemics, the recruitment could have been made more consciously.

Besides, the time limitation for the submission of the thesis and the scope of a master's thesis didn't allow for further elaboration on the design guidelines. The reconceptualized product attachment strategies could have been presented as a much more refined guideline for the designers, provided that the researcher had more time to work on them.

5.4 Recommendations for Further Study

The product attachment design guideline generated at the end of this thesis study can be the topic for further studies. This guideline can be introduced to designers can improve with their feedback. Workshops among designers where they implement these guidelines into their design process can be organized. Thus, the influence of this guideline on the design process along with the designed product can be observed.

Furthermore, the strategies within the guideline can be implemented on different product groups. This approach would present more detailed strategies specialized to each product category. Finally, it would also be interesting to see how the strategies within the guideline differ according to different user groups. Different applications of the strategies can be generated regarding the characteristics of different user groups. Such a study would offer means of encouraging sustainable behaviors by customizing the strategies to each user group.

An alternative structuring of the field research may include the use of online communities to gain insight into involvement stories. Carrying out content analysis with online communities would enable the researcher to access a wider sampling. Investigating blog pages where people share their experiences, the difficulties they faced, their motivations, and visual diaries of their involvement would provide a further rich source of information for the field study.

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APPENDICES

A. PRELIMINARY STUDY ONLINE SURVEY QUESTIONS (TURKISH)

Kullanıcı-Ürün İlişkisinin Tüketim Faaliyetlerine Etkisi

Bu çalışma, Orta Doğu Teknik Üniversitesi Endüstri Ürünleri Tasarımı Bölümü Yüksek Lisans öğrencisi Pelin Bilgin tarafından Dr. Öğr. Üyesi Senem Turhan danışmanlığında tez çalışması kapsamında yürütülmektedir.
Bu ön çalışmanın amacı tüketim faaliyetlerine kullanıcı-ürün ilişkisinin etkisini incelemektir. Çalışmaya katılım tamamen gönüllülük esasına dayanmaktadır. Yanıtlarınız ve kimliğiniz gizli kalacak ve anonimleştirilecektir. Yanıtlarınız yalnızca akademik araştırmalar kapsamında kullanılacaktır. Herhangi bir noktada anketi tamamlamak istemezseniz yarıda bırakabilirsiniz. Anketi tamamlamak yaklaşık 10 dakikanızı alacaktır. Çalışmayla ilgili herhangi bir konu ile ilgili Dr. Öğr. Üyesi Senem Turhan ile turhans@metu.edu.tr adresinden iletişim kurabilirsiniz. Katılımınız için şimdiden çok teşekkürler.

Soru Seti 1

1. Öğrenci misiniz, çalışıyor musunuz? (Birden fazla seçeneği işaretleyebilirsiniz)
   - Öğrenciyim
   - Çalışıyorum
   - Çalışmıyorum
2. Nasıl bir evde ve kimlerle yaşıyorsunuz? (Yurt, tek başıma evde, paylaşımlı evde, aile evinde)

Soru Seti 2

3. Sizin için en değerli ve vazgeçemeyeceğiniz, duygusal bağ kurduğunuz eşya/eşyalar nelerdir?

4. Bu eşya/eşyalardan vazgeçememe, duygusal bağ kurma nedenleriniz nedir?

Soru Seti 3

5. Çok hızlı tükettiğinizi düşündüğünüz ve kullanılabilir/çalışabilir durumdayken sık sık attığınız/değiştirdiğiniz eşyalarınız (tek kullanımlık ürünler hariç) var mı?
6. Sık sık attığınız/değiştirdiğiniz eşyaları elden çıkarma sebebiniz neler?

Soru Seti 4

7. Kendi kullanımını tamamladıktan sonra başka amaçlarla kullandığınız eşyalarınız var mı? (Eski bir tabureyi komodin olarak kullanmak v.b.)
8. Kendi kullanımını tamamladıktan sonra başka amaçlarla da kullanabilmek için üzerinde değişiklik yaptığınız eşyalarınız var mı? (Bir şişeyi aydınlatmaya dönüştürmek, eski kıyafetleri kullanarak yastık dikmek, araba tekerleklerinden çiçeklik yapmak v.b.)

Soru Seti 5

9. Eşyalarınızı başka amaçlarla kullanmak veya kullanabilmek adına üzerinde değişiklikler yapmadaki motivasyonunuz neler?
10. Uzun süreli kullanıma sahip, sizin yaşayışınıza adapte olabilen, zaman içinde farklı ihtiyaçlara cevap veren, işlevini değiştiren ürünler kullandınız mı? Kullandıysanız neler? (Çocuk büyüdükten sonra sandalye olarak kullanılabilen mama sandalyeleri, çocuk büyüdükten sonra yatak olarak kullanılan beşikler v.b.)

B. PRELIMINARY STUDY ONLINE SURVEY QUESTIONS (ENGLISH)

The Effect of User-Product Relationship on Consumption Activities

This study was carried out by Pelin Bilgin, a graduate student in the Department of Industrial Design at Middle East Technical University, under the supervision of Ms. Senem Turhan (Ph.D.) of the same Department. The aim of this preliminary study is to examine the effect of the user-product relationship on consumption activities. Participation in the study is completely voluntary. Your answers and your identity will remain confidential and anonymized. Your answers will only be used for academic research. If at any point, you do not want to complete the survey, you can leave it halfway through. It will take approximately ten minutes to complete the survey. Regarding any subject-related matter with this study, you can reach us, Ms. Senem Turhan (Ph.D.) via turhans@metu.edu.tr or, Pelin Bilgin, via pelin.bilgin@metu.edu.tr. Many thanks in advance for your participation.

Question Set 1

1. Are you a student or are you working? (You can tick more than one option)
   - Öğrenciyim
   - I'm a student
   - b. I'm studying
   - c. I'm not working

2. What kind of house do you live in and with whom? (e.g dormitory, home alone, shared home, family home)

Question Set 2

3. What are the most valuable and indispensable things for you, with which you have an emotional bond?

4. What are your reasons for not giving up these items/goods and for establishing emotional bonds?

Question Set 3

5. Do you have any items (excluding disposable items) that you think you consume too quickly and that you throw away/change frequently while they are still usable/workable?

6. What are your reasons for disposing of the items that you throw/change frequently?

Question Set 4

7. Do you have items that you use for other purposes even after they completed their own purpose of use? (e.g. using an old stool as a nightstand, etc.)

8. Do you have any items that you have modified so that they can be still used for other purposes after completing their own purpose of use? (e.g. Turning a bottle into lighting, sewing pillows using old clothes, making flower beds from car wheels, etc.)

Question Set 5

9. What is your motivation for making changes to your belongings in order to extend their use or still use them for other purposes?

10. Have you ever used long-life items that can be adapted to your lifestyle and meet your changing expectations over time or changing their functionality, like in the photo below? What are they if you have such items (e.g. Highchairs that can be used as chairs after a child grows up, cradles used as a bed after the child grows up, etc.)?

C. ONLINE SURVEY QUESTIONS FOR FIELD STUDY SAMPLING (TURKISH)

Kullanıcı Ürün Müdahalelerinin Kullanıcı-Ürün İlişkisine Etkisi

Tüketim faaliyetlerinin çevreye olan etkisinin azaltılması, ürün tasarımının belli başlı hedefleri arasında yer almaktadır. Yapılan çalışmalar sonucunda, kullanıcı-ürün ilişkisinin güçlendirilmesiyle ürünlerin kullanım ömrünün arttığı ve tüketim faaliyetlerinin azaldığı gözlenmiştir. Bu anket, Orta Doğu Teknik Üniversitesi Endüstri Ürünleri Tasarımı Bölümü Yüksek Lisans öğrencisi Pelin Bilgin tarafından Dr. Öğr. Üyesi Senem Turhan danışmanlığında yürütülen tez çalışmasının bir parçasıdır. Yapılan çalışmanın amacı, kullanıcıların belli bir süredir kullandıkları ürünlere yaptıkları müdahalelerin, kullanıcı-ürün ilişkisine etkisini incelemektir. Çalışmaya katılım gönüllülük esasına dayanmaktadır. Yanıtlarınız gizli kalacak ve kimliğiniz anonimleştirilecektir. Yanıtlarınız yalnızca akademik araştırmalar kapsamında kullanılacaktır. Herhangi bir noktada anketi tamamlamak istemezseniz yarıda bırakabilirsiniz. Anketi tamamlamak yaklaşık 5 dakikanızı alacaktır. Çalışmayla ilgili herhangi bir konu ile ilgili turhans@metu.edu.tr adresinden Dr. Öğr. Üyesi Senem Turhan veya pelin.bilgin@metu.edu.tr adresinden Pelin Bilgin ile iletişim kurabilirsiniz. Araştırmaya katkıda bulunduğunuz için teşekkür ederiz.

1. Sizin için değerli, herhangi bir nedenden dolayı vazgeçemeyip uzun süredir kullandığınız; ayrıca üzerinde küçük de olsa bir müdahale / değişiklik yaptığınız eşyalar neler? (Bu tarz eşyalara örnekler şunlar olabilir: Beğendiğiniz bir kahve bardağından yapılmış kalemlik, bağcık rengi değiştirilmiş sevdiğiniz bir spor ayakkabı, severek kullandığınız ve tamir ettirdiğiniz bir mutfak robotunu, üzerine boyayarak desenler yaptığınız bir ahşap mobilya, üzerine desenler işlenmiş sevdiğiniz bir t-

shirt, üzerine sticker'lar yapıştırdığınız ve her gün kullandığınız bilgisayarınız)

2. Bahsettiğiniz üründen vazgeçememe, uzun süre boyunca kullanma nedeniniz nedir?

3. Bahsettiğiniz ürüne yaptığınız müdahale / değişiklikten kısaca bahseder misiniz?

4. Verdiğiniz yanıtlarla ilgili yaklaşık 45 dakikalık bir görüşmeye katılmak isterseniz lütfen bizimle e-mail adresinizi paylaşın. *Görüşmeler internet üzerinden, katılımcının uygun gördüğü tarih ve saatte gerçekleştirilecektir.

D. ONLINE SURVEY QUESTIONS FOR FIELD STUDY SAMPLING (ENGLISH)

Effect of User-Product Interventions on User-Product Relationship

Reducing the impact of consumption activities on the environment is among the main goals of product design. As a result of various studies, it was observed that the service life of the products increased, and consumption activities decreased by strengthening the user-product relationship. This questionnaire was administered by Pelin Bilgin, a graduate student at Middle East Technical University, Department of Industrial Design, under the supervision of Ms. Senem Turhan (Ph.D.) of the same Department. The aim of the study is to examine the effect of the interventions made by the users on the products they have been using for a certain period of time, on the user-product relationship. Participation in the study is on a voluntary basis. Your answers will remain confidential, and your identity will be anonymized. Your answers will only be used for academic research. If at any point you do not want to complete the survey, you can leave it halfway through. It will take you approximately 5 minutes to complete the survey. Regarding any subject related matter with this study, you can reach, Ms. Senem Turhan (Ph.D) via turhans@metu.edu.tr or, Pelin Bilgin, via pelin.bilgin@metu.edu.tr.

Thank you for participating to this research.

1. Those valuable for you, that you cannot give up for any reason and that you have used for a long time, what are these items on which you have made any kind of personal intervention or change, albeit a small one (e.g.; a coffee cup you like converted to a pencil holder, a sneaker that you love with a different lace color, a food processor that you love to use and have it repaired, wooden furniture on which you later painted patterns, a t-shirt that

you put personal patterns on, your computer that you put your favorite stickers on, etc.)?

2. What are your reasons for not giving up on such products still in use with you for such a long time?

3. Could you briefly talk about the details of interventions or changes you have made to these products you are emotionally attached to?

4. Please share your e-mail address with us if you would like to participate in a short phone interview (appx. 45 min.) with us, regarding your answers to this questionnaire. These interviews will be held on the internet at the date and time that you deem appropriate.

E. CONSENT FORM (TURKISH)

Tüketim faaliyetlerinin çevreye olan etkisinin azaltılması, ürün tasarımın belli başlı hedefleri arasında yer almaktadır. Yapılan çalışmalar sonucunda, kullanıcı-ürün ilişkisinin güçlendirilmesiyle ürünlerin kullanım ömrünün arttığı ve tüketim faaliyetlerinin azaldığı gözlenmiştir.

Davetli olduğunuz görüşme, Orta Doğu Teknik Üniversitesi Endüstri Ürünleri Tasarımı Bölümü Yüksek Lisans öğrencisi Pelin Bilgin tarafından Dr. Öğr. Üyesi Senem Turhan danışmanlığında yürütülen tez çalışmasının bir parçasıdır. Yapılan çalışmanın amacı, kullanıcıların belli bir süredir kullandıkları ürünlere yaptıkları müdahalelerin, kullanıcı-ürün ilişkisine etkisini incelemektir. Görüşmeler sırasında elde edilen bilgiler, güçlü bir kullanıcı-ürün ilişkisi hedefleyen tasarımcılara ilham verici bir kılavuzun hazırlanmasına yardımcı olacaktır.

Yapılan görüşmeler, izniniz doğrultusunda kayıt altına alınacaktır. Çalışmaya katılım tamamen gönüllülük esasına dayanmaktadır. Yanıtlarınız ve kimliğiniz gizli kalacak; ayrıca kimliğiniz anonimleştirilecektir. Yanıtlarınız yalnızca akademik araştırmalar kapsamında kullanılacaktır. Görüşmenin herhangi bir noktasında araştırmacıdan açıklama talep edebilirsiniz. Görüşmenin herhangi bir aşamasında sebep belirtmeksizin görüşmeden çekilme talebinde bulunabilirsiniz. Çalışmayla ilgili herhangi bir konu ile ilgili turhans@metu.edu.tr adresinden Dr. Öğr. Üyesi Senem Turhan veya pelin.bilgin@metu.edu.tr adresinden Pelin Bilgin ile iletişim kurabilirsiniz.

Araştırmaya katkıda bulunduğunuz için teşekkür ederiz.

Ad Soyad:

Tarih:

İmza:

F. CONSENT FORM (ENGLISH)

Reducing the impact of consumption activities on the environment is among the main goals of product design. As a result of the studies, it was observed that the service life of the products increased and consumption activities decreased by strengthening the user-product relationship.

The interview you are invited to was conducted by Ms.Pelin Bilgin, a graduate student at Middle East Technical University, Department of Industrial Design, and is a part of the thesis study conducted under the supervision of Ms. Senem Turhan (Ph.D) of same Department. The aim of the study is to examine the effect of the interventions made by the users on their products they have been using for a certain period of time as related to user-product relationship. The information gained during the interviews will help prepare an inspiring guide for designers aiming for a strong user-product relationship in their design process. Interviews will be recorded with your permission. Participation in the study is completely voluntary. Your answers and your identity will remain confidential; your identity will also be anonymized. Your answers will only be used for the purpose of academic research. You can request clarification from the researcher at any point in the interview. At any stage of the interview, you can request to withdraw from the activity without stating any reason.

Regarding any subject related matter with this study, you can reach us, Ms. Senem Turhan (Ph.D) via turhans@metu.edu.tr or me, Pelin Bilgin, via pelin.bilgin@metu.edu.tr.

Thank you for participating to this research.

Name Surname:

Date:

Signature:

G. SEMI-STRUCTURED INTERVIEW GUIDE (TURKISH)

Seçilen Ürün

- Seçtiğiniz ürünün hikayesini anlatabilir misiniz?
- Ürün nasıl kullandığınızı aşamalarıyla anlatabilir misiniz? (Kullanıma hazırlama, temizleme, bakım, kullanım vs. aşamaları ile)
    - Bahsettiğiniz aşamaları bütüncül değerlendirdiğinizde, bu ürünü kullanmak size nasıl hissettiriyor? Üründen örneklerle açıklayabilir misiniz? Hangi aşamalar size olumlu ve olumsuz hissettiriyor? Bir başka deyişle herhangi başka bir (kullanıcının bahsettiğini ürün örneği)'ni düşündüğünüzde, bu ürünün daha değerli olmasının nedeni ne?
- Bu ürüne değer verme nedeniniz nedir? Ürünün hangi özelliklerinin, ürüne verdiğiniz değeri etkilediğini düşünüyorsunuz?
- Seçtiğiniz ürüne uzun bir süredir sahip olmanız ürünü kullanım şeklinizi herhangi bir şekilde etkiledi mi?

Kullanıcının ürüne yaptığı müdahale

- Seçtiğiniz ürüne yaptığınız müdahalenin hikayesini anlatır mısınız?
- Bahsettiğiniz müdahaleyi yapma amacınız neydi?
- Ürüne yaptığınız bu müdahaleyi düşündüğünüzde, ürün malzemesinin yaptığınız değişikliğe etkisi ne oldu?
    - Bu müdahaleyi yaparken zorlandığınız noktalar neler oldu? Yapmak isteyip yapamadığınız herhangi bir değişiklik var mıydı?
    - Seçtiğiniz üründe başka nasıl müdahaleler yapabilmek isterdiniz?
- Bahsettiğiniz müdahalenin, ürünün kullanım ömrüne nasıl bir etkisi oldu?
- Bahsettiğiniz müdahale, ürüne yaklaşımınızı nasıl değiştirdi?

- Bu müdahaleyi yapmamış olsaydınız ürünü kullanmaya nasıl devam ederdiniz? Ürüne verdiğiniz değerde bir değişiklik olur muydu?

Ürün Bağlılığı Belirleyici Etmenler

Anı Değeri

- Seçtiğiniz ürün sizin için herhangi bir anı değeri taşıyor mu? Neden?
- Ürünün hangi özelliklerini sizin için önemli olan anıyla özdeşleştiriyorsunuz?
- Daha önce bu ürünün anı değerini artırmak için yaptığınız bir müdahale oldu mu?
- Bahsettiğiniz müdahaleyi düşündüğünüzde, ürünün anı değerinin nasıl etkilendiğini düşünüyorsunuz?
- Sizce bu ürün nasıl daha fazla anı değeri taşıyabilirdi?

Kullanıcıyı İfade Etme Yeteneği

- Seçtiğiniz ürünün sizi yansıttığını düşünüyor musunuz? Bu ürün sizin değerleriniz, hedefleriniz, kişiliğiniz veya yaşama şeklinizi yansıtıyor mu?
- Sizce bu ürünün hangi özellikleri sizi yansıtıyor? (Malzeme, estetik, fonksiyon, üretim şekli vs.)
- Daha önce ürünün sizi daha iyi yansıtması için yaptığınız bir müdahale oldu mu?
- Sizce seçtiğiniz ürün sizi nasıl daha iyi yansıtabilirdi?

Sosyal Fayda

- Seçtiğiniz ürünün sosyal çevrenizde nasıl karşılandığını düşünüyorsunuz? Bu ürünün sosyal statünüze herhangi bir etkisi oluyor mu?
- Sizce bu ürün hangi özelliklerinden dolayı sosyal statünüze etki ediyor?
- Bu ürünü sosyal çevrenizden başka insanlarla beraber kullanıyor musunuz?

    - Bu ürünü başka insanlarla beraber nasıl kullandığınızı aşamalarıyla anlatır mısınız?
    - Kullanıyorsanız, bu durum ürüne olan yaklaşımınızı nasıl etkiliyor?
- Bu ürüne sosyal çevreniz daha farklı bir tepki vermesi için yaptığınız herhangi bir müdahale oldu mu?
- Sosyal çevrenizin bu ürüne verdiği tepki, sizin ürüne verdiğiniz değeri nasıl etkiliyor?

Ürün Deneyimi ve İletişimi

- Sizce ürünün kullanımı yeterince açık mı? (geri bildirimler, kullanımın açıklığı, kullanılabilirlik, ürünün kullanıcı yönergelerine uyması vs.) Üründen örnekler vererek anlatabilir misiniz?
- Ürünü kullanırken nasıl yapacağınızı anlayamadığınız bir kullanım oldu mu?
    - Sizce bu durumun önüne nasıl geçilebilirdi?
    - Bu durumun önüne geçmek için herhangi bir müdahalede bulundunuz mu?
- Daha önce bu ürünün kullanım şeklini değiştirmeyi hiç düşündünüz mü? Herhangi bir müdahalede bulundunuz mu?
    - Ürünün kullanımını değiştirmek isteseniz ürünün hangi özellikleriyle oynardınız?
- Ürünün kullanımı hakkında yapmak isteyip yapamadığınız değişiklikler oldu mu?
- Sizce bu ürünün kullanımı nasıl daha iyileştirilebilirdi?

Fonksiyonel Özellikler

- Seçtiğiniz ürünün performansı hakkında ne düşünüyorsunuz? Ürünün hangi özelliklerini yüksek veya düşük performans ile özdeşleştiriyorsunuz?

- Daha önce bu ürünün performansını artırmak için yaptığınız herhangi bir müdahale oldu mu?
- Ürünün performansı, sizin bu ürüne verdiğiniz değeri nasıl etkiliyor?
- Ürüne yaptığınız diğer müdahaleler, sizce ürünün performansını nasıl etkiledi?

Estetik Özellikler

- Seçtiğiniz ürünün estetiği hakkında ne düşünüyorsunuz? Üründen örnekler vererek açıklayabilir misiniz?
- Daha önce bu ürünün estetik değerini artırmak için yaptığınız herhangi bir müdahale oldu mu?
- Ürünün estetik özellikleri, sizin bu ürüne verdiğiniz değeri nasıl etkiliyor?
- Ürüne yaptığınız diğer müdahaleler, sizin için ürünün estetik değerini nasıl etkiledi?

H. SEMI-STRUCTURED INTERVIEW GUIDE (ENGLISH)

Selected product

- Can you tell the story with the product you chose?
- Can you explain, step by step, how you use the product? (with the stages of preparation for use, cleaning, maintenance, using, etc.)
    - How does it make you feel to use this product when you evaluate the stages you mentioned holistically? Can you explain this with examples from the product? Which phases make you feel positive or negative? In other words, when you consider any other (example of the product the user is talking about), why is this product more valuable?
- Why do you value this product? Which features of the product do you think would affect the value you placed on the product more?
- Has your long-term use of the product you connected affected the way you use the product in any way?

User Involvement

- Can you tell us the story of your intervention on the product you have chosen?
- What was the purpose of this intervention you mentioned above?
- When you think about this intervention you made to the product, what was the effect of the material that product was made of on the alteration you made?
    - What were the points that you had difficulty in doing this intervention? Were there any changes you would want to make differently or not?
    - What other interventions would you like to be able to make in the product you have chosen?

- What effect did the intervention you mention have on the life of the product?
- How did the intervention you mention change your approach to the product?
- If you had not made this intervention, how would you continue to use the product? Would there be a change in the value you place on the product?

Product Attachment Determinants

Shared History

- Does the product you choose have any memory value to you? Why?
- What features of the product do you identify with the moment that is important to you?
- Have you ever made an intervention to increase the memory value of this product?
- When you think about the intervention you mentioned, how do you think the immediate value of the product is affected?
- How do you think this product could carry more memory value for you?

Self-expressive Abilities

- Do you think the product you chose reflects you? Does this product reflect your values, goals, personality or lifestyle?
- Which features of this product do you think reflect you the best? (material, aesthetics, function, production method, etc.)
- Have you made any interventions to make the product reflect you better?
- What do you think how the product you chose could reflect you better?

Social Benefits

- How do you think your chosen product is received in your social circle? Does this product have any effect on your social status?
- In your opinion, which features do you think, does this product affect your social status?
- Do you use this product with other people from your social circle?
    - Can you tell me step by step how you share this product with other people?
    - If shared, how does this affect your approach to the product?
- Have you made any interventions to make your social circle react differently to this product?
- How does the reaction of your social circle to this product affect the value you placed on?

Product Experience & Comprehensible Product Communication

- Do you think the use of the product is clear enough? (feedback, clarity of use, usability, compliance of the product with assembly/user instructions, user's manual, etc.) Can you explain by giving examples from the product?
- While using the product, was there any usage that you could not understand how to?
    - How do you think this situation could have been avoided?
    - Have you taken any action to prevent this situation?
- Have you ever thought of changing the way this product is used? Did you take any action?
    - If you wanted to change the use of the product, which features of the product would you work on?
- Were there any changes you wanted to make or not about the use of the product?
- How do you think the use of this product could be positively improved?

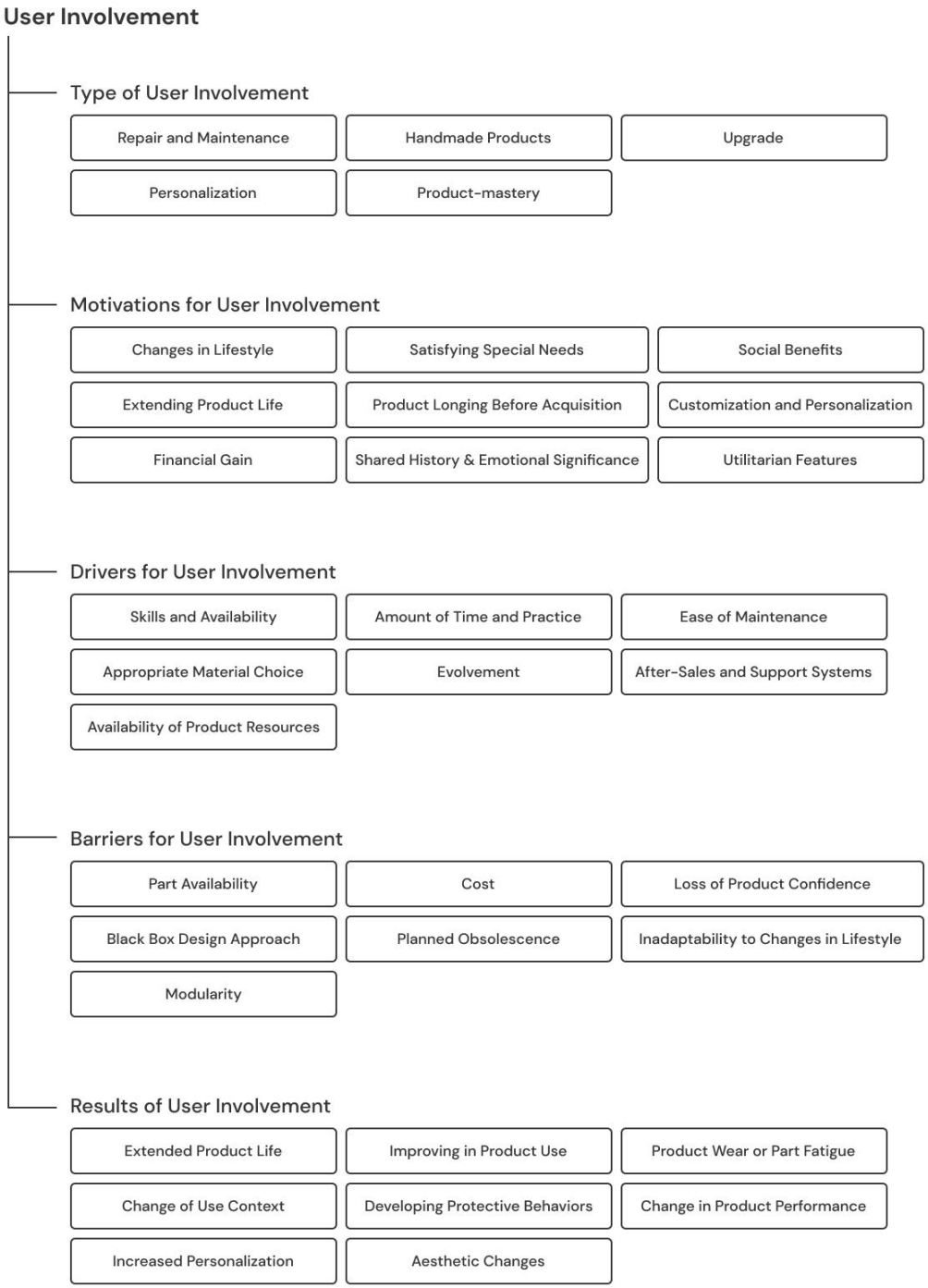
Utilitarian Features

- What do you think about the performance of the product you have chosen? Which features of the product do you associate with high or low performance?
- Have you made any interventions to improve the performance of this product before?
- How does the performance of the product affect the value you placed on it?
- How do you think your other interventions to the product affect the performance of the product?

Formal Aspects

- What do you think about the aesthetics of the product you have chosen? Can you explain by giving examples from the product?
- Have you ever made any interventions to increase the aesthetic value of this product?
- How do the aesthetic features of the product affect the value you placed on?
- How did your other interventions to the product affect the aesthetic value of the product?

I. FINALIZED CODE STRUCTURE



J. DESIGN GUIDE FOR TRIGGERING PRODUCT ATTACHMENT THROUGH USER INVOLVEM