

Designing valuable GOODbyes: A review of state-of-the-art 'Design for Divestment' literature and its implementation in practice

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Abstract: Consumers play a crucial role in closing loops in a circular economy, as they decide how and when products are returned. However, the end-of-use of products is underexplored from a consumer perspective. This final phase of the consumption cycle, also known as *divestment*, is the process of the physical and mental & emotional separation of the consumer from their product. The field of 'Design for Divestment' is in its infancy.

This paper therefore explores the present situation of Design for Divestment in theory and practice and identifies knowledge gaps. The study first reviews the state-of-the-art literature and then analyzes divestment in practice. Interviews were held with inter alia Original Equipment Manufacturers (OEMs) and Producer Responsibility Organizations (PROs) to explore how the collection of e-waste is designed and how the divestment/consumer perspective is understood and integrated.

No universal factor could be found in literature nor practice to guide consumers towards collection solutions. Nevertheless, experimenting with different interventions at a small scale to design effective collection solutions seems to be key. It may be beneficial to engage consumers more actively during the design process and leverage their tacit and latent knowledge. Although the research field is not yet widely known by interviewees, divestment definitions, tools and methods in literature offer a base for designers. These could be complemented with methods commonly employed when designing for the purchase and use phases but adapted to divestment. Further research is needed to deepen and diversify Design for Divestment methodology and to bridge gaps between theory and practice to design valuable goodbyes.

Introduction

The collection rate of e-waste needs to be improved drastically to reach European Union (EU) targets and attain a circular and sustainable Europe. Consumers have an essential role in closing loops in a circular economy, as they decide how and when products are collected. Despite their importance in this transition, the consumer perspective at the end-of-use of products is underexplored (Camacho-Otero et al., 2018; Selvefors et al., 2019), especially in contrast to the attention spent on the business perspective and technical perspective.

The term 'divestment' refers to the process of physical and emotional & mental separation from a product by the consumer during the last phase of the consumption cycle. 'Design for Divestment' considers how to design for this last phase of the consumption cycle from a consumer perspective.

This paper studies the current state of Design for Divestment research in theory and practice. Additionally, it uncovers knowledge gaps to guide further research in the field.

The scope of this research lies on the divestment of e-waste through their collection in the EU. We focus on business-to-consumer (B2C) activity, as the largest share (83%) of e-waste generated in Europe comes from this market (Fonti et al., 2021).

The first part of the paper provides an inventory of state-of-the-art divestment research identified through a literature review. The second part explores how divestment is understood and integrated in designing the collection of end-of-use electrical and electronic equipment (EEE) in practice. The final part discusses the main findings and knowledge gaps.

State-of-the-art divestment literature

Let's first dive into the theory by looking into social sciences and design literature to uncover the state-of-the art of (design for) divestment research. This study builds upon previous work from a doctoral thesis (Poppelaars, 2020) and expands it with a literature study focusing on publications after 2020. This part defines divestment, its process, influencing factors, approaches, tools and design principles currently available.

Definition of divestment

There is no consensus yet in literature on how to refer to the last phase of the consumption cycle from a consumer perspective. Various terms are used in literature, for instance, 'disposal', 'disposition' (Jacoby et al., 1977) and 'disinvestment' (Radtko et al., 2022). We use the term 'divestment' for this phase. Divestment combines both the physical and mental & emotional separation experienced by consumers when ending the use cycle of a product (Poppelaars et al., 2020). The physical separation stands for the visible part of divestment during which the consumer acts on their decision and transfers the ownership and responsibility of the products to another party. In contrast, the mental and emotional separation is the invisible part of divestment happening in consumers' heads. This part includes habits, biases, and the relationship with the product.

Divestment process

Several models of the divestment process can be found in scientific literature in the fields of business administration and marketing (Blackwell et al., 2006; Cruz-Cárdenas & Arévalo-Chávez, 2018; Hanson, 1980; Roster, 2001), and in design literature (Macleod, 2021). In these different models, six stages can be recognized, as depicted in Figure 1. The figure

provides a glimpse in the minds of consumers throughout the divestment phase:

1. **Dilemma recognition** occurs when the consumer reflects on whether to keep the product or to end its use cycle.
2. The consumer **searches for divestment options** (i.e., ways to separate from this product, such as selling, donating, collection or throwing away).
3. The consumer **evaluates these options** and chooses one, resulting in a divestment intention.
4. The product and consumer are **prepared for divestment**.
5. The consumer acts on their intention and performs the **final act of disposition** by physically severing with the product using the chosen divestment option.
6. The consumer ends the process with the **divestment outcomes** of the actions taken in the past stages.

Factors influencing divestment

Most of the research in the field focusses on inventorying factors influencing divestment (e.g. Mohamad et al., 2022; Ting et al., 2019). These factors can be classified as product-, consumer-, context- or option-related, including for example attachment with the product, life events, environmental beliefs, convenience of divestment options, lifestyle, and social norms. Each of the stages in the divestment phase has its own set of influencing factors, but the studies do not point to a universal (set of) factor(s) to guide consumers toward collection. The factors are dynamic over time, interdependent and different for each consumer. In other words, the consumer is not rational but a complex being in an even more complex situation. These factors can thus not be used as predictive triggers to design collection solutions. Nevertheless, they do provide further understanding and important insights in the complexity of the divestment process (Poppelaars, 2020).



Figure 1. Stages of divestment (Poppelaars et al., 2020).

Design for Divestment approaches, tools and design principles

Several publications offer Design for Divestment approaches, tools and principles to support designers with the development of valuable consumer divestment experiences.

Early research in the field has approached behaviour change at an individual level where consumers are rational. However, more recent research advocates approaching it at a collective level to deal with consumers' complexities and unpredictability. Encino-Muñoz (2020), for instance, considers the multi-layered and complex process by studying the divestment of clothing, furniture and mobile phones based on (social) practice theory (e.g. Reckwitz, 2002). Complexity theory (Nijs & Engelen, 2014; Webster, 2015) could also help to instigate change through emergence and adaptive methods (Poppelaars, 2020).

Master graduate Timmerman (2018) created the tool *'Design for product detachment – Saying goodbye to a(n) ...'* to help designers shape the divestment phase. It combines the consumer-product lifecycle with a divestment experience using a model of the process, value cards and behaviour cards.

Design endings pioneer Joe Macleod developed the *'Canvas for Consumer Endings and Off-Boarding'*. Macleod prescribes that "[a] good ending should be: consciously connected to the rest of the experience through emotional triggers that are actionable by the user, in a timely manner" (Macleod, 2022). The canvas prompts the designer with inputs on "where does it end?", "type of ending?", "how should it feel?", "what legislation?", "what are the phases?", and "how to measure?".

Lastly, Poppelaars, Bakker & van Engelen (2020) proposed *ten design principles* for the divestment of smartphones based on insights of seven design projects. These principles include e.g. "hold users by the hand to say goodbye", "think outside the divestment phase" and "consider the body and soul of devices".

Divestment in practice

On this theoretical backdrop, this second part studies the advancements of divestment in practice for EEE. How is the experience of

consumers understood and integrated in designing e-waste collection solutions?

Through semi-structured interviews, Producer Responsibility Organizations (PROs) and Original Equipment Manufacturers (OEMs) are asked how they design collection solutions for EEE and think about divestment. For completeness and when possible, these insights are supplemented with reports on the cases.

PROs results

A large Italian PRO (personal communication, January 20, 2023) indicates that they mostly develop new e-waste collection solutions through an iterative design process by testing novel ideas through pilot projects. Integration of the consumer in this process comes through experience from previous projects, and conducting interviews and surveys. In other words, they mostly rely on empirical research when designing a collection solution. The PRO indicates that their main focus is on the convenience of their collection solutions, but they also try to inform the consumer about the relevance of gathering e-waste through speeches and small events about sustainability. The design of collection solutions by a large French PRO (personal communication, February 23, 2023) is thoroughly informed by consumer research to get a better understanding of what moves consumers. This goes beyond quantitative studies by complementing questionnaires with ethnological studies at collection points and with focus groups spread around France. The consumer knowledge is not anchored in scientific theories and models, but is the result of years of empirical research through various pilots and learning by doing to provide a wide array of collection solutions to consumers and instigate trust and new habits.

A Dutch PRO (personal communication, March 14, 2023) indicates that their collection solutions are strongly influenced by consumer behaviour. To closely involve and understand the consumer, the PRO employs methods such as focus groups, pilot projects and continuous evaluation with the target group through large scale surveys. They recommend segmenting consumers in lifestyle groups instead of demographic groups. The PRO uses insights from neuro marketing to leverage the

subconsciousness of consumers to evoke the preferred behaviour. They recognise the physical, mental and emotional separation processes of consumers. Knowledge gaps mentioned are ways to retrieve stored devices, means to alleviate privacy concerns and further insights in how the specific type of EEE influences the divestment process.

The European-funded project COLLECTORS, executed in association with European PROs, "aims to identify and highlight existing good practices of waste collection and sorting", including e-waste (COLLECTORS, 2018). Case studies for social acceptance showed that citizen participation (e.g. focus groups, workshops and providing feedback) is one of the key elements of successful collection solutions. It acknowledges that "alignment – on the citizen's needs – is crucial and has to be taken into account when designing the measure implemented at the local level" (de Bree et al., 2019).

OEMs results

A large multinational producing consumer EEE currently relies on collective collection solutions organised by PROs (personal communication, January 16, 2023). The company indicates that they are researching the viability of a take-back system for specific product categories. They are aware of design for divestment and are particularly interested in the added value that can be created by integrating the end-of-use of a product in their customer journey. To this end, they have explored several tools and models to understand and integrate the consumer in designing collection solutions (e.g. Fogg behaviour model, service safari, in-depth consumer interviews, personas, eco storytelling, service blueprint and co-creation sessions with designers).

Another EEE OEM, that also depends on PROs for the collection of their products, is currently exploring a business case for the development of a take-back program (personal communication, February 9, 2023). To them, its viability depends on the benefits gained by improving the relationship with customers compared to the costs of the implementation of such a program.

An IT equipment OEM has embedded the collection of their products in their value proposition (personal communication, March 23, 2023). Firstly, they try to postpone the end-of-use by offering various replacement parts and upgrade modules. When the use phase finally ends, they offer a take-back system that allows for the return of devices, regardless of the brand. The OEM indicates that their collection system is not financially attractive on its own, but fits with their company values and helps with customer acquisition and retention. The collection solution has a prominent place on their website and is combined with vouchers for a new purchase. The consumer is also triggered earlier in the customer journey through a message on the packaging indicating that the packaging is designed to be used to send the device back after its use. The OEM indicates that the consumer was not engaged during the design process of this collection solution and that it is mostly based on beliefs held about consumers through prior experiences.

Discussion and Conclusions

Based on the results from the literature review and interviews, we can define state-of-the-art Design for Divestment knowledge and identify interesting future research opportunities in theory and practice.

Experiment, experiment, experiment!

Although we are all looking for *the* universal factor that will stimulate consumers to return their products at the end-of-use, a clear conclusion is not reached in literature, nor in practice. The awareness, convenience and financial compensation of collection solutions are very relevant, but are not enough to bring everyone to action. As suggested in literature, consumers are not rational and can thus not be approached in a uniform and predictable manner. To navigate this, several interviewed PROs supplement surveys and interviews with experiments of collection solutions at a small scale, and iterate their interventions until they fit the targeted consumers. Experimenting with small groups by changing various interventions is in line with novel behaviour change approaches proposed in literature (i.e., practice theory and complexity theory) and could be further investigated.

Engage the consumer during design

There also lies an opportunity in actively engaging the consumer in the design of collection solutions. The methods that the interviewed OEMs and PROs employ seem to rely on traditional explicit and observable knowledge. According to Sanders & Stappers (2012), two deeper levels of knowledge exist: knowledge from personal experience (i.e., tacit knowledge), and knowledge from thoughts and ideas on what has not yet been experienced, yet could have an opinion on it based on past experiences (i.e., latent knowledge) (Figure 2). These two deepest levels of knowledge remain largely unleveraged. Actively engaging consumers in design, for instance through generative sessions, may help in creating more effective collection solutions made with and for consumers. Some of the interviewed PROs and OEMs started exploring these knowledge levels to some extent, but it may be valuable to further research this knowledge gap.

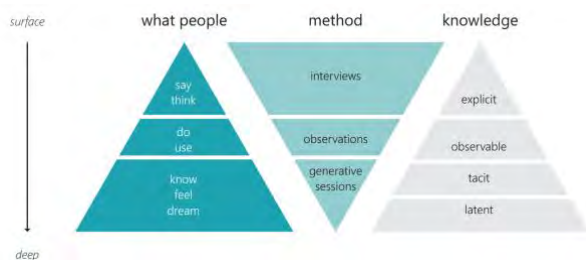


Figure 2. Methods to study what people say, do and make help access different levels of knowledge (reproduction of Sanders and Stappers, 2012, p.67).

Design collection as part of the customer journey

Furthermore, as seen in literature, collection rates may be increased by making collection an integral part of the consumption cycle and by leveraging the relationship between consumers and OEMs. The interviewed OEMs recognise the potential of integrating collection solutions in their customer journey. However, they currently do not all have their own collection/take-back programs and are exploring their added value. Additional research is needed to substantiate these benefits (e.g. improved customer relationship, brand equity and recurring purchases).

Design for Divestment research as basis

To perform the earlier mentioned experiments, designers need a direction for the required interventions shaping the collection solutions (e.g. collection point, campaign, hardware, software, service, packaging, etc). The definitions, processes, factors, tools and methods found in literature offer a good starting point for expanding knowledge within the emerging Design for Divestment field. Their robustness should be further tested and developed by for example investigating differences between product categories and brands (Radtke et al., 2022). Divestment as a concept is not yet widespread in practice, but piqued the interest of interviewees eager to get more knowledge on divestment to better understand consumers.

- Designers should consider the consumer when shaping the end-of-use of their products and services. To do so, following the definition of divestment, they could both take the physical separation and the mental & emotional separation process into account.
- The stages of divestment (Figure 1) can be used as a map of the mind of consumers. It starts at acknowledging that the product does not fulfil needs anymore, continues with searching and evaluating options, formulating an intention, preparing for it *and* acting upon it, and finishes with enjoying the result.
- To better understand consumers, more knowledge on patterns in factors and behaviour could support designers with design principles.
- The tools by for example Macleod and Timmerman can also guide designers in this still unknown territory of divestment and make the novel knowledge as practical as possible.

Learn from design methods in the purchase and use phases

New design for divestment methods can be inspired by design methods that are commonly applied to designing products and services at the purchase and use phases, many of which recognise the consumers in their diversity and complexities:

- As argued by two PROs, segmenting consumer groups, neuromarketing and ethnography help guide the design of interventions for collection solutions.
- Different master graduates have used personas, service safari, consumer interviews, co-creation sessions with designers, and service blueprints

(e.g. Fan, 2022; Jingwei, 2018; Mertens, 2018; Polat, 2019) when designing collection solutions.

- Parts of the Use2Use design Toolkit could also be leveraged (Selvefors et al., 2019)

To conclude, the field of Design for Divestment is still in an early stage of its development and will need to be further deepened, diversified and consolidated. A foundation was created in both theory and practice to design valuable and effective collection solutions to keep EEE at their highest value and utility over time by closing the loop from a consumer perspective. We invite researchers and practitioners to bridge the knowledge gaps identified in this paper with further research to design valuable GOODbyes.

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