Consumer Attitudes towards Circular Business Models and Activities

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Consumer Attitudes towards Circular Business Models and Activities

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Executive summary

In this study, we focus on the willingness of consumers to use circular business models (CBMs). We assess the 'suitability' of a product or sector for a particular circular business model from a consumer-based perspective, namely is it likely that a sufficient number of consumers would be willing to adopt the CBM to make it worthwhile for providers to enter this market. The study aims to provide a helicopter view of different attitudes towards a diverse set of CBMs. Specifically, we work with six different scenarios concentrating on coffee, printing, housing, clothing, household chores and secondhand markets. This approach allows us to compare results for a variety of CBMs as well as to identify general trends in consumers' intentions and reported behavior.

Using one framework to compare different CBMs and different products in a consistent manner is the main contribution of this study. This approach clearly shows that a context-dependent strategy will be needed to stimulate consumers to adopt circular business models and activities. One-size-fits-all circular business solutions and policy measures are not easily achievable as they will only be effective for parts of the population and specific products/services. Thus, a targeted approach and focused information provision are required to have a sizable impact on the transition towards a circular economy. Still some general observations can be made.

A first general observation is that concerns about contractual conditions and perceived risks emerge as important barriers towards the adoption of CBM. While this is understandable from a consumer's point of view, easy solutions are more difficult to find as suppliers are dealing with a moral hazard problem.

A second general observation involves the possibility to increase consumers' environmental awareness since a desire to reduce one's environmental impact was the most important driver mentioned by the respondents and higher scores on the environmental awareness scale were correlated with a higher willingness to adopt circular business models. Here, education and sustained information campaigns through traditional as well as social media can play an important role.

A third general observation relates to the lack of familiarity, which is one of the barriers that can be addressed in a fairly straightforward way. Governments and administrations can lead by example. Businesses can allow potential consumers to test what is on offer before asking them to commit to a long-term subscription.

Fourthly, when private companies communicate about CBM and develop marketing strategies to positions one's business offer on the market, it will be important to not solely focus on the environmental aspects. Although the environmental driver was strongest in all cases that were considered in our study, in many cases it will be equally – or even more – important to stress other benefits such as quality, ease of use, financial savings and reduced risks.

Samenvatting

In deze studie bekijken we de bereidheid van consumenten om circulaire bedrijfsmodellen (CBM's) te overwegen en te gebruiken. We beoordelen de 'geschiktheid' van een product of sector voor een bepaald circulair bedrijfsmodel vanuit een consumentenperspectief: wat is de kans dat er voldoende consumenten bereid zouden zijn om het CBM te adopteren om het voor aanbieders de moeite waard te maken om tot deze markt toe te treden. De studie beoogt een helikopterview te geven van verschillende attitudes ten aanzien van een uiteenlopende reeks CBM's. Concreet werken we met zes verschillende scenario's die zich concentreren op koffie, printen, huisvesting, kleding, huishoudelijke taken en tweedehandsgoederen. Deze aanpak stelt ons in staat de resultaten voor verschillende CBM's te vergelijken en algemene trends te identificeren in de bevraagde intenties en het gerapporteerde gedrag van consumenten.

Het gebruik van één kader om verschillende CBM's en verschillende producten op een consistente manier te vergelijken is de belangrijkste bijdrage van deze studie. Deze aanpak laat duidelijk zien dat er een contextafhankelijke strategie nodig zal zijn om consumenten te stimuleren circulaire bedrijfsmodellen en activiteiten te adopteren. One-size-fits-all circulaire bedrijfsoplossingen en beleidsmaatregelen zijn niet gemakkelijk haalbaar, omdat ze alleen effectief zullen zijn voor delen van de bevolking en specifieke producten of diensten. Een doelgerichte aanpak en informatievoorziening zijn dus nodig om een meetbare impact te hebben op de transitie naar een circulaire economie. Toch kunnen we enkele algemene observaties maken.

Een eerste algemene observatie is dat bezorgdheid over contractuele voorwaarden en gepercipieerde risico's naar voor komen als belangrijke barrières voor de adoptie van CBM. Hoewel dit vanuit het oogpunt van de consument begrijpelijk is, zijn gemakkelijke oplossingen moeilijker te vinden omdat leveranciers te maken hebben met een *moral hazard* probleem.

Een tweede algemene observatie betreft de mogelijkheid om het milieubewustzijn van de consument te vergroten, aangezien de wens om de eigen milieu-impact te verminderen de belangrijkste drijfveer was die door de respondenten werd genoemd en hogere scores op de schaal voor milieubewustzijn gecorreleerd waren met een grotere bereidheid om CMBs te overwegen. Hier kunnen educatie en aanhoudende informatiecampagnes via zowel traditionele als sociale media een belangrijke rol spelen.

Een derde algemene vaststelling heeft betrekking op het gebrek aan vertrouwdheid met deze 'nieuwe' bedrijfsmodellen. Dit is een belemmering die op een vrij eenvoudige manier kan worden aangepakt. Regeringen en overheidsdiensten kunnen het goede voorbeeld geven en voortrekkersrol spelen. Bedrijven kunnen potentiële consumenten de mogelijkheid bieden het aanbod uit te proberen voordat ze hen vragen een langlopende verbintenis aan te gaan.

Ten vierde, wanneer particuliere bedrijven over CBM communiceren en marketingstrategieën ontwikkelen om hun aanbod op de markt te positioneren, zal het belangrijk zijn zich niet alleen op de milieuaspecten te richten. Hoewel de milieudrijfveer altijd belangrijk was, zal het in veel gevallen even belangrijk - of zelfs belangrijker - zijn de nadruk te leggen op andere voordelen zoals kwaliteit, gebruiksgemak, financiële besparingen en verminderde risico's.

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1. Introduction

The transition towards a circular economy has important implications for the products, services and product-service combinations that are traded on markets as well as for the functioning of these markets. The business models of companies and organizations may need to be adjusted and redefined in order to remain relevant to these changing circumstances. Traditionally, a company's business model is defined as "the rationale of how an organization creates, delivers and captures value" (Osterwalder & Pigneur, 2010, p.14). It describes the key activities, and how they are interconnected within the organization and throughout the supply chain. Through these interconnections, the organization will aim to generate value or profit. Circular business models (CBMs), more specifically, are business models that increase resource efficiency and maximize value creation over that of traditional business models. Some authors limit their definition of CBMs to those with return flows of products (re-use, remanufacturing, and recycling after use of the existing resource stocks) (Linder & Williander, 2017). Others focus on strategies to leverage the unused capacity of the current material stock such as product-service systems (PSS) (Tukker, 2015; Goedkoop et al., 1999) and the sharing economy (access economy, platform economy and community-based economy, Acquier et al., 2017). Although each business model is unique, several broad categories can be distinguished, each with specific drivers and barriers.

The current study is designed to investigate consumer-related attitudes and determinants concerning a variety of circular business models. In this report, we use the term 'circular business model' or 'CBM' in a broad sense to capture the circular business models as well as the circular activities. We focus on a set of business models and activities that (1) happen in an organized way, (2) require the exchange of money (or possibly an in-kind compensation), and (3) facilitate the transition towards a circular economy. Thus, the study aims to answer the following research questions:

- Which types of people are open towards circular business models? Which product or sector characteristics prevent or allow for the successful adoption of circular business models by consumers?
- Which sectors or products could be suitable candidates to encourage circular business models by consumers?
- Towards which business models are consumers generally more open?
- What policy recommendations can be formulated based on the answers to the questions above?

Thus, we are mainly interested in the willingness of consumers to use circular business models. A first (small) step requires for individuals to be open to, or intend to use, such a business model. A second (bigger) step would be that they are already using it at the moment or have specific plans to implement it in their lives. This second step can be referred to as the adoption of a circular business model. The distinction between openness and behavior is related to the distinction between attitudes, intention and behavior. Furthermore, we assess the 'suitability' of a product or sector for a particular circular business model from a consumer-based perspective, namely is it likely that a sufficient number of consumers would be willing to adopt the CBM to make it worthwhile for providers to enter this market.

Specifically, we work with six different scenarios to provide a credible context to the participants. These scenarios concentrate on different products, namely coffee, printing, housing, clothing, household chores and secondhand markets. The study aims to provide a helicopter view of different attitudes towards a multitude of CBMs rather than an in-depth study of one or a limited set of CBMs. This approach allows us to compare results for a variety of CBMs as well as to identify general trends in consumers' intentions and reported behavior. The comparison of different CBMs and different

products in a consistent manner is the main contribution of this study as the available literature often focuses on a single case study.

The report is structured as follows. First, we provide an overview of the model set-up and investigate the role of the decision-maker, the product/service and the business model. Next, we describe the survey design and data collection methods, followed by a brief overview of the statistical methods used to analyze the data. In section 4, some general characteristics of the sample are described, while the next section presents the analysis of different scales that were used to measure respondents' attitudes. In section 6, the main attitudes of the respondents, as well as the drivers and barriers to adopting each of the CBMs, are described per scenario. Next, in section 7, respondents' intentions towards different CBMs are explained based on their attitudes, product and business model characteristics and some socio-demographic variables. Section 8 describes the results for respondents' reported circular behaviors. Section 9 presents an overview of the main insights and section 10 concludes.

2. Model set-up

Three crucial elements play an important role in each use or buy decisions that households make: the characteristics of (1) the decision-maker or consumer, (2) the product or service, and (3) the business model. In the following sections, we discuss each of these three elements in more detail. The overall set-up of the study is illustrated in Figure 1.
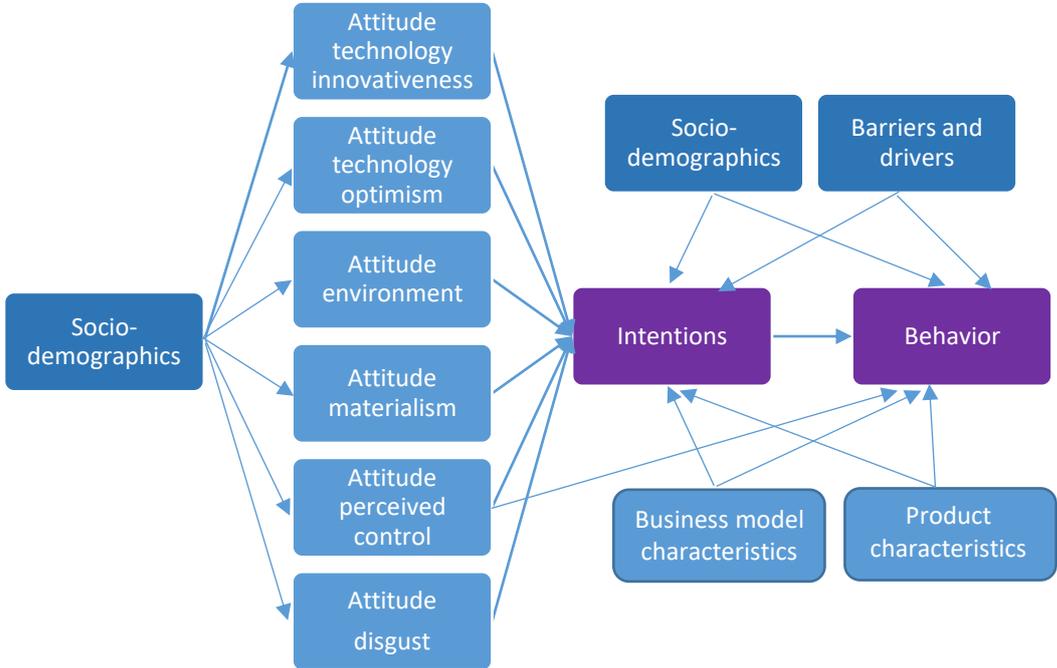
Figure 1: Research set-up

## 2.1 Consumers

Each decision-maker or consumer is unique and her habits, values, and attitudes will determine whether or not she is interested in a certain offering. A popular and widely used framework to understand the role of these underlying characteristics in the buyers' decision-making process is Ajzen's Theory of Planned Behavior (TPB) (Ajzen, 1985; 1991; 2002). The TPB states that behavior is

best predicted by behavioral intention – that is, that someone is most likely to perform a given behavior if they have formed the intention to do so beforehand (Ajzen, 1991). Behavioral intention is thought to be determined by an individual's attitudes and subjective norms, i.e. the perceived social pressure to perform the behavior (Ajzen & Fishbein, 1980). The TPB also includes perceived behavioral control, a measure of an individual's perceived ability to perform the behavior in question (Ajzen, 1991). In the model, attitudes and subjective norms influence behavior indirectly via behavioral intention, whereas perceived behavioral control can have both an indirect effect, via intention, and a direct effect on behavior. Studies utilizing the TPB have consistently found support for its predictive power. In a meta-analysis of 185 studies, the model was found to explain 27% and 39% of the variance in behavior and intention respectively (Armitage & Conner, 2001). Still, actual individual behavior is imperfectly observable by researchers and may deviate from the behavioral intentions, depending on the individual's behavioral control and the enablers and constraints present (such as budget and time constraints).

The TPB has been used in a wide variety of settings. However, most interesting for the current setting are the studies related to sustainable behavior such as sustainable food consumption (Vermeir & Verbeke, 2008; Dowd & Burke, 2013) as well as those related to the transition towards a circular economy such as recycling behavior (Terry et al., 1999), car-sharing (Zhang et al., 2018), bike-sharing (Yu et al., 2018) or textile disposal (Henzen & Pabian, 2019). Furthermore, past studies investigating the adoption of mobile services or e-commerce may also be relevant, such as the intention to use mobile banking (Luo et al., 2010). In each of these studies, the TPB is typically extended to reflect additional motivational factors that are thought to be relevant in a particular setting such as the confidence (Vermeir & Verbeke, 2008), environmental concerns (Paul et al., 2016), self-identity (Dowd & Burke, 2013), social identity and group norms (Terry et al., 1999).

In the current study, we use a variation of the TPB to gain more insight into the relative importance of consumers' attitudes and socio-demographic characteristics in predicting intentions to adopting circular business models and activities (see Figure 1). Besides determining the factors that are related with consumers' intentions, we also gain insight into the main drivers and barriers such as familiarity, financial concerns, or risk perceptions. We use a two-step approach to distinguish between the direct and indirect effect via attitudes of personal characteristics such as age and education on stated intention and reported behavior. As is discussed hereafter, six attitudinal scales are thought to be relevant in this setting: technological innovativeness, technological optimism, environmental awareness, materialism, perceived control and disgust.

Firstly, openness to circular business models and activities is likely to relate to the notion of *technology readiness* as technology's role in service delivery, e.g. through online interactions, is rapidly expanding (Vaittinen et al., 2018). Parasuraman (2000, p.308) defined technology readiness as "people's propensity to embrace and use new technologies for accomplishing goals in home life and at work". Technology readiness can be measured via the Technology Readiness Index (TRI) which captures four different dimensions (Parasuraman, 2000, p.311):

- Innovativeness: a tendency to be a technology pioneer and thought leader.
- Optimism: positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives
- Discomfort: perceived lack of control over technology and a feeling of being overwhelmed by it
- Insecurity: distrust of technology and skepticism about its ability to work properly

Later, Vaittinen et al. (2018) have adjusted and reinterpreted this scale to reflect the service readiness of organizations.

Secondly, as some circular business put a large emphasis on sustainability and the environment, the *environmental concern*s of consumers are an important attitude to measure (Rousseau, 2020). A frequently used approach to measure environmental awareness is the New Environmental Paradigm (NEP) scale developed by Dunlap and Van Liere (1978).

Thirdly, the more a product is perceived to be part of the extended self, the more customers have a desire to own and customize the product (Mugge et al., 2009). The traditional ways of buying and owning a product give consumers full control and ownership over the product. In order to measure *materialism* in consumers, the Material Values Scale (MVS) was developed by Richins and Dawson (1992).

Fourthly, consumers' intentions and behaviors may be influenced by the degree to which they believe that they have control over the outcome of events in their lives, this is also called *locus of control or perceived control* (Rotter, 1966; Paulhus, 1983). Individuals with a strong internal locus of control believe events in their life derive primarily from their own actions, while people with a strong external locus of control tend to praise or blame external factors. The Spheres of Control (SOC) scale developed by Paulhus (1983) measures three layers of control: personal, interpersonal and socio-political control. Individuals who score high on perceived (internal) control tend to find decision-making easier (Azjen, 2002).

Fifthly, some people are susceptible to psychological or physical barriers such as contamination or responsibility barriers (Hazée et al., 2017). Customers may worry about perceived contamination because the item may come into actual and/or imagined physical contact with others and they are concerned that they may be held responsible for their and/or others' usage of the innovation. In order to measure perceived contamination, we use the Revised *Disgust Scale* (DS-R) developed by Haidt et al. (1994) and modified by Olatunji et al. (2007).

Besides consumers' attitudes, other factors can also influence people's openness towards circular business models and activities (Edbring et al., 2016; Lawson et al., 2016; Neunhoeffer & Teubner, 2018; Keirbilck & Rousseau, 2019). *Financial aspects and price* clearly matter. Several types of CBM allow consumers to replace paying a one-time purchasing price with lower fees over the full use period. *Ease of use and product-service quality* are also likely to be important factors. Further, the *social community* is very important for status products and products that connect people and communities. Consumption decisions are influenced by the consumer's desired *image and lifestyle*. Some circular businesses, therefore, make a conscious effort to create a brand community through Facebook groups, discussion forums, secondhand markets (such as Patagonia) and merchandise. Sharing platforms and repair cafes require at least some social interaction. Some people will find social interaction and meeting new people a bonus, others will find this a barrier (Hawlitschek et al., 2016). Consumers' behavioral intentions are also influenced by their *risk perceptions*. Risk perceptions can be influenced by, among other things, the type of insurance that is available, trust in the service provider, or the responsiveness of the provider (Bardhi & Eckhardt, 2017; Neunhoeffer & Teubner, 2018; Rousseau, 2020). *Familiarity* with the CBM typically reduces consumers' risk perceptions (Rexfelt & Hiort Af Ornäs, 2009; Edbring et al., 2016; Lawson et al., 2016).

2.2 Products and services
Consumer perceptions towards circular business models and activities also depend on the type of product or service (Edbring et al., 2016; Keirsbilck & Rousseau, 2019). Characteristics such as brand loyalty, fast innovation cycle, and the environmental impact of the product/service can have an impact on the success of a circular business model. As stated by Bardhi and Eckhardt (2017), consumption that

is associated with high levels of brand loyalty, attachment, and identification with the brand seems to be more solid and thus more likely to favor product ownership over access-based consumption. On the other hand, products that require frequent maintenance and upgrades such as products with fast innovation cycles are more attractive for consumers to rent than to own (Rexfelt & Hiort af Ornäs, 2009).

Naturally, consumer and product/service characteristics will interact, for example, the importance of barriers such as image and contamination will differ for different products (Hazée et al., 2017); contamination may be a bigger issue for products where hygiene is important and consumers are in close contact with the product, such as with a child's crib or clothes. Baxter et al. (2017) discussed that contamination may hinder the use of sharing or reuse business models in favor of downcycling, recycling or disposal.

2.3 Business models

Inspired by the EIT RawMaterials' Circulator tool (EIT RawMaterials, 2019), we include a wide range of business models in our survey as consumers are likely to react differently to different types of business models. The tool distinguishes four business model archetypes:

- From product to service; focusing on the relationship with the customer
- Circular product or process design; focusing on the product or process itself
- Building circular value networks; focusing on the relationship with the value network
- Circularity as a unique selling proposition; focusing on sustainable identity.

Each of these business model archetypes is a mix of different circular strategies aimed to (1) act upon the material and product resources in the business model (sustainable materials management strategy), (2) deliver circular value to the customer (business strategy), or (3) engage with others beyond the company borders (value network strategy).

Inspired by the categorization of the Circulator tool, we selected the most relevant strategies: use-oriented product-service systems, result-oriented product-service systems, sharing systems, reuse, recycling, and labeling.

A product-service system (PSS) can be defined as a combination of tangible products and intangible services designed to fulfill specific customer needs (Tukker, 2004; Tukker & Tischner 2006). Typically, three main types of PSS are distinguished. A product-oriented PSS is mainly focused on the sale of products, but some extra services are added. The sale of an appliance combined with a maintenance contract is such an example. In a *use-oriented PSS*, the service-provider remains the owner of the asset and the use of products is intensified through leasing, sharing and renting a product with several different users. Tool libraries are good examples. In a *result-oriented PSS*, the client and provider agree on a result without the involvement of a pre-determined product (Tukker, 2004). Mobility-as-a-service (MAAS) is an example.

While sharing systems are sometimes seen as belonging to the category of use-oriented PSSs, the concept of the sharing economy is broader. The term sharing economy is clouded by unclear and overlapping concepts such as peer economy, gig economy, access economy, and collaborative consumption. Botsman (2015) distinguishes four systems that are commonly classified under the term 'sharing economy'. All systems aim to match what one person has with another person's wants to unlock the value of underused assets, result in a more distributed power, and often rely on new digital and communication technologies for trust and efficiency. However, they differ substantially in other aspects. Firstly, the collaborative economy describes an economic system of decentralized networks

and marketplaces that unlocks the value of underused assets by matching needs and haves, in ways that bypass traditional middlemen, such as Etsy and Kickstarter. Secondly, a *sharing economy* is an economic system based on sharing underused assets or services, for free or for a fee, directly from individuals such as Airbnb and BlaBlaCar. Thirdly, collaborative consumption involves the reinvention of traditional market behaviors (renting, lending, swapping, sharing, bartering, gifting) through technology, taking place in ways and on a scale not possible before the internet such as Zipcar, Freecycle and eBay. Fourthly, the on-demand economy includes platforms that directly match customer needs with providers to immediately deliver goods and services such as Uber (Botsman, 2015).

Table 1: Circular business models and activities included in the survey

	Housing	Fast-moving	Slow-moving
Use-oriented PSS	(I) Smart home *		(I) Subscription coffee at home * (I) Print subscription at home * (I) Wash subscription at home *
Result-oriented PSS		(I) Rent clothes from online platform *	(I) Subscription coffee in city * (I) Print subscription at copy center *
Sharing	(B) Airbnb (B) Cohousing (I) Cohousing *	(B) Past user/supplier online service platform (I) Use online service platform *	(B) Past user/supplier at Peerby (B) Car sharing (B) Bicycle / step sharing (I) Use sharing platform Peerby * (I) Rent coffee maker on Peerby (I) Rent printer on Peerby (I) Rent tools on Peerby
Recycling		(B) Use recycled printing paper * (B) Buy clothes with recycled fibers	(B) Treatment of coffee grit
Reuse & repair	(I) Buy 2ndhand construction timber (I) Buy 2ndhand tiles (I) Buy 2ndhand door (I) Buy 2ndhand kitchen tap (I) Buy 2ndhand bath (I) Buy 2ndhand boiler (I) Buy 2ndhand toilet	(B) Repair clothes by seamstress (B) Repair clothes in repair café (B) Buy/sell 2ndhand goods (B) Buy in 'De Kringwinkel' (B) Buy/sell in 2ndhand shop (B) Buy/sell 2ndhand online (B) Buy/sell 2ndhand at (informal) markets (B) use 2ndhand clothes from family * (I) Buy 2ndhand clothes (I) Buy 2ndhand goods *	(B) Past user/supplier at repair cafés (I) Buy 2ndhand coffee make (I) Buy 2ndhand printer (I) Buy 2ndhand tools (I) Participate in repair café *
Labeling		(B) Use eco-labeled printing paper (B) Buy clothes with organic label (B) Use ecological detergent	

* Follow-up question on drivers and barriers included; (I) intentions; (B) behavior

Through *recycling*, materials can be recuperated out of products that are at their end-of-life; the products are taken apart and materials are used again in other products. *Reuse*, on the other hand, typically refers to reusing an item for its original function. These circular strategies fit with the desire to have materials circle longer by maximizing the number of consecutive cycles and/or the time in each

cycle (Ellen MacArthur Foundation, 2013). Repair activities allow for an extension of the useful life span and reuse of products.

By branding, circular businesses can get a price premium by highlighting and guaranteeing quality and/or environmental claims. They may do this by obtaining certificates, labels, advertising and environmental stewardship. *Ecolabeling* is a voluntary method of environmental performance certification and labeling that is practiced around the world (Global Ecolabelling Network, n.d.). An ecolabel identifies products or services proven to be environmentally preferable within a specific category.

Next, we had a thorough brainstorm session and subsequent additional literature search to search for applications of these strategies in the housing, slow-moving consumer goods and fast-moving consumer goods sectors. Finally, we settled on four product categories, namely housing, coffee, clothes and printers, based on the following criteria:

- Many of the circular business strategies can be applied in these contexts.
- The categories are simple and familiar to many.
- Many households use these products regularly.
- We cover a range of goods that are quite heterogeneous.

An overview of the different types of reported behavior (B) and intentions (I) towards circular business models and activities is provided in Table 1. Examples that are indicated with an asterisk in the table have detailed follow-up questions in the survey while other examples are only touched upon briefly (see section 3). Note that not all types of CBMs and products are included in the set of questions regarding intentions or behavior. Table 2 summarizes which of the previously mentioned CBMs are included in the survey.

Table 2: Overview of CBMs and activities included in the survey

CBM and activities included in survey	
Use-oriented PSS	The service-provider remains the owner of the asset and the use of products is intensified through leasing and renting a product with several different users.
Results-oriented PSS	The client and provider agree on a result without the involvement of a pre-determined product
Sharing economy	An economic system based on sharing underused assets or services, for free or for a fee
Recycling	Materials can be recuperated out of products that are at their end-of-life; the products are taken apart and materials are used again in other products
Reuse	Typically refers to reusing an item for its original function (possibly after repair)
Ecolabeling	A voluntary method of environmental performance certification
CBM and activities not included in survey	
Product-oriented PSS	
Collaborative economy	
Collaborative consumption	
On-demand economy	
Circular brand creation	
Remanufacturing	

3. Methods

Firstly, we describe the survey design and set-up as well as how the data were collected. Secondly, we briefly discuss the statistical methods used to analyze the dataset.

3.1 Survey design and data collection

We use an online survey, created in Qualtrics, that targets Flemish adults and questions them about their willingness to participate in a newer, more circular way of consumption. The survey is shared through newsletters and websites of partners, social media and by asking Flemish cities and communities for their cooperation from mid-June till the end of November 2019. Data were anonymous and respondents gave their informed consent to use the answers for research. In order to increase the response rate, 50 vouchers were distributed among the respondents. This non-probabilistic sampling technique results in a sample that is not representative of all Flemish consumers and is likely to contain more higher educated and more sustainable consumers due to the possible self-selection bias. Thus, the dataset is likely to be biased towards individuals that are more open towards circular business models and activities. The oversampling of these individuals allowed us to collect enough observations to make meaningful statements about (intended) adopters as these CBM are mostly niche markets. Our findings can, therefore, be interpreted as, on the one hand, an upper limit of consumers' openness towards some CBM (especially those associated with higher prices such as PSS), and, on the other hand, as an lower limit for other CBM (those associated with lower prices such as secondhand products).

The survey flow is illustrated in Figure 2. The survey starts with general socio-demographics, questions about respondents' current behavior and habits regarding the four product categories that we focus on: coffee, printing, housing and clothing. Next, respondents are asked about their attitudes towards (1) technology based on four items (1, 2, 5, 6) of the seven-item TRI subscale regarding 'innovativeness' (Parasuraman, 2000), (2) the environment based on the six-item version (2, 4, 5, 6, 9, 11) of the original twelve-item NEP-scale (Dunlap & Van Liere, 1978; Steger et al. 1989), and (3) materialism based on the shortened six-item MVS developed by Richins (2004) which includes two items of each of the three subscales: items 1 and 4 ('success' subscale), 11 and 12 ('centrality' subscale) and 15 and 17 ('happiness' subscale).

Next, each of the respondents is randomly assigned to one of the three question blocks asking about their attitudes towards the online sharing community Peerby, secondhand markets, and repair cafés. Each of the three versions is designed to probe in more detail into one of the three topics (indicated by 'plus' in Figure 2). This is followed by questions measuring respondents' perceived control based on seven items of the third version of the SOC scale (Paulhus & Van Selst, 1990): items 1 and 9 ('personal control' subscale), 2 and 6 ('interpersonal control' subscale) and 7, 8 and 10 ('socio-political control' subscale).

Next, each of the respondents is randomly assigned to one of the four questions blocks related to the four product categories. Respondents who indicated in preceding questions to never use or be unfamiliar with one or more of the products are not assigned to these question blocks. To end, respondents are asked about their optimism regarding new technologies based on five items (1, 2, 4, 6, 10) out of ten-item TRI subscale regarding 'optimism' (Parasuraman, 2000) and about their fear of physical contamination based on six items (3, 4, 5, 6, 8, 18) of the DS-R scale (Haidt et al., 1994, modified by Olatunji et al., 2007).

Note that this survey flow implies that sample sizes vary depending on the topic that is studied. These sample sizes are indicated in Figure 2.
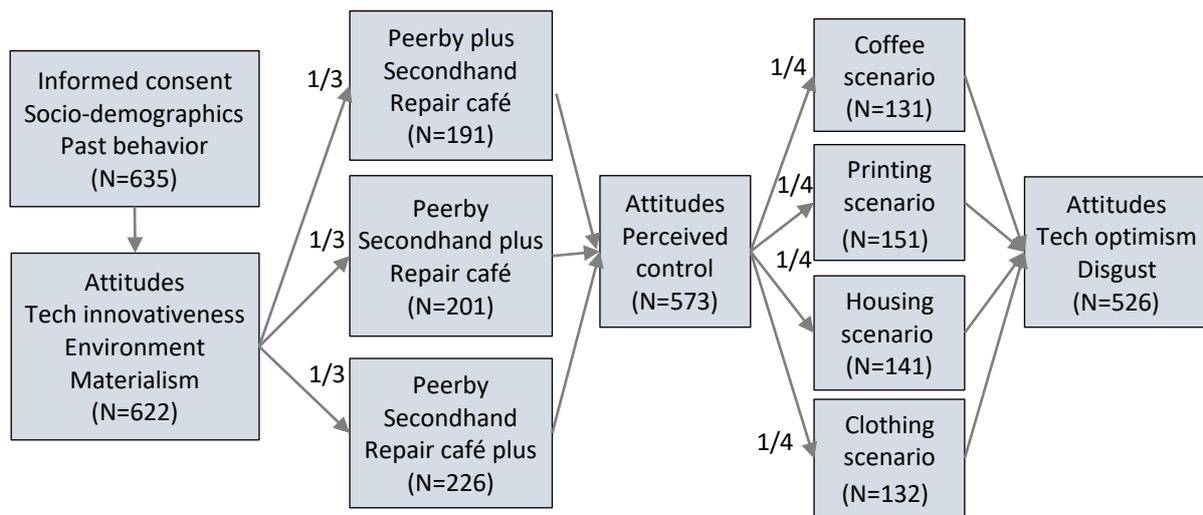
Figure 2: Survey flow

Moreover, for fourteen CBMs (see items with * in Table 1), respondents are asked which factors would encourage them to adopt the proposed circular option and which are keeping them back from adopting the option. The list of twelve possible drivers and barriers is based on the past studies (Edbring et al., 2016; Lawson et al., 2016; Hazée et al., 2017; Neunhoeffer & Teubner, 2018; Keirsbilck & Rousseau, 2019) and feedback from experts:

- Contractual conditions, the fine print
- Ease of use
- Environment-friendliness
- Expected quality
- Familiarity
- Hygiene, risk of contamination
- My image
- My lifestyle
- The opinion of my social group (group opinion)
- Price or cost
- Risks
- Social contact

3.2 Estimation methods

All data manipulation and estimations are executed in Stata. Other figures and tables are created in Excel.

Firstly, we calculate the Cronbach's alpha for the different attitude scales that were used in the survey. The Cronbach's alpha is a measure of the internal consistency of a scale and describes the extent to which all the items in a test measure the same concept (Tavakol & Dennick, 2011). Acceptable values of alpha typically range from 0.70 to 0.95. Lower values can indicate a low number of questions, poor inter-relatedness between items or heterogeneous underlying concepts. After reversing some of the scale items, the median value for each respondent for each scale (1=completely disagree; 5= completely agree) is calculated.

Secondly, we estimate a multinomial logit model to investigate the relationship between drivers and barriers and the characteristics of respondents, CBMs and products. The questions regarding drivers and barriers are multi-response questions. To facilitate the analysis, the dependent variable is coded as if the respondent had to select one of the twelve factors described in Section 3.1, if any, as a driver (or barrier) to adopt a specific CBM. This process is repeated as long as the respondents identify one of the factors as a driver (or barrier).

Finally, to reflect the complex structure presented in Figure 1, we use a structural equation model (SEM) which is a methodology for estimating a network of relationships between variables (Weston & Gore, 2006; Schumacker & Lomax, 2010). Specifically, we estimate two SEMs: one to explain respondents' intentions towards CBM and one to explain reported behavior. Each SEM contains two phases in this paper. In the first phase, respondents' socio-demographics are used to predict the median attitudinal scores. In the second phase, respondents' intentions or behaviors are explained based on attitudinal scores and the characteristics of the business models and products.

4. Description of the dataset

In total, 715 persons started the survey of which 635 filled in at least one question regarding their behavior or intentions with respect to the circular business models or activities included in Table 1. For the remainder of this text, we will use this reduced sample of 635 respondents.

In Table 3, the socio-demographic characteristics of the sample are described. Approximately, 60% of respondents are female and the average age is 38 years old with 70% of the sample younger than 45. A large majority of the respondents have a higher education degree and more than half have a university degree. About 70% have a part-time or full-time job, 20% are students and 10% are not working. The income distribution in the sample is presented in Figure 3. Almost 18% of respondents have a monthly net household income below 2500 euro, 53% has an income between 2500 and 5500 per month and 17% has a monthly income above 5500 euro. 12% of the sample preferred not to share this information. When asked about their financial situation, 6% of the sample revealed that paying for food can be 'a small problem', while 8% sees paying for housing (rent or bank loan) as a 'small problem' and 1% sees this as a 'big problem' (see Figure 4).
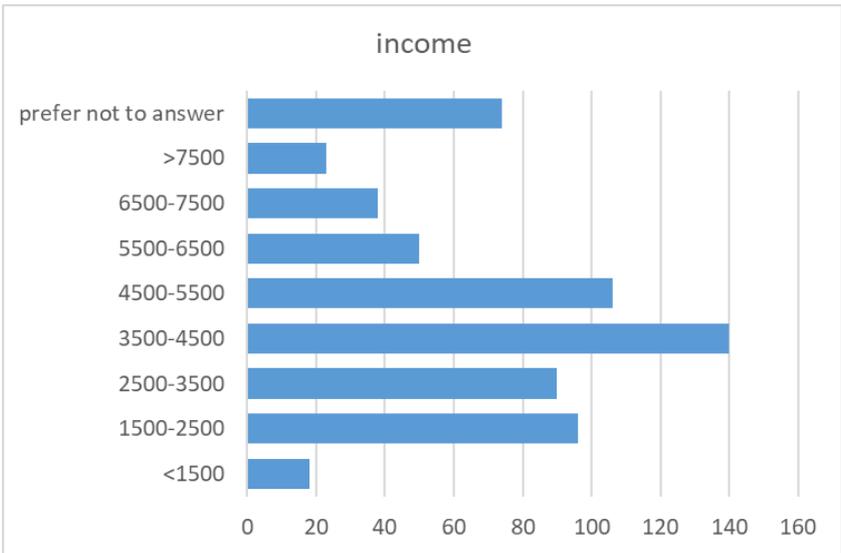
Figure 3: Frequency distribution of monthly net household income (in euro)

Table 3: Sample characteristics

Variable		Frequency	Percentage
Gender	Male	241	37.95
(N = 635)	Female	389	61.26
	X	5	0.79
Age	< 26	155	24.41
(N = 635)	26 – 45	298	46.93
	46 – 65	157	24.72
	> 65	25	3.94
Education	Primary	1	0.16
(N = 635)	Secondary (vocational)	17	2.68
	Secondary (technical)	23	3.62
	Secondary (general)	87	13.70
	Secondary (art)	6	0.94
	Non-university higher education	147	23.15
	University higher education	351	55.28
	Other	3	0.47
Job situation	Student	136	21.42
(N = 635)	Full-time job	334	52.60
	Part-time job	98	15.43
	Paid leave ('tijdskrediet')	3	0.47
	Homemaker	5	0.79
	Disability	8	1.26
	Unemployed	9	1.42
	Retired	23	3.62
	Other	17	2.68
	Missing	2	0.31
Job type	Self-employed, liberal profession	53	11.80
(N = 449)	Employee, no manager	151	33.63
	Employee, manager	73	16.26
	Worker, manual labor	10	2.23
	Education	46	10.24
	Civil servant	107	23.83
	Other	9	2.00
Location	Urban environment	196	30.87
(N = 635)	Semi-urban environment	218	34.33
	Rural environment	221	34.8
Housing	Homeowner	361	56.85
(N = 635)	Home renter	95	14.96
	Other (e.g. living with parents)	122	19.21
	Missing	57	8.98
Charities, NGOs	Member	187	29.45
(multiple answers possible)	Volunteer	151	23.78
	Donations	327	51.50

Looking at the housing situation, the share of respondents living in an urban, semi-urban or rural environment is approximately the same. Slightly more than half of the sample owns the home they are living in. Regarding the household size of the respondents, 30% of the households consist of four individuals, 24% of two individuals and 17% of three individuals (see Figure 5).
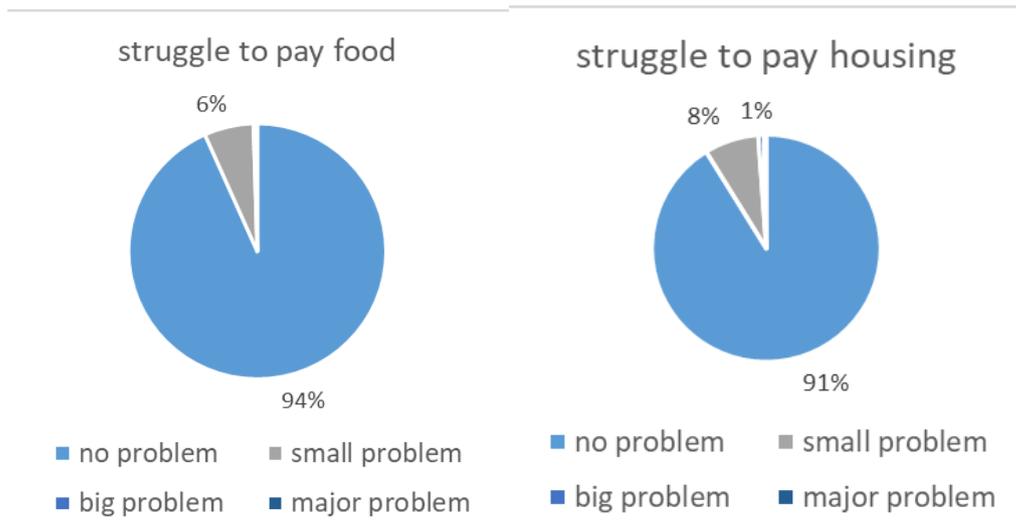
Figure 4: Financial status of respondents
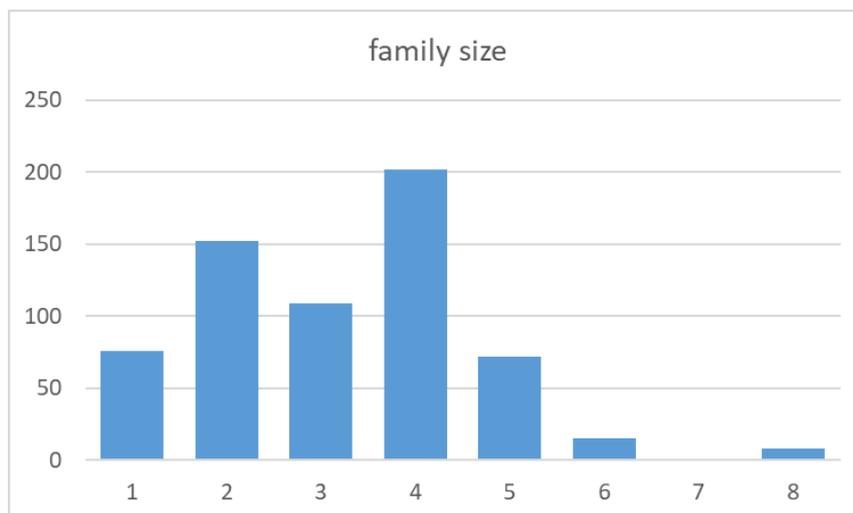
Figure 5: Frequency distribution of the number of family members

As expected based on the sampling strategy, the sample is biased.

Table 4 compares some sample characteristics with the population in Flanders. Highly educated, wealthier, female, younger and more environmentally-aware individuals are overrepresented. Due to the type of bias, the results of this study are likely to represent an upper limit of the openness towards circular business models, with the actual level being below.

Table 4: Comparison sample with population in Flanders

	Sample	Flanders	Source - description	Year
Male	37.95	49.5	https://www.statistiekvlaanderen.be/	2019
Female	61.26	50.5	% total population	
X	0.79			
age < 26	24.41	27.2	https://www.statistiekvlaanderen.be/	2019
age 26 – 45	46.93	25	% total population	
age 46 – 65	24.72	27.6		
age > 65	3.94	20.2		
low education	0.16	18.4	https://www.statistiekvlaanderen.be/	2019
medium education	20.94	40.6	% population 25-64 years old	
high education	78.43	41		
Students	21.42	3.97	https://www.statistiekvlaanderen.be/ registrations in higher education as % total population	2019-2020
Self-employed	11.8	10.68	https://economie.fgov.be/ self-employed as % total population	2019

5. Measuring attitudes

First, we calculate the Cronbach's alpha for the six attitude scales (Table 5) to check the internal consistency of the scales. Internal consistency refers to the general agreement between the multiple items (statements) that make-up a composite score of a survey measurement of a given construct. The Cronbach's alpha is low for two scales, perceived control and disgust, due to the limited number of scale items used from multiple subscales that were used in the survey (see section 3.1).

Table 5: Cronbach's alpha

Attitude scale	N	Cronbach's alpha	Internal consistency (Reliability)
Technology innovativeness	622	0.7834	Fair
Technology optimism	526	0.7616	Fair
Environmental awareness	606	0.7077	Fair
Materialism	597	0.7413	Fair
Perceived control	573	0.5170	Weak
Disgust	525	0.5565	Weak

N = number of respondents that gave their opinion for each item of a scale

We aggregate each of the scales by generating the median for each respondent for each scale. We used a Likert scale with 1 representing 'complete disagreement' with the scale item and 5 representing 'complete agreement'. We structured the dataset so that a higher median score implies that the respondent is more likely

- To have the tendency to be a technology pioneer (tech_innov)
- To have a positive view of technology (tech_opt)
- To be environmental aware (environment)

- To have a materialistic outlook (materialism)
- To believe events derive primarily from their own actions (control)
- To worry about perceived contamination (disgust)

From the cumulative distributions in Figure 6, we learn that, on average, the respondents score highest on environmental awareness and perceived control. They score lowest on the materialism scale. As we work with survey date, these attitudes scores may be influenced by a social desirability bias.

Note that this study was executed before the corona pandemic and that consumer attitudes may have shifted. For example, a fear of contamination may lead to a higher score on the disgust scale.
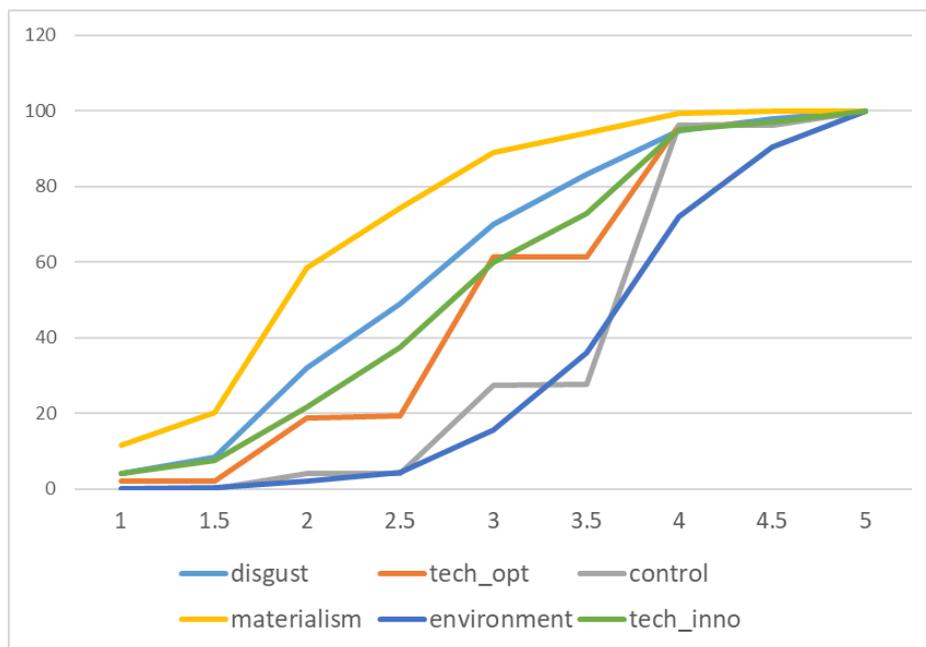
Figure 6: Cumulative distribution of respondents' median scores for the attitude scales

6. Results per scenario: Drivers and barriers

In this section, we describe respondents' behavior and intentions for six scenarios: coffee, printing, housing, clothing, chores and secondhand markets. Note that there is some overlap between secondhand markets and the other scenarios. We refer to Table 1 for an overview of the questions we asked in our survey. In addition, the main drivers and barriers influencing respondents' intentions with respect to adopting circular business models and activities are identified. As explained in Figure 2, the sample sizes (N) differ depending on the question that is analyzed.

6.1 Coffee scenario

The coffee scenario was presented to 131 respondents (see Figure 2). Still, the full sample could be investigated for some coffee-related intentions as some questions were presented to all respondents.

Regarding current behavior, 75% of respondents disposes of used coffee grit by using it in the garden, composting it or by sorting it as 'gft' (separate collection of vegetable, fruit and garden waste) (Figure 7). When it comes to coffee pads, over half of the respondents disposes of them by composting or as

'gft'. Finally, just over 30% of respondents that use coffee cups take these back to the shop or producer. Thus, the frequency of disposing of coffee waste in the residual household waste stream is highly dependent on the type of method used to make coffee and ranges from 18% for coffee grit over 43% for coffee pads to 66% for coffee cups (Figure 7).
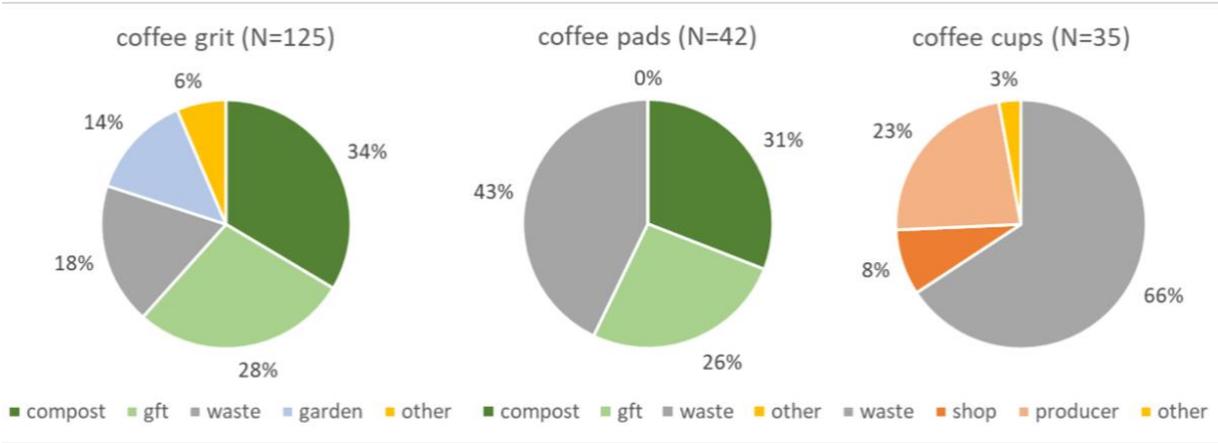
Figure 7: Treatment of coffee waste

We also asked respondents about their intentions to adopt several circular activities related to coffee making (Table 6). A significant proportion of the respondents is not open to seriously consider the four CBM we presented. Approximately 60% of the sample is not willing to rent a coffee maker on an online platform such as Peerby, to buy a secondhand coffee maker or to pay for a coffee subscription that allows getting a fixed number of coffees in several locations throughout the city. Slightly more than 40% was not willing to consider a subscription for coffee at home such as Bundles. Bundles offers access to a functioning coffee maker and fairtrade coffee at home and the user pays per cup of coffee made. A much smaller group of respondents (16-20%) would seriously consider the proposed CBMs.

Table 6: Intentions related to CBM and coffee

Intentions	no		maybe		yes		Total (N)
Rent coffee maker on Peerby	356	59.4%	121	20.2%	122	20.4%	599
Buy secondhand coffee maker	348	59.4%	127	21.7%	111	18.9%	586
Subscription coffee at home	55	42.0%	53	40.5%	23	17.6%	131
Subscription coffee in the city	73	57.0%	35	27.3%	20	15.6%	128

For the two coffee subscription options, we asked respondents to highlight which factors would incentivize them to adopt the CBM ('drivers') and which factors deter adoption ('barriers'). For the subscription at home, the three most important drivers are the reduced risks (maintenance and repair are included), ease of use and environmental impact; while the three main barriers are cost considerations, the lack of familiarity and concern about contractual conditions (Figure 8). For the coffee subscription in a city, a slightly different picture emerges. The three main drivers to adopt this circular option are ease of use, environmental impact and expected quality; the three main barriers are costs, fit with respondents' lifestyle (some people simply never buy coffee on-the-go) and concern about contractual conditions (Figure 9).
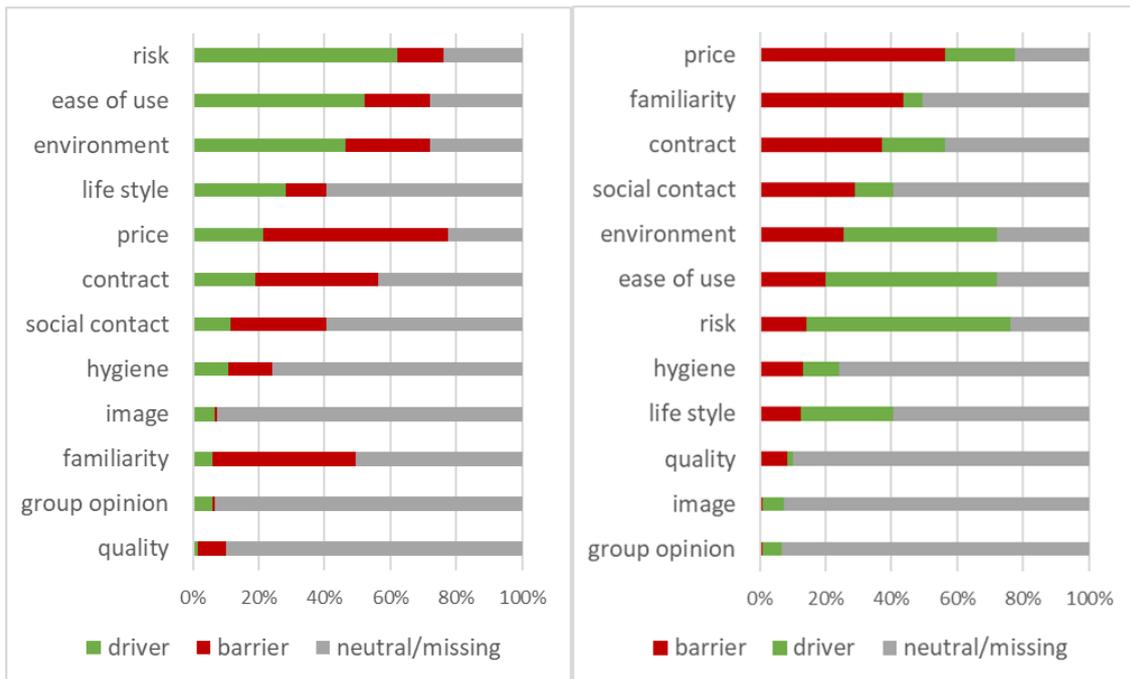
Figure 8: Drivers (ranked left) and barriers (ranked right) for coffee subscription at home (N=121)
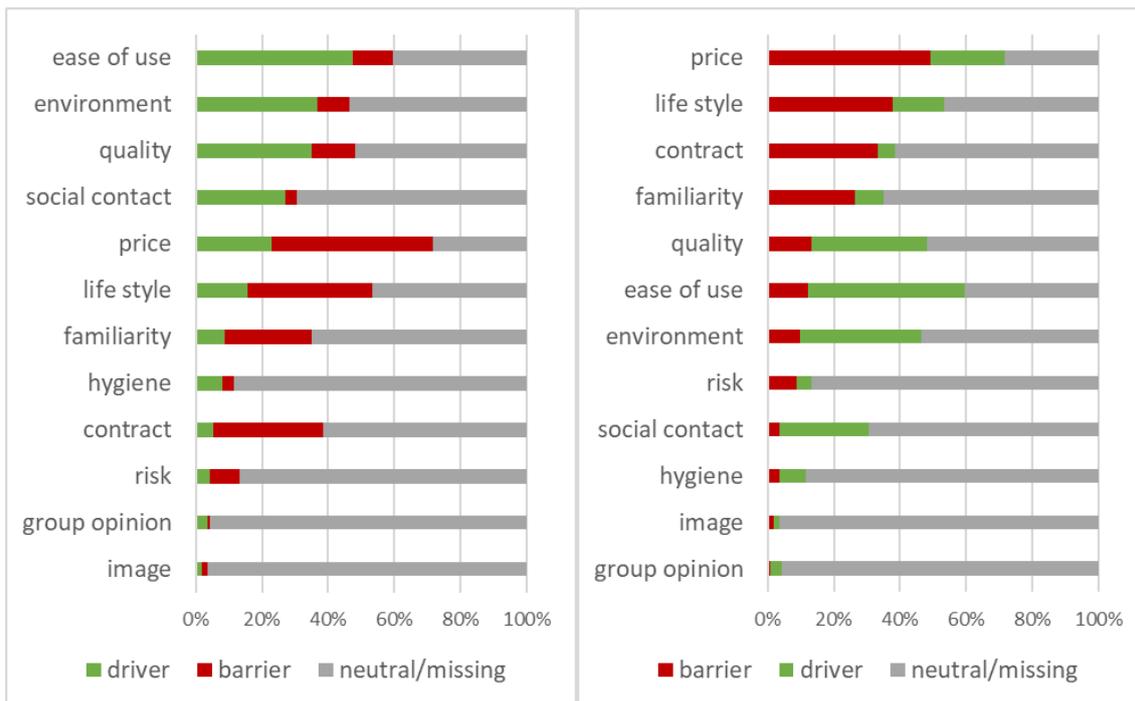
Figure 9: Drivers (ranked left) and barriers (ranked right) for coffee subscription in the city (N=114)

6.2 Printing scenario

The printing scenario was presented to 151 respondents (see Figure 2). Still, the full sample could be investigated for some printing-related intentions or behaviors as some questions were presented to all respondents.

Regarding current behavior, 73% of the respondents (that answered this question) occasionally or frequently uses recycled printing paper and more than 85% uses eco-labeled paper (Table 7). This question was only answered by respondents that have a printer at home (89 out of 151). The main drivers to use recycled paper are the environmental impact, the fit with the respondent's lifestyle and the expected quality; while the main barriers are the price, the expected quality and the ease of use (Figure 10). We observe that the expected quality of recycled printing papers is listed both as a driver and as a barrier which reveals that respondents have heterogeneous views regarding the impact of some factors.

Table 7: Behavior and intentions related to CBM and printing

Behavior	No		Sometimes		Yes		Total (N)
Use recycled printing paper	24	27.0%	23	25.8%	42	47.2%	89
Use eco-labeled printing paper	12	13.5%	23	25.8%	54	60.7%	89
Intentions	**No**		**Maybe**		**Yes**		**Total (N)**
Rent printer on Peerby	167	27.9%	185	30.9%	247	41.2%	599
Buy secondhand printer	252	43.0%	183	31.2%	151	25.8%	586
Print subscription at home	58	38.4%	66	43.7%	27	17.9%	151
Print subscription at copy center	55	38.2%	56	38.9%	33	22.9%	144
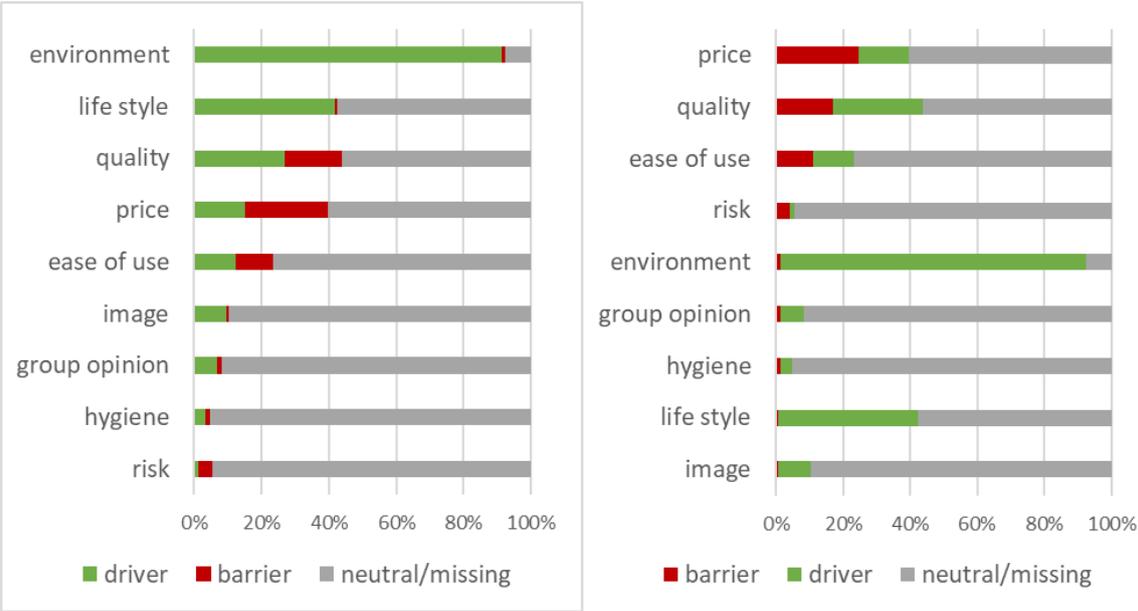
Figure 10: Drivers (ranked left) and barriers (ranked right) of using recycled printing paper (N=146)

We also asked respondents about their intentions to adopt several circular activities related to printing (Table 7). Overall, a large majority of the respondents are (maybe) willing to seriously consider the four CBM options we presented to them: renting a printer via an online platform such as Peerby (72%), buying a secondhand printer (57%), adopting a printing subscription at home such as Instant Ink (62%) or a printing subscription at one or more copy centers (62%). Note that all survey respondents were presented with the Peerby and secondhand options (Figure 2) which provides us with a larger sample. Moreover, the willingness to rent a printer online seems to be very high even though this may be difficult to implement in practice (e.g. installing drivers, predicting use…). Respondents may have

interpreted this option in a different way than intended (e.g. as an option to use the printer of the neighbors).

For the two printing subscription options, we asked respondents to select the factors that would incentivize or deter the adoption of the CBM. The printing subscription at home allows the user to print a predetermined number of pages per month, ink is automatically delivered and collected at home. A current example is "Instant ink" which is only available for HP printers. The three main drivers are the ease of use, the environmental impact and the price; while the three main barriers are the contractual conditions, the lack of familiarity and the price (Figure 11). For the printing subscription at a copy center, the three main drivers are the environmental impact, the ease of use and the expected quality (Figure 12). The three main barriers to adopt this type of CBM are lack of familiarity, contractual conditions and ease of use.
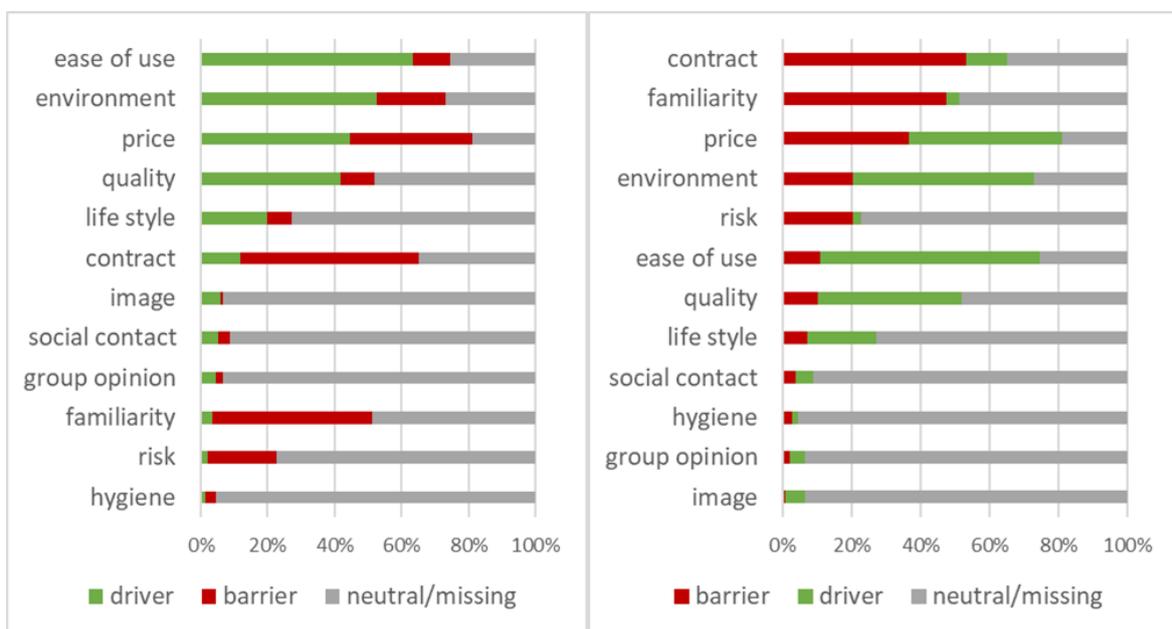
Figure 11: Drivers (ranked left) and barriers (ranked right) of printing subscription at home (N=137)

6.3 Housing and mobility scenario

The housing scenario was presented to 141 respondents (see Figure 2). Still, the full sample could be investigated for some housing- or mobility-related behaviors as some questions were presented to all respondents.

Regarding current behavior, approximately half of the sample has used Airbnb to find accommodation in the past, 10% has experience with cohousing, 27% is/has been a member of a car-sharing system and 28% of a bicycle (or step) sharing system (Table 8).

Table 8: Behavior and intentions related to CBM and housing

Behavior	No		Occasionally		Frequently		Total (N)
Airbnb	298	47.2%	272	43.1%	61	9.7%	631
Cohousing	125	88.7%	8	5.7%	8	5.7%	141
Car-sharing	482	76.3%	113	17.9%	57	9.0%	632
Bicycle / step sharing	435	68.8%	140	22.2%	37	5.9%	632
Intention	**No**		**Maybe**		**Yes**		
Cohousing	52	36.9%	56	39.7%	33	23.4%	141
Smart home	41	31.1%	57	43.2%	34	25.8%	132
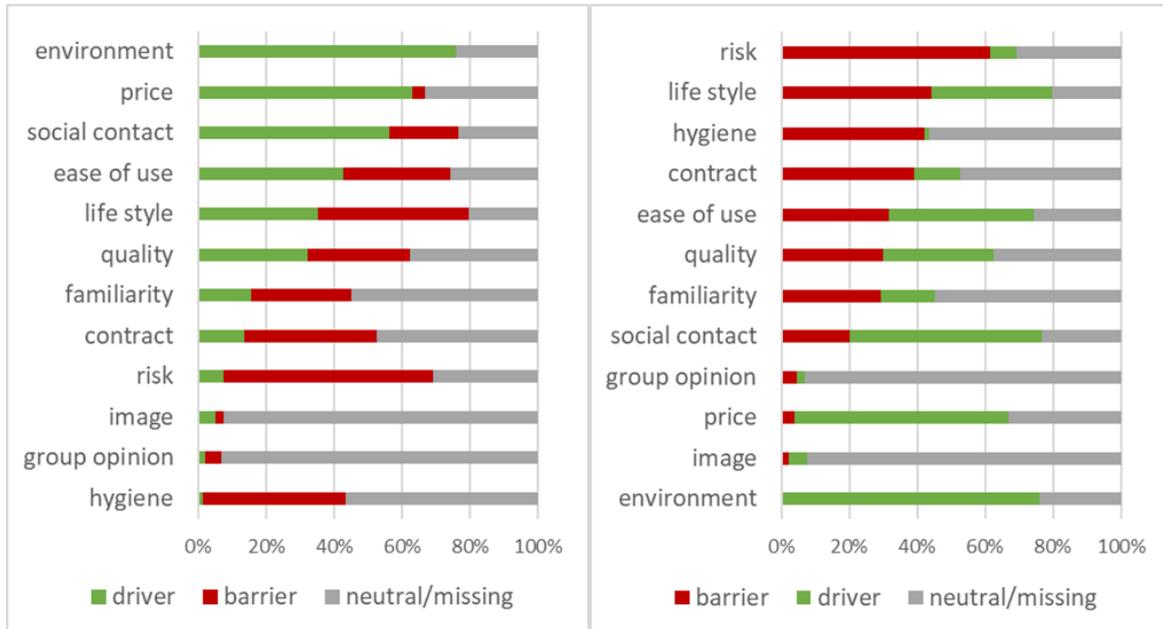
**Figure 13:** Drivers (ranked left) and barriers (ranked right) of cohousing (N=133)

We also asked respondents about their intentions to adopt several circular activities related to housing (Table 8). Again, respondents seem quite willing to seriously consider participating in a cohousing scheme (63% indicated 'maybe' or 'yes') or to install a smart home system (69% 'maybe' or 'yes'). For both CBM, we asked respondents about the factors that would stimulate and discourage adoption. The main drivers to participate in a cohousing scheme were the environmental impact, the possibility

of cost savings and the benefits of social contact (Figure 13). The main barriers were perceived risks, misalignment with the respondent's lifestyle and hygiene considerations. A smart home system allows users to connect different appliances digitally and to operate them from a distance by phone or computer. The main drivers to invest in such a smart home system are ease of use, environmental impact and expected quality; while the main barriers are cost considerations, perceived risks and lack of familiarity (Figure 14). We also asked respondents about their willingness to use secondhand construction materials (see Table 12 in Section 6.6).
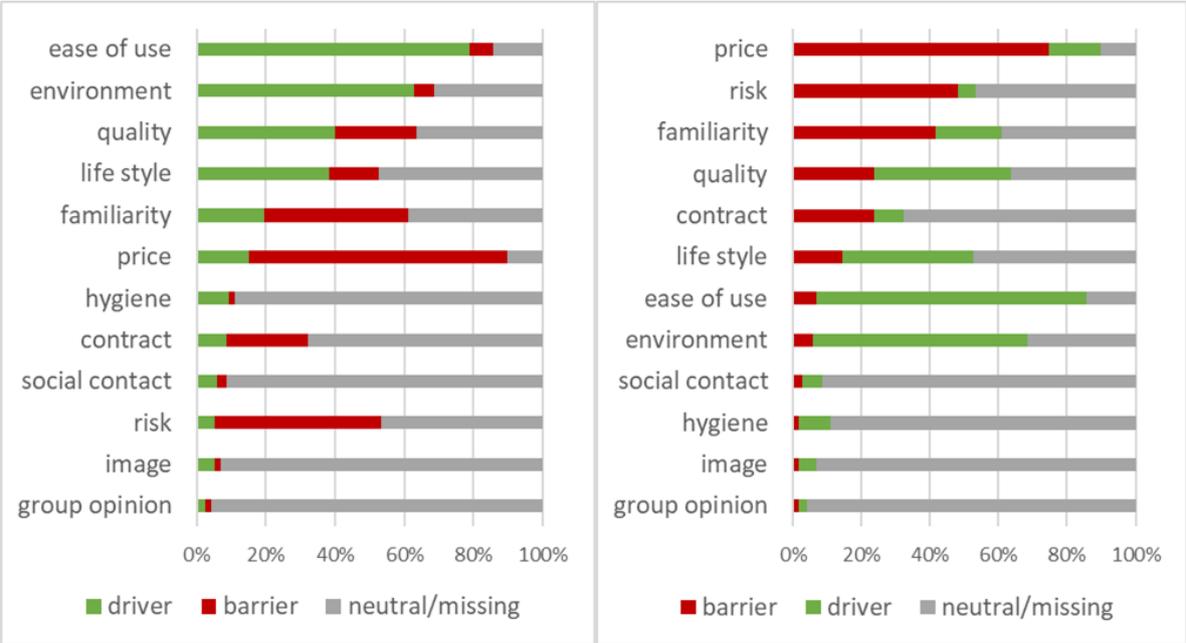
Figure 14: Drivers (ranked left) and barriers (ranked right) of smart home system (N=118)

6.4 Clothing scenario

The clothing scenario was presented to 132 respondents (see Figure 2). Still, the full sample could be investigated for some clothing-related intentions as some questions were presented to all respondents.

Regarding current behavior, over 90% of the respondents have bought clothes with an organic label in the past and some 56% have bought clothes made with recycled fibers (Table 9). Further, slightly more than 30% have paid a professional seamstress to repair clothes in the past and 5% have repaired clothes in a repair café. Some 26% have never used eco-friendly detergent for washing clothes. Virtually all respondents who received clothes from friends or family use these clothes themselves or for their children. The main drivers to use these secondhand clothes are ease of use, environmental impact and cost savings; while the main barriers are hygiene and perceived quality (Figure 15).

We also asked respondents about their intentions to adopt several circular activities related to clothing (Table 9). Almost 80% of respondents indicated to be willing to consider buying secondhand clothes, 66% would consider renting clothes via an online platform, and 52% would consider registering for a washing subscription at home. Online clothing platforms such as Gwynnie Bee or LENA allow their users to choose unlimited clothing from an online catalog for a fixed amount per month. After use, the clothes are sent back or they can be bought at a discount. The main drivers to rent clothes online are the environmental impact, the price and the fit with the respondent's lifestyle; and the main barriers are the lack of familiarity, hygiene, ease of use and contractual conditions (Figure 16). Next, we

consider a subscription for washing machines (e.g. HOMIE) for a fixed amount per month as well as an amount per wash. The main drivers to use such a scheme are the environmental impact, ease of use and expected quality. The main barriers are contractual conditions, price and the lack of familiarity (Figure 17).

Table 9: Behavior and intentions related to CBM and clothing

Behavior	No		Occasionally		Yes/frequently		Total (N)
buy clothes with organic label	14	12.5%	77	68.8%	21	18.8%	112
buy clothes with recycled fibers	58	43.9%	69	52.3%	5	3.8%	132
repair clothes by a seamstress	91	68.9%			41	31.1%	132
repair clothes in repair café	126	95.5%			6	4.5%	132
use 2nd hand clothes from family	1	1.0%			102	99.0%	103
use eco detergent	33	25.8%	59	46.1%	36	28.1%	128
Intention	**No**		**Maybe**		**Yes**		**Total (N)**
buy secondhand clothes	121	20.6%	147	25.0%	319	54.3%	587
rent clothes online	45	34.4%	70	53.4%	16	12.2%	131
washing subscription at home	61	47.7%	48	37.5%	19	14.8%	128
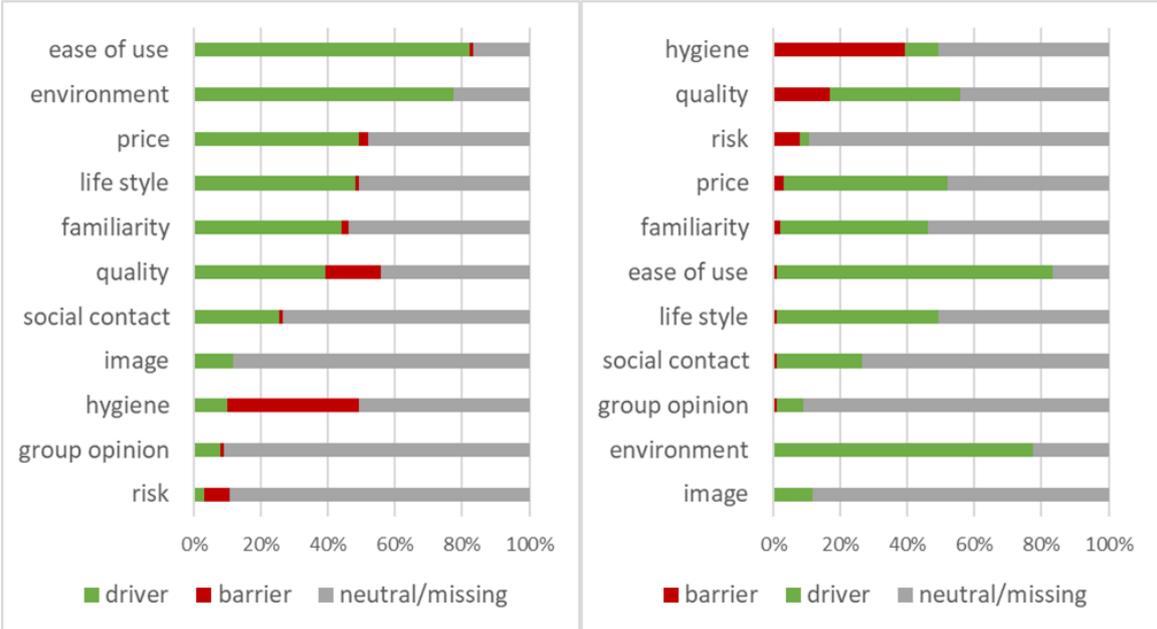
Figure 15: Drivers (ranked left) and barriers (ranked right) of using secondhand clothes from family and friends (N=102)
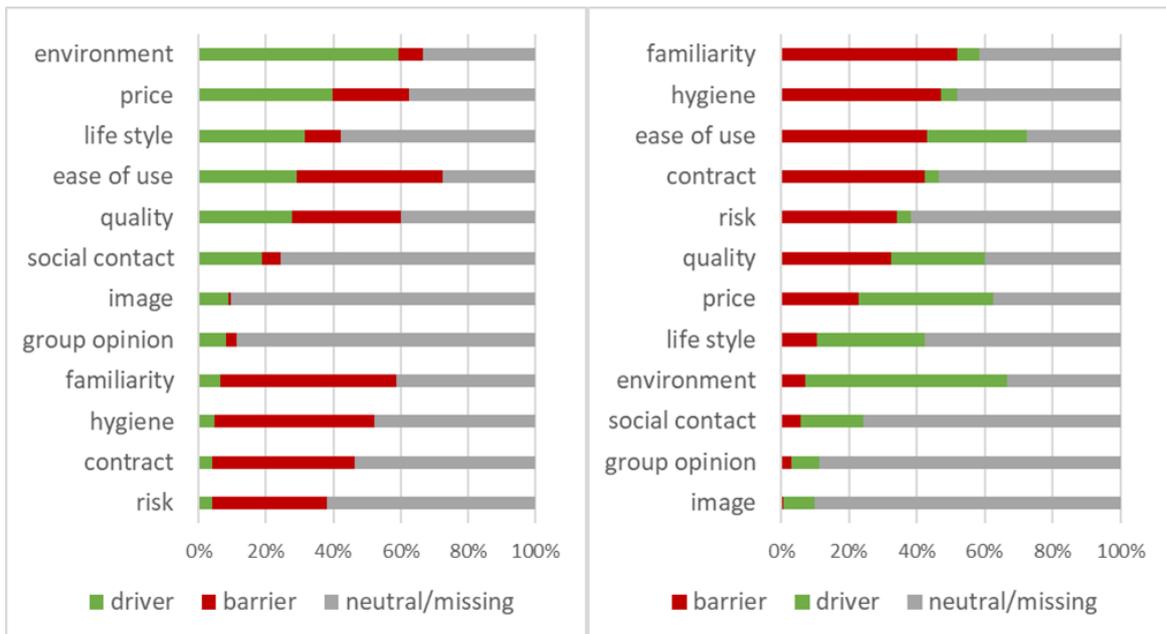
Figure 16: Drivers (ranked left) and barriers (ranked right) of renting clothes online (N=123)
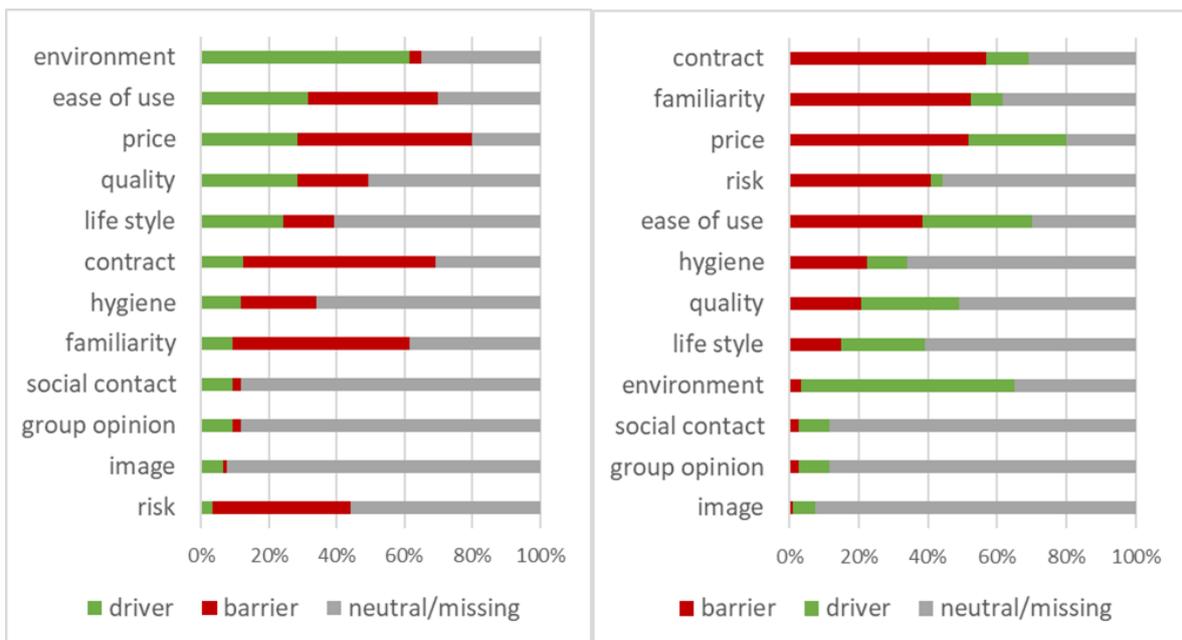
Figure 17: Drivers (ranked left) and barriers (ranked right) of wash subscription at home (N=120)

6.5 Household chores scenario

Regarding current behavior, about 40% of the respondents have already used the online platform Peerby for renting or lending tools and appliances (Table 10). Approximately 20% of the respondents have already offered his/her services at a repair café, while approximately 40% has used these service to repair something (appliance, clothes…). Slightly less than 20% has used an online platform to supply or demand labor for doing chores (painting, gardening,…) in and around the house. Note that we asked the latter question to a very limited sample (26 respondents).

Table 10: Behavior and intentions related to CBM and chores

Behavior	No		Yes, >1year ago		yes, <1year ago		Total (N)
peerby as supplier	92	60.1%	25	16.3%	36	23.5%	153
peerby as user	86	56.2%	24	15.7%	43	28.1%	153
Repair café as supplier	180	79.6%	15	6.6%	31	13.7%	226
repair café as user	140	61.9%	42	18.6%	44	19.5%	226
online chores supplier	22	84.6%	2	7.7%	2	7.7%	26
online chores user	21	80.8%	1	3.8%	4	15.4%	26
Intentions	**No**		**Maybe**		**Yes**		**Total (N)**
rent tools on Peerby	33	5.5%	109	18.2%	457	76.3%	599
buy secondhand tools	49	8.4%	184	31.4%	353	60.2%	586
participate in repair café	38	6.5%	224	38.2%	325	55.4%	587
use online chores	23	17.0%	73	54.1%	39	28.9%	135
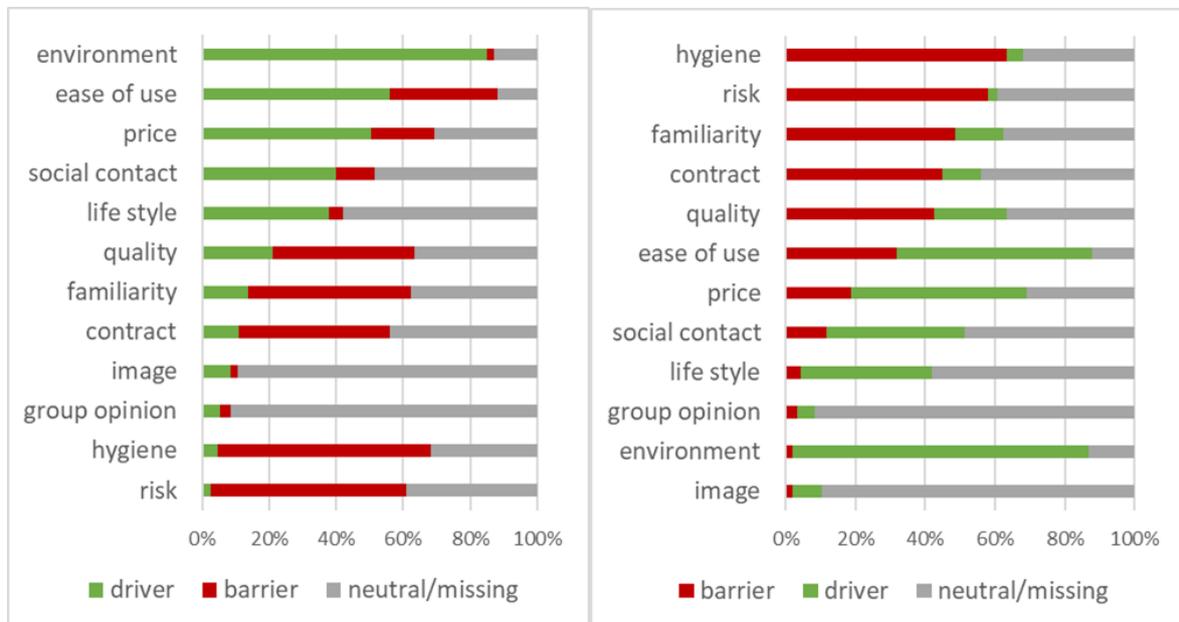
Figure 18: Drivers (ranked left) and barriers (ranked right) of renting tools and appliances from Peerby (N=191)

We also asked respondents about their intentions to adopt several circular activities related to chores that need to be done in their home. Respondents are really open towards these CBM. Less than 10% would not rent tools or appliances on Peerby, buy secondhand tools or participate in a repair café (Table 10). Also, only 17% would not seriously consider using an online platform for finding someone to help with chores. Firstly, the main drivers to use an online platform to rent and lend tools or appliances are the environmental impact, the ease of use and the financial cost; while the main barriers are considerations about hygiene, risk and lack of familiarity (Figure 18). Secondly, the main drivers to participate in a repair café are the environmental impact, the financial cost and the social contact, with ease of use following as a close fourth (Figure 19). The main barriers are the lack of familiarity, perceived risk and concerns about expected quality. Thirdly, the main drivers to hire someone through online service platforms such as ListMinut, LETS, Croqqer and Solidare-It are the price, ease of use and environmental impact; while the main barriers are concerns about risks, expected quality, contractual conditions as well as lack of familiarity (Figure 20).
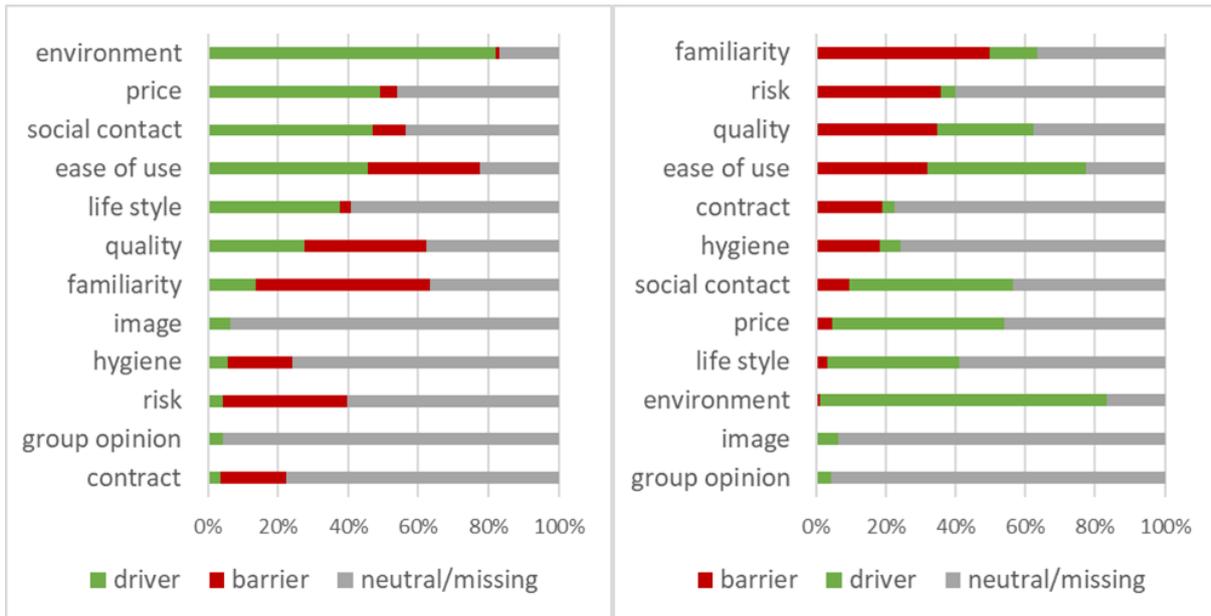
Figure 19: Drivers (ranked left) and barriers (ranked right) to participate in a repair café (N=191)
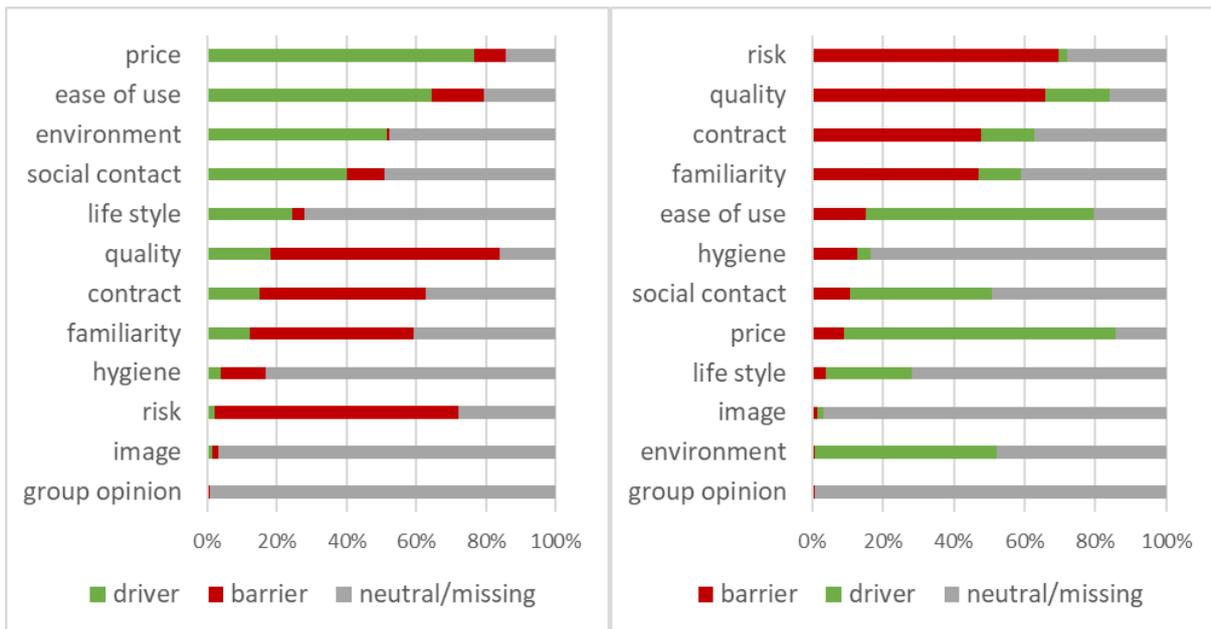
Figure 20: Drivers (ranked left) and barriers (ranked right) of hiring people to do chores through online platform (N=132)

6.6 Secondhand scenario

Note that there is some overlap between this scenario and the other scenarios which also included questions regarding secondhand good. Regarding current behavior, in general over 80% of respondents state to have bought secondhand goods, while 65% have sold secondhand goods in the past (Table 11). However, looking at specific outlets, we find significantly lower amounts: 60% has been a customer of a 'kringwinkel' (charity shop), 65% of a secondhand shop, 25% has bought used goods online and 50% at open markets. This points to the presence of alternative channels for buying and selling secondhand goods such as through friends and family. Noteworthy is the contrast between respondents' reluctance to buy online (25%) and their willingness to sell online (95%).

Table 11: Behavior and intentions related to CBM and secondhand products

Behavior	Never		Occasionally		Frequently		Total (N)
buy secondhand (general)	65	17.6%	148	40.1%	156	42.3%	369
buy in 'De Kringwinkel'	81	40.3%	72	35.8%	48	23.9%	201
buy in secondhand shop	69	34.5%	74	37.0%	57	28.5%	200
buy online	151	75.5%	38	19.0%	11	5.5%	200
buy (informal) market	97	48.5%	60	30.0%	43	21.5%	200
sell secondhand (general)	119	34.1%	151	43.3%	79	22.6%	349
sell in secondhand shop	115	57.5%	58	29.0%	27	13.5%	200
sell online	9	5.0%	73	40.8%	97	54.2%	179
sell (informal) market	21	13.5%	79	51.0%	55	35.5%	155
Intention	**No**		**Maybe**		**Yes**		**Total (N)**
buy secondhand tools	49	8.4%	184	31.4%	353	60.2%	586
buy secondhand clothes	121	20.6%	147	25.0%	319	54.3%	587
buy secondhand printer	252	43.0%	183	31.2%	151	25.8%	586
buy secondhand coffee maker	348	59.4%	127	21.7%	111	18.9%	586

Table 12: Intentions related to secondhand construction materials

Willing to buy 2nd hand?	No		Yes, private		Yes, professional		Yes, both		Total (N)
construction timber	99	17.0%	10	1.7%	136	23.3%	338	58.0%	583
tiles	102	17.4%	11	1.9%	107	18.3%	366	62.5%	586
interior door	108	18.5%	15	2.6%	102	17.5%	359	61.5%	584
kitchen tap	228	39.1%	8	1.4%	154	26.4%	193	33.1%	583
bath	278	47.4%	6	1.0%	123	21.0%	180	30.7%	587
boiler	301	51.3%	6	1.0%	208	35.4%	72	12.3%	587
toilet	329	56.0%	3	0.5%	130	22.1%	125	21.3%	587

We also asked respondents about their intentions to buy a variety of secondhand goods. From Table 11 we learn that respondents are clearly open to buy secondhand tools (92%) and clothes (79%), but less open to buy a secondhand printer (57%) or coffee maker (41%). We also asked respondents about their willingness to buy secondhand construction materials or products (Table 12). Respondents are quite willing to use secondhand construction timber (17%), tiles (17%) or interior doors (19%), but less willing to buy a secondhand kitchen tap (39%), bath (47%), boiler (51%) or toilet (56%). Note that these products are quite different regarding life span and technical state of the art. Overall, respondents are more willing to buy from professional suppliers than from private parties. The main drivers to buy secondhand goods are the price, the environmental impact and fit with the respondent's lifestyle (Figure 21). The main barriers are concerns about hygiene, risks and expected quality.
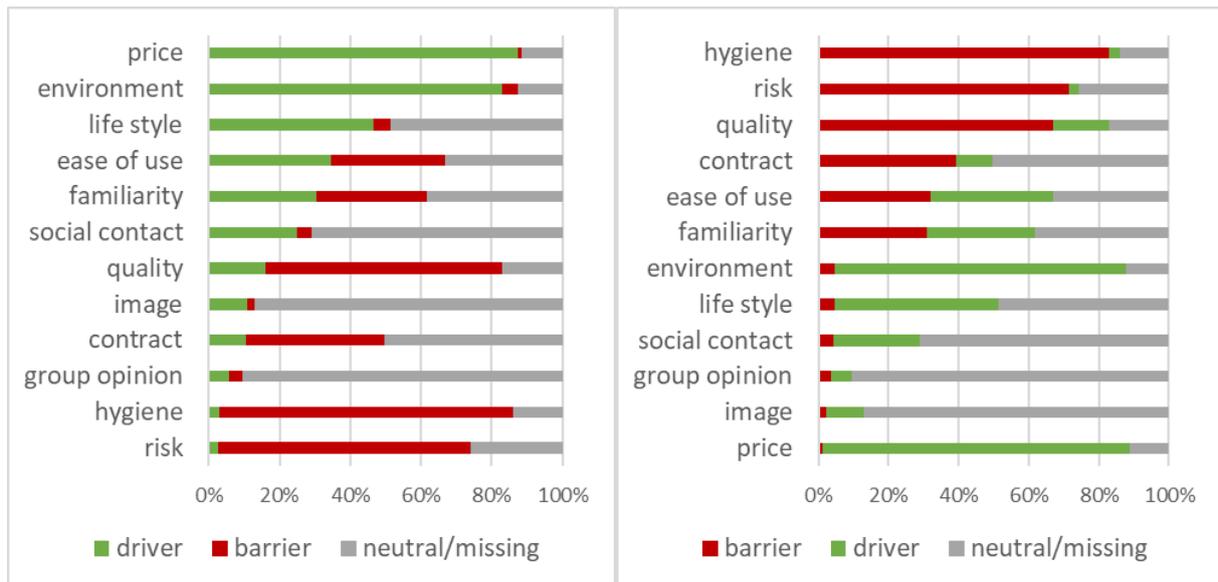
Figure 21: Drivers (ranked left) and barriers (ranked right) of buying secondhand goods (N=193)

6.7 Some general insights regarding barriers and drivers

Based on the results for the different scenarios, some general observations can be made. Firstly, consumers' perceptions regarding barriers and drivers are heterogeneous. Even though the main drivers and barriers to adopting a specific CBM are usually easy to identify, virtually all factors have been selected as a driver as well as a barrier by at least one respondent for each of the fourteen CBM we investigated. For instance, environmental impact was consistently chosen as an important driver, still, some respondents indicated to be indifferent or perceived it as a barrier. Some factors really split the sample: for example, one third saw 'ease of use' as a barrier, as a driver or was indifferent when considering buying secondhand goods (Figure 21). An identical picture emerged, among other things, for 'expected quality' and participation in a repair café (Figure 19), 'price' and adoption of a printing subscription at a copy center (Figure 12), and 'expected quality' and willingness to rent clothes online (Figure 16).

In order to learn more about the factors that are perceived similarly or not by the respondents, we focus on the factors that were ranked first, second or third as a driver or a barrier. For each of the fourteen CBM, we count the number of times a factor is ranked in the top 3 and present this overview of main drivers and barriers in Figure 22. Respondents reveal a larger consensus when it comes to drivers than for barriers towards adopting CBM. The environmental impact was ranked among the first three drivers for each of the CBM. Ease of use and price considerations follow among the most popular main drivers. Five factors (familiarity, contractual conditions, image, group opinion and hygiene) were never selected as a top3-driver. Looking at the main barriers the distribution is more spread out. None of the factors was identified as a barrier in all fourteen CBMs. Only one factor was selected as a top3-barrier in more than half of the CBMs: the lack of familiarity ended in the top 3 barriers for eight of the fourteen CBMs. Risk was ranked second, followed by price and contractual conditions in joint third place. Four factors (environmental impact, social contact, image and group opinion) were never selected as top3-barrier. It is also interesting to see that price was chosen as both the third most important barrier and the third most important driver overall. This shows that, while consumers expect a lower price for many CBM which involve reuse or recycling, they (rightfully) expect higher prices for others (especially access-based subscription CBMs).
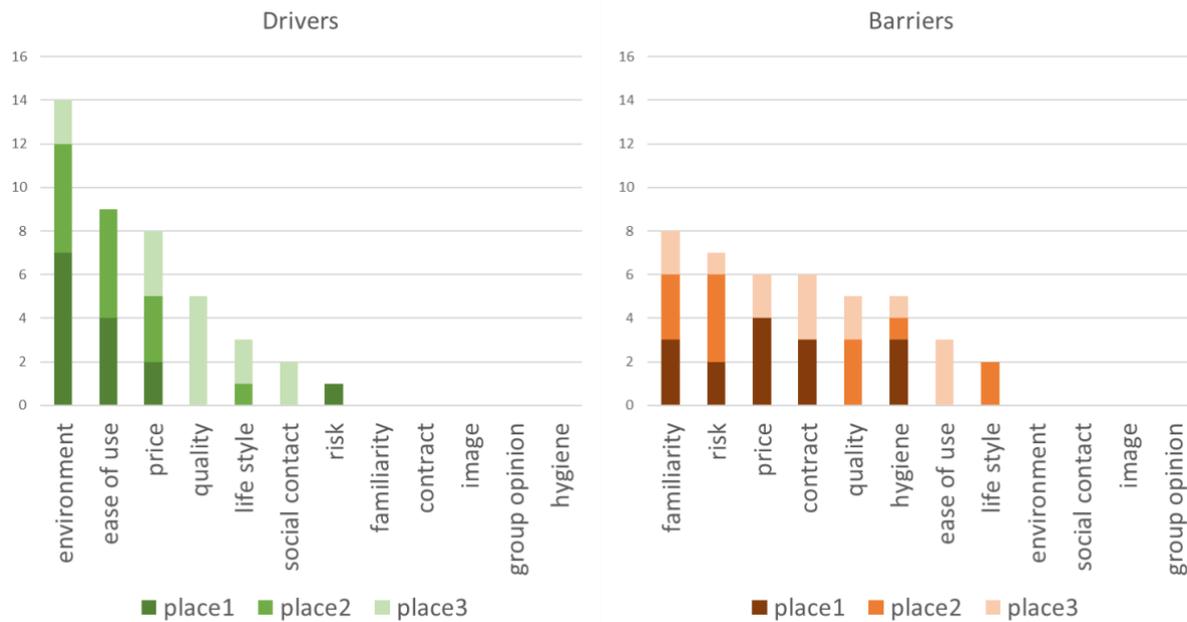
Figure 22: Overview of main drivers and barriers for 14 CBM

Thus, from a general perspective, environmental impact is the main driver for the adoption of circular business models and activities (Figure 22). Ease of use comes second as a driver, although for some CBM (i.e. recycled printing paper, printing subscription at a copy center, renting clothes online), it is seen as a barrier. The financial implications are seen both as an important driver and as an important barrier depending on the CBM. The perception of this factor is not only heterogeneous over different CBM, also perceptions within one CBM are mixed as mentioned above. The same can be said about perceived quality, although to a lesser extent. Lack of familiarity, perceived risks and contractual conditions are ranked as important barriers. Only risk is ranked once as an important driver for the coffee subscription at home which included automatic repairs and replacement of a broken coffee maker. Two factors, image and group opinion, were never selected as either a main driver or a main barrier and can be seen as less important when looking at respondents' willingness to adopt CBMs.

In order to further explore the elements that can explain the selection of a factor as driver or barrier towards the adoption of circular business models and activities, we also estimate two multinomial logistic regressions (see appendix). The models are used to explain the following dependent variable "would you select one of the following twelve factors as a driver (barrier) towards adopting a CBM?". This process leads to 22120 observations (see Table 13) which are investigated in two models. The first of these models investigates the likelihood that a factor is selected as a driver towards adoption, the second investigates the likelihood of being selected as a barrier. The models provide insight into the relationship between the drivers and barriers perceived by respondents and the type of CBM, product category and respondent characteristics. Next, we look in more detail at the results for the type of circular business model or activity, while keeping product category and respondent characteristics constant.

Table 13: Dependent variable for multinomial logit estimations

	Selected as driver	Selected as barrier	Indifferent	Total
Environmental impact	1319	129	464	1912
Ease of use	931	467	502	1900
Price	879	497	561	1937
Lifestyle	637	223	1053	1913
Quality	533	588	670	1791
Social contact	475	153	1113	1741
Familiarity	258	734	771	1763
Contractual conditions	171	676	792	1639
Risk	138	733	999	1870
Image	132	24	1719	1875
Hygiene	105	545	1228	1878
Group opinion	98	40	1763	1901
Total	**5676**	**4809**	**11635**	**22120**

For product-service systems (PSS) compared to other CBM, the results (see appendix) reveal that the adoption of PSS is negatively correlated with price considerations, fit with lifestyle, lack of familiarity and concern about contractual conditions. Environmental impact is less likely to be selected as a driver for PSS compared to other CBMs. On the other hand, the adoption of PSS is positively correlated with hygiene and expected quality considerations. Risk and social contact are less salient as either a driver or a barrier for PSS adoption. Ease of use, group opinion and image have more or less similar roles in the adoption decision of PSS compared to the adoption of other CBMs.

For sharing systems compared to other CBM, the estimation results (see appendix) reveal the participation in a sharing system is negatively correlated with price, ease of use, group opinion, hygiene considerations, fit with lifestyle, social contact, contractual conditions and perceived risks. Note that price is less likely to be perceived as a barrier for adopting a sharing system compared to a reuse-based CBM, but more likely compared to PSS. Overall, the stimulating elements for sharing systems are fairly similar to those for reuse-based CBMs and differ from PSS as described above.

7. Aggregated results: Intentions

In this section, we analyze all data related to respondents' intentions to adopt CBMs in an aggregate manner. The focus on intentions implies that we can investigate the following set of CBMs: reuse-based business models and activities, use-oriented PSS, result-oriented PSS and sharing systems (see Table 1).

To this end, we estimate a general structural equation model based on the structure presented in Figure 1. In the first phase, the median attitude scores are explained by respondents' socio-demographic characteristics (Table 14). In the second phase, respondents' willingness to adopt a CBM is explained by their attitudes, socio-demographics, CBM characteristics and product characteristics (Table 15).

The results of the first phase reveal the following patterns (Table 14).

Respondents are more likely to score higher on technology innovativeness and tend to be (or to believe themselves to be) a technology pioneer,

- when they are male
- when they are younger than 25
- when they do not have a higher education degree
- when they sometimes claim to have financial struggles
- when they live in a rural area.

Respondents are more likely to score higher on technology optimism and have a belief that technology people increased control, flexibility, and efficiency in their lives,

- when they are male
- when they are younger than 25
- when they do not have a university degree
- when they live in an urban area
- when they are not homeowners.

Respondents are more likely to score higher on environmental awareness,

- when they are female
- when they are older than 45
- when they have a higher education degree
- when they have no financial issues
- when they donate money to charities and NGO's
- when they live in an urban or semi-urban area
- when they are not homeowners.

Respondents are more likely to score higher on materialism,

- when they are male
- when they are younger than 45
- when do not have a higher education degree
- when they sometimes claim to have financial struggles
- when they live in a semi-urban area
- when they are not homeowners.

Respondents are more likely to score higher on perceived control and belief that their own actions have an impact,

- when they are younger than 25 or older than 45
- when they have a university degree
- when they have no financial issues
- when they donate money to charities and NGO's
- when they live in an urban area
- when they are not homeowners.

Respondents are more likely to score higher on the disgust scale and are concerned about contamination,

- when they are female
- when they are younger than 45
- when they do not have a higher education degree

- when they sometimes claim to have financial struggles
- when they live in a semi-urban or rural area
- when they are homeowners.

Table 14: Explaining willingness to adopt CBMs – phase 1 – attitudes

Phase 1 (ordinal logit - gsem)	Att tech innovative	Att environment	Att materialism	Att control	Att tech optimism	Att disgust
Male	1.233***	-0.454***	0.478***	-0.040	0.410***	-0.276***
Age <25	0.474***	-1.019***	0.401***	0.002	0.377***	0.509***
Age 25-45	0.059	-0.279***	0.305***	-0.193***	0.069	0.326***
Higher non_univ	-0.145*	0.322***	-0.238***	-0.064	0.003	-0.459***
University degree	-0.280***	0.464***	-0.408***	0.498***	-0.367***	-0.172**
No financial issues	-0.444***	0.175**	-1.085***	0.923***	-0.018	-0.584***
NGO donor	0.036	0.096**	-0.040	0.459***	0.058	0.023
Urban	-0.078	0.233***	-0.501***	0.266***	0.102*	-0.255***
Rural	0.087*	-0.194***	-0.256***	-0.084	-0.003	0.137**
Home owner	0.028	-0.242***	-0.110*	-0.240***	-0.162**	0.153**

* 0.05<p<0.1, ** 0.01<p<0.05, *** p<0.01

In the second phase of the estimation, we explain respondents' willingness to adopt CBMs (Table 15). The results reveal the following patterns.

Respondents with the following attitudes are more likely to seriously consider to adopt a circular business model or activity,

- when they score higher on technology innovativeness
- when they score higher on environmental awareness
- when they score higher on perceived control
- when they score lower on materialism
- when they score lower on disgust

Regarding the correlation between certain product groups and respondents' willingness to seriously consider to adopt a CBM, we observe the following:

- CBM related to coffee are less likely to be adopted than CBM related to clothes
- CBM related to printing are less likely to be adopted than CBM related to clothes
- CBM related to housing are less likely to be adopted than CBM related to clothes
- CBM related to chores are more likely to be adopted than CBM related to clothes
- CBM related to tools are more likely to be adopted than CBM related to clothes
- CBM related to fast-moving consumer goods are more likely to be adopted than CBM related to other goods

Regarding the correlation between the type of CBM and respondents' willingness to seriously consider to adopt a CBM, we observe the following:

- Use-oriented PSS are less likely to be adopted than reuse-based CBM
- Result-oriented PSS are less likely to be adopted than reuse-based CBM
- Result-oriented PSS are less likely to be adopted than use-oriented PSS
- Sharing-based CBM are equally likely to be adopted than reuse-based CBM

Table 15: Explaining willingness to adopt CBMs – phase 2

Phase 2: Willingness to adopt (ordinal logit – gsem)	Coef.	Robust Std. Err.	P>z
Attitude technology innovativeness	0.126***	0.034	0.000
Attitude environment	0.201***	0.042	0.000
Attitude materialism	-0.190***	0.038	0.000
Attitude perceived control	0.237***	0.045	0.000
Attitude technology optimism	0.012	0.036	0.735
Attitude disgust	-0.122***	0.031	0.000
Product clothes (reference)			
Product coffee	-1.332***	0.135	0.000
Product printing	-0.385***	0.139	0.006
Product chores	0.673***	0.131	0.000
Product tools	1.084***	0.143	0.000
Product housing	-0.313*	0.170	0.066
Fast-moving consumer goods	0.249*	0.127	0.051
CBM reuse (reference)			
CBM use-oriented PSS	-0.312***	0.106	0.003
CBM result-oriented PSS	-0.612***	0.116	0.000
CBM sharing	0.037	0.063	0.554
SD Male	-0.522***	0.057	0.000
SD Age <25	-0.056	0.099	0.569
SD Age 25-45	0.163***	0.061	0.007
SD Higher non-university	-0.285***	0.085	0.001
SD University degree	-0.299***	0.084	0.000
SD No financial issues	-0.203**	0.090	0.024
SD Urban	0.327***	0.067	0.000
SD Rural	-0.068	0.062	0.273
SD Home owner	-0.601***	0.072	0.000

Finally, we find some direct effects related to the socio-demographic characteristics of the respondents, besides their indirect effects through the attitude variables. All else being constant, we observe that

- male respondents are less likely to adopt CBM than other, mainly female, respondents
- respondents between 25 and 45 are more likely to adopt CBM than other respondents
- respondents with a higher education degree are less likely to adopt CBM than other, lower educated, respondents
- respondents without financial issues are less likely to adopt CBM than respondents with financial issues
- respondents in urban areas are more likely to adopt CBM than respondents in semi-urban or rural areas.
- Respondents who own their home are less likely to adopt CBM than other respondents

8. Aggregated results: Reported behavior

In this section, we analyze all data related to respondents' past adoption of CBMs in an aggregate manner. The focus on reported behavior implies that we can investigate the following set of CBMs: reuse, recycling, labeling and sharing systems (Table 1). Also, the set of products is different when investigating circular behavior instead of intentions in this study (Table 1).

To this end, we estimate a general structural equation model based on the structure presented in Figure 1. In the first phase, the median attitude scores are explained by respondents' socio-demographic characteristics (Table 16). In the second phase, respondents' past behavior is explained by their attitudes, socio-demographics, CBM characteristics and product characteristics (Table 17).

The results of the first phase reveal the following patterns (Table 16). As expected, the results are very similar to the results found in the previous section (Table 11). Some differences in significance levels were found as the dataset is slightly different but the signs for significant coefficients are always the same.

Respondents are more likely to score higher on technology innovativeness and tend to be (or to believe themselves to be) a technology pioneer,

- when they are male
- when they are younger than 45
- when they do not have a higher education degree
- when they sometimes claim to have financial struggles
- when they donate money to charities and NGO's.

Respondents are more likely to score higher on technology optimism and have a belief that technology people increased control, flexibility, and efficiency in their lives,

- when they are male
- when they are younger than 25
- when they do not have a university degree
- when they have no financial issues
- when they live in an urban area
- when they are not homeowners.

Respondents are more likely to score higher on environmental awareness,

- when they are female
- when they are older than 45
- when they have a higher education degree
- when they have no financial issues
- when they live in an urban or semi-urban area
- when they are not homeowners.

Respondents are more likely to score higher on materialism,

- when they are male
- when they are younger than 45
- when do not have a higher education degree
- when they sometimes claim to have financial struggles
- when they do not donate money to charities and NGO's
- when they live in a semi-urban area.

Table 16: Explaining past circular behavior – phase 1 – attitudes.

Phase 1 (ordinal logit - gsem)	Att tech innovative	Att environment	Att materialism	Att control	Att tech optimism	Att disgust
Male	1.209***	-0.415***	0.528***	-0.150**	0.306*	-0.304***
Age <25	0.464***	-1.157***	0.356***	0.035	0.393***	0.615***
Age 25-45	0.140***	-0.275***	0.192***	-0.178***	0.056	0.367***
Higher non_univ	-0.237***	0.277***	-0.273***	-0.117	-0.099	-0.288***
University degree	-0.408***	0.506***	-0.406***	0.468***	-0.395***	-0.053
No financial issues	-0.525***	0.162**	-1.106***	1.025***	0.135*	-0.504***
NGO donor	0.111**	0.067	-0.092*	0.436***	0.005	-0.072
Urban	-0.077	0.156***	-0.645***	0.204***	0.147**	-0.270***
Rural	0.086	-0.304***	-0.364***	-0.135**	-0.033	0.046
Home owner	0.078	-0.200***	-0.021	-0.178**	-0.151**	0.315***

* 0.05<p<0.1, ** 0.01<p<0.05, *** p<0.01; Coefficients in red differ in significance level compared to Table 14.

Respondents are more likely to score higher on perceived control and belief that their own actions have an impact,

- when they are female
- when they are younger than 25 or older than 45
- when they have a university degree
- when they have no financial issues
- when they donate money to charities and NGO's
- when they live in an urban or semi-urban area
- when they are not homeowners.

Respondents are more likely to score higher on the disgust scale and are concerned about contamination,

- when they are female
- when they are younger than 45
- when they do not have a non-university higher education degree
- when they sometimes claim to have financial struggles
- when they live in a semi-urban or rural area
- when they are homeowners.

In the second phase of the estimation, we explain respondents' willingness to adopt CBMs (Table 17). The results reveal the following patterns.

Respondents with the following attitudes are more likely to have adopted a circular business model or activity in the past,

- when they score higher on technology innovativeness
- when they score higher on perceived control

Regarding the correlation between certain product groups and respondents' willingness to seriously consider to adopt a CBM, we observe the following:

- CBM related to mobility are less likely to have been adopted than CBM related to clothes

- CBM related to printing are more likely to have been adopted than CBM related to clothes
- CBM related to housing and tools are equally likely to have been adopted than CBM related to clothes

Table 17: Explaining past circular behavior – phase 2

Phase 2: Behavior (ordinal logit - gsem)	Coef.	Std. Err.	P>z
Attitude technology innovativeness	0.111***	0.035	0.001
Attitude environment	0.057	0.045	0.201
Attitude materialism	-0.026	0.039	0.501
Attitude perceived control	0.306***	0.049	0.000
Attitude technology optimism	-0.036	0.035	0.307
Attitude disgust	-0.042	0.031	0.178
Product clothes (reference)			
Product mobility	-0.948***	0.240	0.000
Product housing	-0.209	0.237	0.378
Product printing	1.178***	0.184	0.000
Product tools	-0.261	0.211	0.216
CBM reuse (reference)			
CBM sharing	-0.649***	0.228	0.004
CBM labels	0.913***	0.117	0.000
CBM recycle	0.419***	0.112	0.000
Outlet digital	0.296***	0.094	0.002
Outlet shop	-0.393***	0.086	0.000
As user	0.285***	0.070	0.000
SD Male	-0.117**	0.057	0.042
SD Age <25	-0.063	0.098	0.525
SD Age 25-45	0.214***	0.062	0.001
SD Higher non-university	-0.121	0.084	0.148
SD University degree	-0.206**	0.080	0.010
SD No financial issues	-0.268***	0.088	0.002
SD Urban	0.325***	0.066	0.000
SD Rural	0.018	0.064	0.779
SD Home owner	-0.176**	0.070	0.012

Regarding the correlation between the type of CBM and respondents' past adoption of a CBM, we observe the following:

- Sharing-based CBMs are less likely to have been adopted than reuse-based CBMs
- Labels are more likely to have been adopted than reuse-based CBMs
- Recycling-based CBMs are more likely to have been adopted than reuse-based CBMs
- CBMs that use an online platform or app is more likely to have been adopted than other CBMs
- CBMs that can be acquired in brick-and-mortar shops are less likely to have been adopted than other outlets (e.g. online)
- Respondents are more likely to be a user of a CBM than a supplier.

Finally, we find some direct effects related to the socio-demographic characteristics of the respondents, besides their indirect effects through the attitude variables. All else being constant, we observe that

- male respondents are less likely to have adopted CBM than other, mainly female, respondents
- respondents between 25 and 45 are more likely to have adopted CBM than other respondents
- respondents with a university degree are less likely to adopt CBM than other, lower educated, respondents
- respondents without financial issues are less likely to adopt CBM than respondents with financial issues
- respondents in urban areas are more likely to adopt CBM than respondents in semi-urban or rural areas
- respondents who own their home are less likely to adopt CBM than other respondents.

9. Discussion

In line with previous studies (e.g. Edbring et al., 2016; Baumeister, 2014), we find that the support for circular business models and activities depends on the specific context. Type of business model, product category, respondent characteristics and attitudes all matter.

Firstly, we have a closer look at the importance of the type of business model in the adoption decision for CBM. Figure 23 shows the ranking (at a 5% statistical significance level) of the different business model types according to respondents' willingness to adopt a circular business model. Business models that are more to the right are expected to have higher adoption. Business models that are vertically aligned are expected to have similar adoption probabilities. We also make a distinction between results based on stated intentions and those based on stated behavior as the latter are less likely to be biased and may provide a more realistic picture. Based on *stated intentions* (below the horizontal line in Figure 23) and keeping all else constant, we learn that adoption is most likely for sharing and reuse-based systems, followed by use-oriented PSS and least likely for result-oriented PSS. Based on *reported past behavior* (above the horizontal line in Figure 23), and again keeping all else constant, we find that adoption of labeled products is most likely, followed by the use of products (partly) made of recycled materials, reuse-based systems, and finally, sharing systems are least likely. It is interesting to see that respondents have high intentions to share and yet share very little in practice. The main barriers for sharing initiatives are the price, group opinion, hygiene, lifestyle, and (unclear) contracts (Appendix); these barriers have seemingly prevented respondents to act on their sharing intentions.

Secondly, we have a closer look at the importance of the product category in the adoption decision for CBM. Figure 24 shows the ranking (at a 5% statistical significance level) of the different product categories according to respondents' willingness to adopt a circular business model. Based on stated intentions and keeping all else constant, we learn that adoption is most likely for tools, followed by chores, clothes, printing & housing and least likely for coffee. Based on reported past behavior, and again keeping all else constant, we find that adoption of printing-related CBM (here this reflects only using recycled paper) is most likely, followed by clothes, housing & tools and that adoption of mobility systems is least likely for the set of CBM we studied.
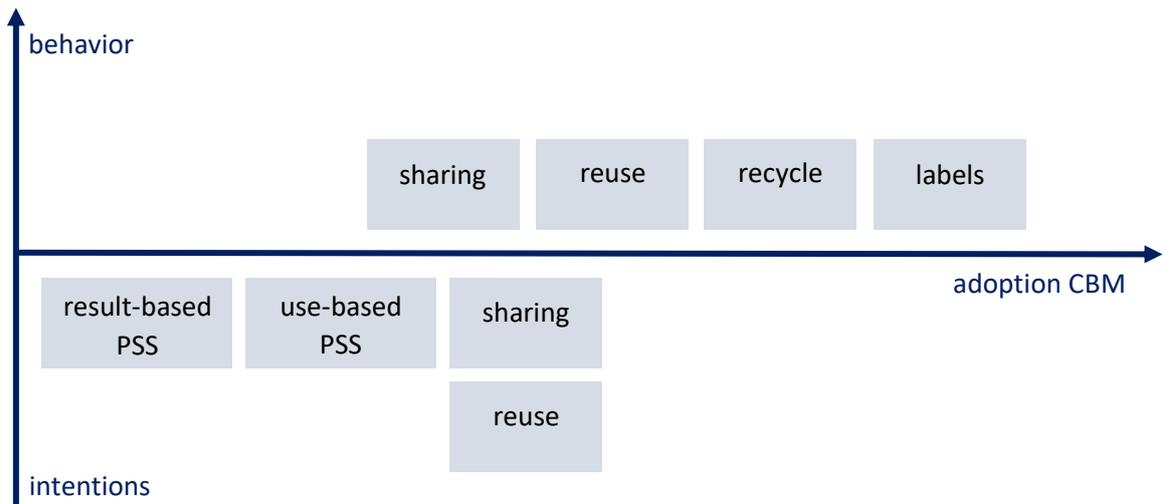
Figure 23: Correlation between CBM types and willingness to adopt CBM
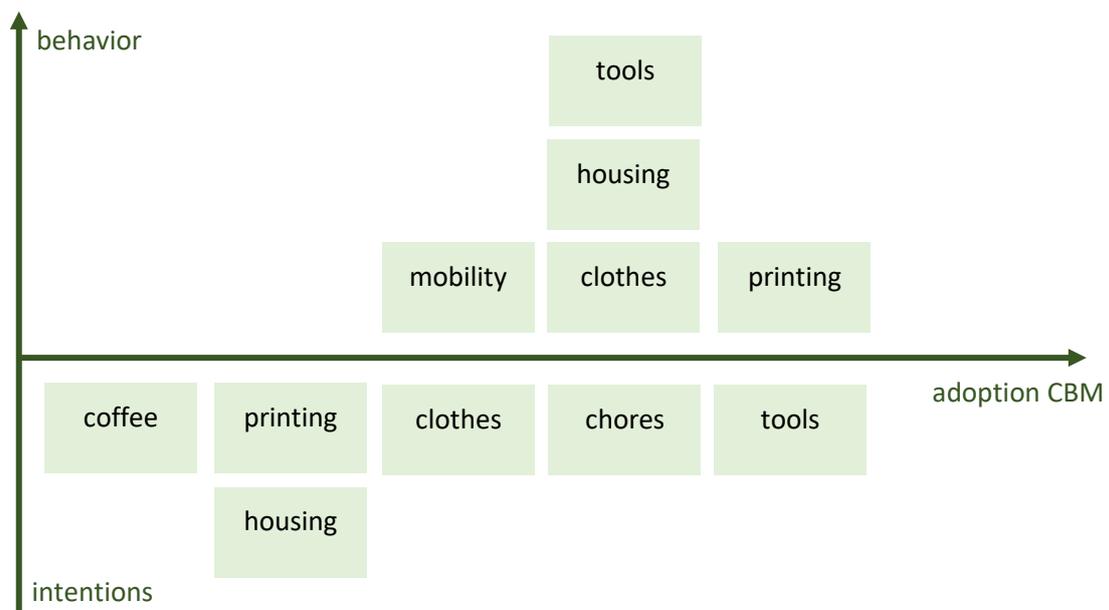
Figure 24: Correlation between product categories and willingness to adopt CBM

Thirdly, respondent attitudes also matter. A similar pattern emerges from the estimations based on intentions and behavior. Respondents are more willing to consider adopting circular business models and activities when they are more ready to adopt new technologies, care more about our environment and more strongly believe that actions taken by themselves, organizations or governments have a tangible impact. On the other hand, we find that respondents who are more materialistic and who are sensitive to (perceived) contamination risks are less likely to adopt CBM. These findings are in line with the literature. We also checked for the presence of interaction effects between attitudes and type of CBM in explaining intentions and reported behavior. The full results are presented in Table A1 in appendix. Specifically, we observe the following:

- Respondents scoring higher on the 'materialism' scale or on the 'technology optimism' scale are significantly more likely to be open towards use-oriented PSS (versus reuse) compared to other respondents. On average, respondents are indifferent between use-oriented PSS and reuse (ceteris paribus).
- Respondents scoring higher on the 'materialism' scale or on the 'disgust' scale are significantly more likely to be open towards result-oriented PSS (versus reuse) compared to other respondents. On average, respondents have a strong preference for reuse compared to use-oriented PSS.
- Respondents who score higher on the 'environment' scale seem to be more open towards sharing (versus reuse) compared to other respondents (10% significance). On average, respondents seem to prefer reuse over sharing (10% significance). The latter finding applies to both intentions and reported behavior.
- Respondents who score higher on the 'environment' scale are more likely to use labeled products (versus reuse) than other respondents. On average, respondents are indifferent between labels and reuse.
- Respondents who score higher on the 'materialism' scale are less inclined to use products made from recycled materials (versus reuse) than other respondents. On average, respondents are indifferent between reuse and recycling.

Further, respondent characteristics are correlated with the intention to adopt a CBM in an indirect as well as a direct way. Again a similar pattern emerges from the estimations based on intentions and behavior. As socio-demographic characteristics are correlated with attitudes and attitudes are correlated with the stated willingness to adopt CBMs, this represents an indirect route through which respondent characteristics influence CBM adoption intentions. For example, respondents aged between 25 and 45 score higher on the technology innovativeness scale; which is positively correlated with a willingness to adopt CMBs. However, these respondents also score lower on the environmental awareness scale and the perceived control scale and they tend to score higher on the materialism and the disgust scales; which are all negatively correlated with a willingness to adopt CBMs. Besides these indirect routes, we also tested the direct route by including the socio-demographic characteristics into the intention and behavior estimations. Based on this direct route, we see that, for similar levels of attitudes and similar CBM, respondents aged 25 to 45 are more open to CBM than other age groups. Similarly, we find that female respondents are more open to CBM than male respondents. Surprisingly, we also find that respondents without a higher education degree more open to CBM than higher-educated respondents which contradicts the literature. Also, respondents who occasionally have trouble paying their bills seem to be more open to CBM than those who report having no financial difficulties. Further, respondents living in urban areas are more open to CBM than respondents living in rural or sub-urban areas. Finally, respondents who own their home are less willing to adopt CBM than other respondents. While some of these results seem surprising at first sight, it is important to stress that we have already corrected for attitudes. Recall that respondents without financial issues score higher on the environmental awareness scale and lower on the disgust scale, while respondents from rural areas and home owners score significantly lower on the environmental awareness scale and higher on the disgust scale. These attitudes are important determinants of respondents' intentions and behaviors. As final note, these socio-demographic results can pick up some of the bias resulting from omitted variables (for instance, expected cost savings from circular activities as we did not explicitly including a price in our offers) or from the sample selection bias.

Looking at the drivers and barriers that respondents perceive when considering the adoption of CBMs, some patterns emerge. Based on Tables A2 and A3 in the appendix, we present an overview of how certain factors can be perceived as a driver or as a barrier depending on the circular business model or activity under consideration (see Table 18). This analysis takes reuse-based CBM as a reference point.

For instance, price is more likely to be seen as an important barrier for PSS than for reuse. Interestingly, while fit with lifestyle and image are seen as drivers to adopt recycling-based CBM, fit with lifestyle and group opinion are seen as barriers to adopt sharing systems. Furthermore, hygiene and contamination concerns are seen as an important barrier towards sharing systems, but are perceived as a driver for PSS. Also expected quality is seen as an important driver of PSS compare to reuse or recycling CBMs.

Table 18: Overview of the link between drivers and barriers and CBMs

	Reuse-based CBM	Use-oriented PSS	Result-oriented PSS	Sharing systems	Recycling
Price	0	--	--	-	--
Group opinion	0	0	0	--	0
Life style	0	0	--	-	++
Hygiene	0	++	+	--	0
Familiarity	0	-	-	0	0
Image	0	0	0	0	++
Ease of use	0	0	0	-	--
Contract	0	-	-	?	0
Social contact	0	-	--	-	0
Risk	0	+	?	-	0
Environmental impact	0	-	-	0	+
Quality	0	+	++	0	-

--= likely to be a very important barrier, - = likely to be a barrier, + = likely to be a driver, ++ likely to be a very important driver, ? may be both a driver or a barrier, 0 = no effect/equal to reference.

Table 19: Overview of the four main drivers and barriers per CBM

	Ease of use	Risk	Environment	Lifestyle	Price	Contract	Social contact	Hygiene	Image	Group opinion	Familiarity	Quality
Use-oriented PSS:												
Wash subscription at home	-1	-2	4	1	-3	-4	0	0	0	0	-3	2
Smart home	4	-3	3	1	-4	-1	0	0	0	0	-2	2
Printing subscription at home	4	-1	3	0	2	-4	0	0	0	0	-3	1
Coffee subscription at home	3	4	2	1	-4	-2	-1	0	0	0	-3	0
Result-oriented PSS:												
Renting clothes online	-2	-1	4	2	3	-2	1	-3	0	0	-4	0
Printing subscription in copy center	3	-1	4	0	1	-4	0	0	0	0	-4	2
Coffee subscription in city	4	0	3	-3	-4	-2	1	0	0	0	-1	2
Sharing system:												
Peerby renting	3	-3	4	1	2	-1	1	-4	0	0	-2	-1
Online service platform	3	-4	2	1	4	-2	1	-1	0	0	-2	-3
Cohousing	1	-4	4	-3	3	-1	2	-2	0	0	0	0
Reuse-based CBM:												
Repair cafe	2	-2	4	1	3	-1	3	0	0	0	-4	-3
Buy secondhand goods	0	-3	3	2	4	-1	0	-4	0	0	0	-2
Use secondhand clothes from family	4	0	3	2	2	0	0	-4	0	0	1	-1
Recycling:												
Recycled printing paper	0	0	4	3	-4	0	0	0	0	0	0	2

The main drivers is indicate by '4', the second most frequently selected driver by '3' and so on. The main barriers are indicated with negative signs.

Next, we investigate the main drivers and barriers towards adopting CBM based on the results presented in Section 6. An overview representing the four main drivers and the four main barriers for each of the fourteen CBM can be found in Table 19. The main drivers is indicate by '+4', the second most frequently selected driver by '+3' and so on. The main barriers are indicated with negative signs. Note that we only label a factor as a driver if more respondents selected it as a driver than as a barrier and a factor is only labeled as a barrier if more respondents selected it as a barrier than as a driver.

Most of the factors can easily be classified as a driver or a barrier as respondents' perceptions are more or less homogenous. The environmental impact was consistently ranked as an important driver for each of the CBM (see Table 19). Ease of use was also a popular driver except for two of the PSS, i.e. wash subscription at home and renting clothes via an online platform. Fit with lifestyle was generally considered to be a driver, except for the coffee subscription in the city and cohousing. As most of the respondents score high on environmental awareness (Figure 6), they may consider the adoption of CBM as fitting a more environment-friendly lifestyle except when it is practically not feasible. Lack of familiarity, concerns about contractual conditions, perceived risks and concerns about hygiene are seen as important barriers for most CBM. This confirms insights from past studies such as Rousseau (2020) in which consumers' attitudes towards leasing smartphones were explored in Flanders and where 'concerns regarding the lack of clarity with respect to, among other things, insurance, follow-up of defects and accidents, overall costs and final ownership at the end of the lease period' (p.6) were explicitly mentioned. A notable exception in the current study is the role of risk as a driver in the 'coffee subscription at home' option which may be related to the fact that the description of this CBM contained the following sentence 'In the event of a defect, the coffee machine will also be repaired or replaced by the supplier'. In general, the factors 'image' and 'group opinions' do not seem to play a role when respondents consider to adopt a circular business model or activity, with the exception of the negative relation between 'group opinion' and openness towards sharing systems and the positive relation between 'image' and openness towards using products made from recycled material (Table 16). The limited relevance of image and group influence may be the result of a sample selection or social desirability bias as other studies have found evidence that group opinions can play a role in individuals' intentions and behaviors. However, the role of social communities can be dependent on the type of product that is considered. It may be lower for products that are consumed merely for their primary function than for products that have high associated social status, such as cars, or emotional value, for example when consumers want to express personal style or identity through their consumption patterns (Mont & Plepys, 2003; Edbring et al., 2016). Also, past studies have shown that social contact is something that can be seen as a catalyst for sharing resources regardless of the type of product (McArthur, 2014; Edbring et al., 2016). Yet, for some people, potential conflict situations may arise as a result of sharing products which is then perceived as a barrier (Edbring et al., 2016).

Perceptions regarding the remaining factors are more heterogeneous and seem to be correlated with the type of CBM (see Table 19). Overall, social contact does not seem to be an important decision factor, however, it is seen as a driver for each of the sharing systems we presented to the respondents. Expected quality is seen as a driver for the different product-service systems, but is ranked as a barrier for reuse-based and sharing systems. Financial considerations reveal an opposite picture: cost concerns are perceived as a barrier to adopt several of the use-oriented PSS included in this study, but as a driver for reuse and sharing systems. Thus respondents seem to correlate higher expected quality with higher expected prices.

Also note that the majority of past research on the drivers and barriers towards adoption of CBM is either very specific for one circular product/sector (e.g. car sharing, smartphone leasing) or focusses on one or more circular business models (e.g. peer-to-peer sharing systems, access-based

consumption). While the first group of studies can provide reliable insights within their specific context, the findings from the second group of studies are more difficult to interpret without taking the product/sector into account.

To conclude, some limitations of this study should be mentioned. Importantly, the sample is not representative of the population in Flanders. Several groups are under- or overrepresented which leads to a biased sample. The sample is biased towards the higher educated and environmentally aware individuals. Yet, these biases are likely to have a similar impact: we are estimating an upper limit of the willingness to seriously consider the adoption of circular business models and activities. True intentions are likely to be lower than those presented in this study.

10. Policy recommendations

In order to stimulate consumers to adopt circular business models and activities, a context-dependent strategy will be needed. One-size-fits-all circular business solutions and policy measures are not easily achievable as they will only be effective for parts of the population and specific products/services. Thus, a targeted approach and focused information provision are required to have a sizable impact on the transition towards a circular economy.

10.1 Some general insights

While context clearly matters, some overarching trends emerge from the dataset. This allows us to comment on some general broad measures that may be effective in moving forward with the circular economy.

A first general observation is that concerns about contractual conditions and risks emerge as important barriers towards the adoption of CBM. While this is understandable from a consumer's point of view, easy solutions are more difficult to find as suppliers are dealing with a moral hazard problem. Moral hazard occurs when one party engages in risky behavior or fails to act in good faith because it knows another party bears the economic consequences of its behavior. Here this would imply that an individual who participates in a coffee subscription scheme at home would be less careful with the coffeemaker because it would be automatically replaced when it breaks down. The company offering the contract then bears all the risks even if the customer would deliberately throw the appliance against the wall and this would make the service very expensive. To reduce the risk and the price of the subscription, typically a contract is drawn up including conditions of use. Note that the consumers' lack of familiarity with CBM and their past experiences with insurance and warranty contracts reinforce their concerns about contractual conditions. More research is needed to investigate what contractual clauses consumers find acceptable and which are able to control the moral hazard problem in CBMs.

A second general observation involves the possibility to increase consumers' environmental awareness as a desire to reduce one's environmental impact was the most important driver mentioned by the respondents and higher scores on the environmental awareness scale were correlated with a higher willingness to adopt circular business models. Here, education and sustained information campaigns through traditional as well as social media can play an important role. Embedding sustainability and environmental awareness in curricula from nursery schools to universities is not only important within the context of the circular economy but also within the broader context of achieving the United Nations' Sustainable Development Goals. Transformative, long-term societal change requires raising public awareness and thus education plays a vital role as it is crucial in shaping people's attitudes. In the scenarios that were studied here, image and peers' opinions were hardly ever considered a barrier

which might mean that society is evolving to embrace these CBM. Although it may also be a consequence of a sample selection bias.

Note that how we activate social norms and frame information matters. Studies have shown that subtle shifts in social context can dramatically change an individual's social identity and thus her behavior in the marketplace (Marin et al., 2009; Champniss et al., 2015). Descriptive versus injunctive norms, positive versus negative framings, general versus specific messages,… it all plays a role (e.g. Demarque et al., 2015). Moreover, norms will motivate behavior primarily when they are activated, which is more likely if they have been made salient. Thus the effect of norm activation is again context-dependent (Arlen & Talley, 2008) and may even lead to negative consequences through crowding out effects (Frey & Oberholzer-Gee, 1997), negative spillovers (Nillson et al., 2017) or normalization effects (Schultz et al., 2007). Furthermore, the presence of a wide variety of environmental and sustainability claims on products – that can be vague or misleading ('greenwashing') – is perceived as confusing by certain consumer groups and may lead to rejection of these types of messages (Padel & Foster, 2005; Schmuck et al., 2018). Regarding the circular economy transition, a recent study illustrates the challenges with using product labels to provide information. Boyer et al. (2021) found that the average customer – based on a UK sample – "almost always prefers a more "circular" product when compared to products with otherwise identical attributes, and that customers are consistently willing to pay more for products with low or moderate levels of circular content. However, analysis suggests that willingness to pay more for products disappears, and in some cases declines, as the proportion of recirculated content increases. Results offer evidence that applying a numerical circular economy label at low levels of recirculated content could be a profitable strategy for producers of mobile phones and robot vacuum cleaners. Such a strategy is less certain for heavily refurbished products, fully reused products, or other product types" (Boyer et al., 2021, p31).

A third general observation relates to the lack of familiarity which is one of the barriers that can be addressed in a fairly straightforward way. Governments and administrations can lead by example. Access to car-sharing or bicycle-sharing systems for their employees is such an option. Municipalities and non-profit organizations can organize free activities such as repair cafés that are open to all and actively promoted through different communication channels. Businesses can allow potential consumers to test what is on offer before asking them to commit to a long-term subscription. Explicitly offering consumers a chance to try out the concept and have a test run before concluding a contract has been shown to reduce consumers' risk perceptions regarding access-based consumption (e.g. Edbring et al., 2016; Lawson et al., 2016). It may be an option to organize a big circularity event bringing together providers and consumers (e.g. in Brussels Expo or Flanders Expo) with thematic subevents (e.g. on food, fashion, building, …). Such an event can be combined with the development of a dedicated – and permanent – website listing businesses, circular organizations, relevant information (e.g. summaries of policy and academic research) and short videos illustrating new concepts and CBM. This will also generate a wide stream of information in traditional and social media, thus making these CBM more accessible and familiar to interested consumers.

Fourthly, when private companies communicate about CBM and develop marketing strategies to positions one's business offer on the market, it will be important to not focus solely on the environmental aspects. Although the environmental driver was strongest in all cases that were considered in our study, it will be equally – or even more – important to stress other benefits such as quality, ease of use, financial savings and reduced risks in many cases. For example, including the automatic replacement or repair of broken appliances rather than offering a legal warranty contract buried in the fine print may be an attractive feature for potential consumers. As another example,

participation in sharing systems was found to be positively correlated with price considerations from a consumers' point of view.

Fifthly, contractual and legal barriers are related to a lack of familiarity with CBM both from a consumer and a producer point of view. From a legal perspective, the adoption of product-service systems is something completely different from the traditional purchase of consumer products as no transfer of ownership takes place. Yet, traditional EU consumer protection law is still very much focused on the traditional business model of the one-off sale of consumer goods and transfer of ownership to consumers within the broader context of a linear economy (Keirsbilck & Terryn, 2019). Despite the growing importance of the service sector in the EU, further exacerbated by the shift from a linear to a more circular, functional economy (Mont, 2002), the EU regulatory framework on services is still quite 'lean and mean', with much more room for contractual freedom and national regulatory freedom than in the area of sales (Keirsbilck & Terryn, 2019).

As a last general point, as the survey used in this study was administered in 2019, it cannot factor in the impact of the COVID-19 health crisis. Anecdotal evidence suggests that, for obvious reasons, consumers have become much more concerned about hygiene when using sharing-based or reuse-based CBMs. It is important to engage in new research projects to investigate whether this increased hygiene concern is transient or that it has a more structural impact on consumers' willingness to adopt sharing schemes in the future. Also possible responses by providers should be studied in order to ensure that hygiene concerns do not become higher barriers than they already were for particular products/services.

10.2 Some specific insights

Despite some obvious reservations, we next provide some possible suggestions for the specific scenarios we investigated. First, however, we want to clearly stress that the current dataset is not designed to generate representative results for all consumers in Flanders, nor does it allow us to comment on causal links between factors and outcomes. Moreover, we did not measure the effect of policy interventions nor did we question respondents on their possible reactions regarding possible measures or interventions. Keeping these caveats in mind, the results of the study do reveal some underlying patterns and interesting insights that allow us to formulate some suggestions for action.

Firstly, we look at the scenarios that included a product-service system. Here we have to rely on stated intentions as PSS are not yet common on the market. Consequently, the lack of familiarity is an obvious issue. Thus, allowing customers to test the concept or offer a limited-time starting offer at an attractive price may provide customers with the opportunity to become familiar with this CBM. The lack of familiarity also seems to lead to some heterogeneity regarding the perceived ease of use of these PSS, which is sometimes listed as an important barrier and sometimes as a driver. This is important information for providers of PSS that want to use ease of use as a value proposition since potential customers may not easily be convinced. However, when ease of use is perceived as a reduction of risks – for instance, by integrating maintenance, repair and replacement in the offer – this may significantly increase the attractiveness of the offer. The offered PSS were generally perceived as being of high quality and as being convenient. Still, these more attractive characteristics are associated with consumers' expectations of having to pay a higher price. While the main barriers and drivers are similar for the four products (coffee, printing, housing and textiles), some differences are worth noting. The two coffee subscription options (at home vs. at a coffee shop) are valued differently regarding social contact. Respondents indicated the lack of social contact as a barrier for the 'at home' subscription, while they noted the possibility of social contact as a driver for the 'at coffee shop' subscription. While

the printing scenario included the same two versions of a subscription, social contact was not seen as an important driver or barrier. It is also notable that concerns about hygiene are listed as a barrier for the textile-related PSS, but not for the other PSS. From a policy point of view, it seems that making credible information generally available, increasing familiarity with the concept and protecting consumers through clear and understandable contracts are the main focal points.

Secondly, we look at the scenarios that focus on the sharing economy. Here we can use observations related to reported behavior (e.g. cohousing, car sharing, experience with Peerby) as well as reported intentions regarding the use of sharing platforms (e.g. Peerby, LETS, ListMinut). The main drivers regarding sharing systems concern uncertainty on possible risks and the unanticipated consequences related to the contractual conditions and fine print. Moreover, respondents are worried about hygiene (cohousing, tools) as well as quality (hiring someone for chores). On the positive side, sharing systems are perceived as a cost-saving alternative, convenient to use, environment friendly and as a means to increase social contact. Thus, sharing systems have different positions in the market compared to PSS regarding perceived quality and price. Also, respondents seem to be more familiar with sharing systems than with PSS. However, only a minority of the respondents (<10%) reports to frequently use systems such as Airbnb, cohousing, car sharing, bicycle or step sharing. The large majority has no experience with any of these sharing options. From a policy point of view, the uptake of sharing system may benefit from a quality monitoring system checking the quality of the services as well as the contractual obligations. As trust and credibility of quality monitoring are crucial for the effectiveness of these systems, the government can play a role here as a third-party assessor. Moreover, the introduction of a certification system related to the quality assessment may be worth considering.

Thirdly, we look at the scenarios that included recycled materials. These results regarding drivers and barriers mostly relate to using recycled printing paper. It seems that a (perceived) higher price and lower quality are the main barriers mentioned, while environmental concerns represent the main driver. It is noteworthy that more respondents mention that they (sometimes) use eco-labeled paper than those that use recycled paper (87% vs. 73%). We find a similar result for respondents' willingness to – at least occasionally - buy clothes with an organic label compared to clothes made from recycled fibers (88% vs. 56%) As long as using recycled materials is more expensive than using virgin materials for producers, it is important that at least a segment of the market is willing to pay a (small) price premium for products made (partly) from recycled material. To facilitate this, labeling schemes can be useful. As several of these labels are already present in the market, additional action does not seem needed. From a policy point of view, it may be more important to focus on the supply and demand of recycled materials compared to virgin material as this tackles the underlying mechanisms in these markets. A small point that is worth making is that the selective collection (and recycling) of coffee cups and pads may be further improved as approximately half of the respondents (that were asked this question) indicated that the cups and pads ended in the residual waste fraction.

Fourthly, we look at the scenarios that focus on reuse. Again, concerns about quality and hygiene are important factors related to the willingness to buy – or use – secondhand goods. These concerns are visible in the respondents' willingness to use secondhand building materials such as timber, tiles or doors, but not secondhand equipment such as kitchen taps, baths, boilers or toilets. To some extent, these quality concerns are counteracted by buying from a professional supplier rather than a private party. The main drivers include the positive effect on the environment, lower expected prices and fit with respondents' lifestyle. Note that sharing platforms may provide a more attractive path towards secondhand goods for some consumers since we observed that 28% would never rent a printer via the Peerby platform while up to 43% would never buy a secondhand printer. The fact that sharing (and renting) is more flexible and easier to undo may be relevant here. Looking at respondents' intentions

towards repair café, we see a lack of familiarity with this CBM besides concerns about quality and convenience. Despite the lack of familiarity, some 30% of the respondents already participated in a repair café, which is comparable to the number of respondents that reported the past use of a professional seamstress to repair or adjust clothes. On the upside, we see that repair cafés are seen as an opportunity for social contact besides being good for the environment and an opportunity to save costs. From a policy point of view, the concerns about the quality of secondhand goods and the perceived risks of using previously owned goods may be alleviated by clearly communicating about the existing regulation. Warranty legislation also applies to secondhand goods and some actors (e.g. De Kringwinkel) have adopted additional criteria. A well-known general set of guidelines and a quality assessment system may be interesting to reduce the asymmetric information on this market. Moreover, as price is an important driver for this type of CBM, a reduction of the VAT rate for secondhand goods could be considered. Finally, the results seem to indicate that respondents are more willing to buy secondhand goods in physical rather than online outlets (50-60% versus 25% has experience with buying secondhand goods through that outlet). Thus, it may be important to continue to ensure the presence and quality of physical secondhand outlets or to improve the perceived quality of online outlets to stimulate reuse.

To conclude, we want to highlight the importance of considering both the consumers' perspective and the producers' perspective when developing strategies to stimulate the uptake of circular business models. The transition towards a circular economy will depend on the existence of both supply and demand to create a thriving and sustainable economic system.

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Appendices

Table A1: Explaining intentions towards CBM including interactions between CBM types and attitudes

	INTENTIONS		BEHAVIOR	
	coeff.	p-value	coeff.	p-value
Attitude technology innovativeness	0.147***	0.003	0.107**	0.021
Attitude environment	0.139**	0.021	0.025	0.665
Attitude materialism	-0.274***	0.000	0.019	0.715
Attitude perceived control	0.227***	0.001	0.244***	0.000
Attitude technology optimism	-0.073	0.169	-0.034	0.469
Attitude disgust	-0.137***	0.003	-0.053	0.204
Product clothes (reference)				
Product coffee	-1.351***	0.000		
Product printing	-0.396***	0.005	1.189***	0.000
Product chores	0.669***	0.000		
Product tools	1.079***	0.000	-0.252	0.232
Product housing	-0.349**	0.041	-0.196	0.411
Product mobility			-0.938***	0.000
Fast-moving consumer goods	0.240*	0.061		
CBM reuse (reference)				
CBM use-oriented PSS	-1.406	0.169		
* Att technology innovativeness	-0.027	0.821		
* Att environment	-0.084	0.583		
* Att materialism	0.441***	0.001		
* Att perceived control	-0.114	0.478		
* Att technology optimism	0.307**	0.022		
* Att disgust	-0.020	0.852		
CBM result-oriented PSS	-3.455***	0.003		
* Att technology innovativeness	0.098	0.432		
* Att environment	0.055	0.753		
* Att materialism	0.381**	0.013		
* Att perceived control	0.095	0.623		
* Att technology optimism	0.130	0.396		
* Att disgust	0.254**	0.044		
CBM sharing	-1.117*	0.077	-1.418*	0.058
* Att technology innovativeness	-0.061	0.389	0.016	0.831
* Att environment	0.170*	0.054	-0.008	0.939
* Att materialism	0.047	0.564	-0.071	0.401
* Att perceived control	0.047	0.632	0.164	0.134
* Att technology optimism	0.121	0.126	0.051	0.531
* Att disgust	0.005	0.940	0.043	0.535
CBM labels			0.213	0.847
* Att technology innovativeness			-0.014	0.907

* Att environment			0.323**	0.046
* Att materialism			-0.157	0.263
* Att perceived control			0.161	0.337
* Att technology optimism			-0.173	0.158
* Att disgust			-0.090	0.441
CBM recycle			0.095	0.940
* Att technology innovativeness			0.023	0.854
* Att environment			0.267	0.154
* Att materialism			-0.315**	0.033
* Att perceived control			0.023	0.912
* Att technology optimism			-0.090	0.533
* Att disgust			0.036	0.783
Outlet digital			0.291***	0.002
Outlet shop			-0.397***	0.000
As user			0.282***	0.000
SD Male	-0.523***	0.000	-0.128**	0.027
SD Age <25	-0.052	0.597	-0.061	0.534
SD Age 25-45	0.168***	0.006	0.210***	0.001
SD Higher non-university	-0.288***	0.001	-0.122	0.148
SD University degree	-0.298***	0.000	-0.200**	0.013
SD No financial issues	-0.204**	0.023	-0.274***	0.002
SD Urban	0.331***	0.000	0.331***	0.000
SD Rural	-0.063	0.309	0.019	0.769
SD Home owner	-0.604***	0.000	-0.176**	0.013

Table A2: Estimation multinomial logit model explaining selection of 12 factors as driver for (intended) adoption (base outcome = no factor selected as driver)

DRIVER	price	group opinion	life style	hygiene	familiarity	image	ease of use	contract	social contact	risk	environment	quality
CBM reuse (reference)												
CBM pss_use	-1.107	.	-0.336	1.269	-0.819	.	(0.265)	.	-1.564	.	-0.284	.
CBM pss_result	-1.087	.	-0.579	.	-1.308	.	.	-0.799	-0.643	-1.549	-0.442	0.444
CBM sharing	.	.	.	.	(-0.425)	.	.	0.923	.	.	.	.
CBM recycle	-1.735	.	0.812	.	.	2.034	-2.502	.	.	.	0.866	.
Behavior (vs. intention)	-0.391	.	.	1.436	0.717		1.251	.	.	.	.	1.001
Product: clothes (reference)												
Product: chores	(-0.313)	.	-0.478	.	.	-2.128	0.758	.	.	.	-0.484	.
Product: house	.	.	.	.	.	-2.439	0.769	.	(0.530)	.	-0.537	.
Product: printing	0.565	.	-0.889	-1.974	-1.424	-2.230	0.615	.	.	.	-0.678	.
Product: coffee	.	.	-0.672	.	.	-2.353	0.611	(0.713)	.	1.981	-0.849	(-0.588)
Fast_moving goods	0.362	.	(-0.373)	.	.	-1.681	.	.	.	.	-0.484	.
Male	.	0.730	-0.319	(0.371)	.	.	.	.	.	.	.	.
Age <25	0.308	0.804	0.311	0.825	.	.	.	.	.	.	.	.
Age 25-45	.	.	.	.	.	.	.	.	.	.	.	.
higher_non_univ	.	-0.983	.	(-0.442)	(-0.327)	-0.809	.	.	-0.418	.	.	.
higher_univ	.	(-0.547)	.	-0.997	-0.405	.	.	-0.482	-0.335	.	.	.
Urban	.	0.712	0.439	0.737	0.535	0.468	0.188	0.739	.	.	(0.131)	0.477
Rural	.	.	.	0.783	.	.	.	0.443	.	.	.	(0.207)
_constant	-2.823	.	-2.696	-5.914	-3.540	-2.693	-3.610	-4.946	-2.918	-5.099	-1.802	-3.913

Coefficients with p-value < 0.05; ( ) = coefficients with p-value > 0.05 and < 0.1; . = coefficient not significant at 10% level. Negative (positive) coefficients mean the driver is less (more) likely to be chosen.

Table A3: Estimation multinomial logit model explaining selection of 12 factors as barrier for (intended) adoption (base outcome = no factor selected as barrier)

BARRIER	price	group opinion	life style	hygiene	familiarity	image	ease of use	contract	social contact	risk	environment	quality
CBM reuse (reference)												
CBM pss_use	4.228	.	.	-1.058	0.562	.	.	0.378	.	-0.268	(0.715)	-0.754
CBM pss_result	3.832	.	0.899	-0.755	0.371	.	.	.	-1.336	-0.627	.	-0.671
CBM sharing	1.440	1.923	1.301	1.462	.	.	0.448	0.982	0.731	0.377	.	.
CBM recycle	3.329	.	.	.	.	.	4.224	.	.	.	.	1.017
Behavior (vs. intention)	(1.307)	.	(-2.003)	-0.939	-2.981	.	-3.807	.	(-1.963)	-2.303	.	-1.492
Product: clothes (reference)												
Product: chores	1.108	-3.478	-1.823	-3.430	.	.	-1.387	-0.847	.	-0.395	.	.
Product: house	.	-2.944	.	-3.948	-0.525	.	-1.829	-1.007	.	.	.	.
Product: printing	-0.987	.	.	-4.385	(-0.365)	.	-1.576	.	.	-0.670	.	-0.814
Product: coffee	.	-2.817	.	-3.117	-0.547	.	-1.822	(-0.386)	1.484	-1.129	.	-0.600
Fast_moving goods	-0.765	.	.	-1.659	.	.	-0.943	.	.	(0.243)	.	0.522
male	.	(0.535)	.	.	.	1.633	.	.	.	.	.	.
Age <25	.	.	.	.	0.376	.	0.481	(0.202)	.	.	.	.
Age 25-45	(0.216)	.	.	.	.	.	0.390	.	.	.	.	.
higher_non_univ	.	.	.	.	.	.	.	.	.	.	.	.
higher_univ	.	.	.	-0.277	.	(-1.282)	.	.	.	.	.	.
urban	.	(-0.667)	-0.349	-0.341	(-0.171)	.	.	(-0.178)	(-0.352)	-0.296	-0.645	-0.262
rural	.	-0.930	.	.	.	(-1.057)	.	-0.259	.	.	.	.
_constant	-6.235	-4.013	-4.160	.	-3.265	-6.119	-2.468	-3.007	-4.581	-2.665	-4.770	-2.925

Coefficients with p-value < 0.05; ( ) = coefficients with p-value > 0.05 and < 0.1; . = coefficient not significant at 10% level. Negative (positive) coefficients mean the barrier is less (more) likely to be chosen.

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