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Authors: Ksenija Kuzmina, Sharon Prendeville, Dale Walker, Fiona Charnley

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Future scenarios for Fast-Moving Consumer Goods in a circular economy

Dr Ksenija Kuzmina*
** Institute for Design Innovation, Loughborough University London, Loughborough University, London, E15 2GZ (**corresponding author**)*
k.kuzmina@lboro.ac.uk

Dr Sharon Prendeville
Institute for Design Innovation, Loughborough University London, Loughborough University, London, E15 2GZ
s.prendeville@lboro.ac.uk

Dale Walker[1]
Centre for Competitive Design, Cranfield University, Bedfordshire, MK43 0AL, United Kingdom
dale.walker@ellenmacarthurfoundation.org
[1]Ellen MacArthur Foundation, Cowes, Isle of Wight, United Kingdom

Dr Fiona Charnley
Centre for Competitive Design, Cranfield University, Bedfordshire, MK43 0AL, United Kingdom
f.j.charnley@cranfield.ac.uk

FMCG Highlights

- Exploratory scenario planning is used to engage experts and users in envisioning the future of Fast-Moving Consumer Goods within a circular economy context.
- Five future scenarios to inform a vision for the future of the Fast-Moving Consumer Goods industry in circular economy are presented.
- The analysis of the scenarios reveals a new perspective on how value is created for circular economy and the role of the consumer and information technologies within it.
- Insights from the Fast-Moving Consumer Goods industry bridges a gap within the literature between the circular economy and consumer studies.

Abstract

The aim of the study is to envision, through an inductive scenario planning methodology, future scenarios of the fast-moving consumer goods (FMCG) industry in the context of a circular economy (CE). The study uses an exploratory scenario planning, an inductive approach to engage FMCG industry organisations, CE experts, end-users, and academic stakeholders in exploring the future of FMCG within a CE context. Five future scenarios that can inform a vision for the future of the FMCG industry were developed: (1) Rinse and Reuse, (2) The Cycling of Pure Materials, (3) The Rise of the Circular Retailer, (4) A World Without Supermarkets and (5) Connected Living. The analysis and discussion of the scenarios consider how value is created within circular economy and the integral role that the consumer and the IT play within it. The study provides insights on how the FMCG sector might participate in the CE and in doing so provides a basis for further research in this area. Future areas for research are outlined.

Keywords: Circular Economy, Fast-Moving Consumer Goods, Consumers, Scenarios

1. Introduction

The aim of the study is to envision, through an inductive scenario planning methodology, future scenarios of the Fast-Moving Consumer Goods (FMCG) industry within a circular economy (CE) context.

Fast-Moving Consumer Goods (FMCG) are "nondurable retail products" (Park, 2015a) including food, beverages, personal care, furniture, textiles, household care and packaging (Quested & Johnson, 2012a; Stahel & Clift, 2015) goods that are bought frequently, are cheap and typically have a shorter service life than durable goods (Park, 2015b; Stahel & Clift, 2015). Consumer goods, or 'throw-away goods' fall into two categories: consumable goods (e.g. washing powder) and throwaway or disposable goods (e.g. packaging or newspapers (Vezzoli & Manzini, 2008)).

In contrast to durable goods, these products require less investment from both the manufacturer and consumer, resulting in a 'lighter-minded' (Park, 2015b) attitude towards the potential environmental impact of the industry. Yet, while food, beverages, clothing and packaging account for approximately 35% of materials used globally, around 80% of the materials used for FMCG end up in landfills, incinerators or wastewater (Hawken, Lovins, & Lovins, 2014; Park, 2015b). Thus, there is a significant need to rethink the ways in which consumer goods and services are designed and delivered.

This 'linear' economic model of extracting raw materials and manufacturing goods to be sold, used and disposed of (Schulte, 2013) has been the dominant production system for the last 150 years. While this model has been hugely successful for profit generation, it depletes natural resources and generates vast quantities of waste. The CE is one alternative, also known as a 'closed loop' system, it espouses a system where the integrity of materials and products are preserved through multiple product and material life-cycles. The CE envisions products and materials that are designed to pass through a series of predefined closed loop life cycles such as repair, reuse, and recycling, thus closing the loop on resource flows. To-date, there is a lack of research into FMCG and how it is envisioned in the context of the CE (Park, 2015b).

Research on the CE so far has a tendency towards durable goods (Bakker, Wang, Huisman, & Hollander, 2014; Bocken, Bakker, & Pauw, 2016; Moreno, De los Rios, Rowe, & Charnley, 2016), with less work on consumer goods. These studies aim to

counteract the perceived premature retirement of products by extending life-times through a combination of design and business model innovation strategies (Bakker, Wang, et al., 2014; Bocken, Short, Rana, & Evans, 2014; Prendeville, Connor, Bocken, & Bakker, 2017; Tukker, 2004, 2015).

To this end, the aim of the study is to envision the future of the FMCG industry within a CE context. This is done through an inductive scenario planning methodology where future scenarios of the FMCG industry within a CE context are explored. The inductive nature of the scenario method means that this study is led by observations linked to the participatory development of future scenarios, which are then considered in light of key CE literature. The paper focuses on four FMCG sectors: food, beverages, household and personal care products. The remainder of the paper is structured as follows: a literature review on key concepts of the CE, results and analysis leading to the final scenarios, discussion in light of key literature and conclusion and future research areas.

2. Literature Review

2.1 The Circular Economy Concept

The CE is a conceptual model that describes a reformed production-consumption system according to closed-loop material cycles (Blomsma & Brennan, 2017; Ghisellini, Cialani, & Ulgiati, 2016; Murray, Skene, & Haynes, 2015). It requires a systemic approach that engages with multiple stakeholders (Ghisellini et al., 2016) as well as placing emphasis on product, process and system 'redesign' (Murray et al., 2015). At the essence of this resource-centric concept is the need to innovate business models based on circular value propositions that shift from single transactions between actors in the value chain to multiple transactions through circular business models (Bakker, den Hollander, van Hinte, & Zijlstra, 2014; Nußholz, 2017; Urbinati, Chiaroni, & Chiesa, 2017).

The CE concept is increasingly perceived as an umbrella construct that has evolved over time and many academics and organisations have contributed to the subject. For recent reviews of the topic, we refer the authors to a special issue in the Journal of Industrial Ecology, as well as in a number of review studies (c/f Blomsma & Brennan, 2017; Ghisellini et al., 2016; Kirchherr, Reike, & Hekkert, 2017; Korhonen, Honkasalo, & Seppälä, 2018; Merli, Preziosi, & Acampora, 2018). While it has been suggested that the CE presents new 'discursive' opportunities to approach resource issues (Blomsma & Brennan, 2017) its limitations have been pointed out by many scholars. For example, D'Amato et al. (2017) review CE alongside interconnected ideas of green economy (GE) and bio-economy (BE) to highlight the variation in aims, objectives and operationalisation of these concepts. They note that CE is embedded in the context of industrial urban systems and does not account for social and local dynamics (as GE does) nor biological (as BE does). Relevant to the FMCG sector are criticisms related to levels of consumption.

2.2 Circular Business Models for FMCG

Through circular business models it is proposed that value can be derived for businesses through savings on labour, material and energy while in parallel having the capacity to reduce negative externalities such as toxic substances, water and greenhouse gas emissions (Bakker, Wang, et al., 2014; Bocken, Bakker, & Pauw, 2016b). The

circular business model concept incorporates ideas such as the product-service-system (PSS), which are particularly relevant for the FMCG sector. This is because the PSS concept (Tukker, 2004, 2015) is a value capturing strategy that moves the focus from products, to creating services that sell satisfaction rather than goods, to meet customer needs (Manzini & Vezzoli, 2003). For example, De los Rios & Charnley (2017) present the case of Splosh, a PSS company, driven by technological-innovation in cleaning products. Bocken et al. (2014) describe 'stewardship-based' business models, where the consumer may pay a premium for a more sustainable product, such as those certified as Fair Trade. Bakker's 'Hybrid' business model describes a business model that involves selling a durable product (such as a coffee machine or a razor handle) combined with a consumable (disposable coffee capsule or a razor blade). Typically, the focus is on the long-life design of the durable part of the product with less consideration of the circularity of the linked consumable. Nevertheless, this illustrates how some existing circular business models may be relevant for FMCG. However, most business models currently discussed, such as the 'Classic Long-Life' (Bakker, Wang, et al., 2014) or 'Sufficiency-Driven' business models (Bocken et al., 2016) are implicitly at odds with the "fast-moving" nature of the consumer-goods sector as it stands today.

This means that while there are some insights in the existing body of literature that are relevant to consumer-goods, many more business strategies may yet be developed. For example, in the context of FMCG, designing products for emotional attachment can be relevant (e.g. for textiles) whereas developing sophisticated and user-centred services (e.g. refilling packaging / recycling on the go) for "fast" loops may be viable for food, packaging and beverages. Furthermore, ways of selling, for instance through online marketplaces such as Yerdle[1] and collaborative consumption models (e.g. sharing and peer-to-peer platforms) (Cohen & Muñoz, 2016) can also support reduced environmental impacts, by optimising transport systems (Steffen & Gros, 2003). Industry 4.0 will see a world of connected devices and newly distributed production systems (Srai et al., 2016) are expected to relocalise value chains with the potential to support the CE (Prendeville, Hartung, Brass, Purvis, & Hall, 2017). Yet, so far, these developments have not been elaborated on with respect to the emerging CE agenda.

Nevertheless, many circular business models have been formulated on the assumption that people would accept them unquestioningly. Other authors are beginning to highlight that this underestimates the magnitude of changing practices being asked of consumers (Lofthouse & Prendeville, 2017; Lofthouse & Prendeville, 2018) as well as revealing an 'impoverished' view of the scale of change embedded within the CE model (Hobson & Lynch, 2016). For instance, to see more reuse of goods in society requires market demand from consumers, in turn requiring 'awareness and transformation' (Ghisellini et al., 2016) as well as a new uptake of a much broader and more complex set of social practices (Hobson & Lynch, 2016).

The consumer goods industry is characterised by high sales volumes and low prices (Robinson & Fornell, 1985). The focus of innovation strategies within the FMCG industry is on new product innovation (Petala, Wever, Dutilh, & Brezet, 2010) or brand development (Ambler & Styles, 1997). These characteristics, coupled with the short lifespan of FMCG products, make it difficult to frame CE principles according to the FMCG industry (Ellen MacArthur Foundation, 2013). The low (perceived) value of goods means consumer loyalty is hard to win and retain, thus challenging core CE

[1] https://www.yerdle.com/

concepts such as take-back schemes or subscription packages (McDonald, de Chernatony, & Harris, 2001).

So far studies on consumers and the CE focus on a specific aspect, such as repair (Salvia, 2016); packaging design (Magnier & Schoormans, 2015); factors affecting consumer acceptance of circular products (Van Weelden, Mugge, & Bakker, 2016) and consumer factors that affect the potential to extend product life-times (Mugge, Jockin, & Bocken, 2017). Apart from a few studies, it has been suggested the CE literature so far neglects to consider what effect a shift to a future CE requires from consumers (Ghisellini et al., 2016; Murray et al., 2015; Park, 2015b).

2.3 Exploratory Scenario Planning Approach

Engaging with the CE model presupposes a high level of uncertainty due to the complexity and nature of the FMCG sector. Yet, it also allows for opportunity to innovate and develop within a CE agenda. Scenario planning is an approach that has been used by various organisations to overcome limitations to how we envision change and inactivity in the context of innovation (Amer, Daim, & Jetter, 2013; Tapinos, 2012). In particular, research of exploratory scenario planning to envision sustainable futures has seen application in various contexts (Linnenluecke, Verreynne, de Villiers Scheepers, & Venter, 2016) including low carbon society (Fujimoto, Poland, & Matsumoto, 2009), sustainable land use (Tress & Tress, 2003), and territory planning (Folhes et al., 2015). It has been described as a process to expand one's imagination to the "wide range of possible futures" to be better positioned to engage with emerging opportunities (Schoemaker, 1995a; Tapinos, 2012). For this reason, this study uses exploratory scenario planning approach to engage FMCG industry organisations, CE experts, end-users, and academic stakeholders in inquiring into the future of FMCG within a CE context.

Scenario planning approach used in this paper has been defined as a pre-strategy research activity of exploration (van Notten, 2006). This is an alternative view to scenario planning as strategic planning tool to be applied in a decision-making process (Schoemaker, 1995b). The focus here is not on developing strategies against possible scenarios (Wright, 2005), but instead on the process of exploration. Exploration refers to "learning, awareness-raising, stimulation of creative thinking and investigating interaction of societal processes" (van Notten, 2006). Following a theory put forward by Weick, Sutcliffe, & Obstfeld (2005), exploratory scenario planning can be seen as a sensemaking exercise during which mental models are challenged as the scenarios of the future are built from fuzzy and complex information. "It may involve learning from the past and investigating a fundamental uncertainties [sic] about the future" (van Notten, 2006).

The scenarios which result from this process are 'plausible futures' rather than probable futures (Wilkinson, 2009), which is usually the aim of the strategic forecasting. The conditions for plausible futures are imagined or constructed to challenge existing perspectives and plans (ibid.). Plausible futures take shape as scenario narratives. Well-developed scenarios can meaningfully communicate and simplify complex concepts, providing ways through which current and future thinking can be examined (Chermack & Lynham, 2002). However, to the knowledge of authors, it has not yet been used to envision the future of FMCG sector in CE.

3. Scenario Planning Methodology

The aim of the study is to envision, through scenario planning, the future of the FMCG industry within a CE context. The study draws on the intuitive approach to scenario planning (van Notten, 2006). While there is no set way to apply the intuitive approach to develop scenarios, van Notten (2006) suggests a selection of simple steps as an overarching framework: a) identification of subject problem area; b) description of relevant factors; c) prioritisation and selection of relevant factors; d) the creation of scenarios.

Further, the steps can be carried out deductively or inductively. In the deductive approach, important factors are identified early in the process, which guide the development of the scenarios. In the inductive approach the process is freer; scenarios are developed employing personal associations, inferred causal patterns and other subjective methods (ibid). This study followed the *inductive* approach to the scenario development and grounded itself in the participatory element (Allwood, Laursen, Russell, de Rodríguez, & Bocken, 2008; Oteros-Rozas et al., 2015; Tress & Tress, 2003) as illustrated in Fig 1. Finally, the study was grounded in the idea that exploratory scenarios rely on the "description of the past extrapolated by present trends to describe future outcomes" (Allwood et al., 2008 : 1235). This process was used as the basis for the development of the trends and themes, which constituted relevant factors for the scenario planning process and that were used to formulate the final scenarios.

Fig 1 Overview of Methodology Process

During the study, participation of stakeholders with influence on and interest in the issues of FMCG and CE, was sought in all stages of the scenario planning. For example, stakeholders were engaged in dialogue to identify the problem area (Fig 1.), they integrated different types of knowledge defining and prioritising important factors, defined the plausible futures and developed and validated the final narratives.

Table 1 illustrates how the methodology for the study relates to the inductive scenario planning steps proposed by van Notten (2006), as well as the participatory methods used. The participatory methods used include interviews (Robson, 2011), collaborative workshops (Börjeson, Höjer, Dreborg, Ekvall, & Finnveden, 2006), brain-writing (Paulus & Yang, 2000), thematic analysis (Robson, 2011), and storyboarding (Higgins, 1996), placing the process on the intuitive rather than analytical end of the spectrum (van Notten, van Asselt, & Rothman, 2003) outlined in Table 1.

Table 1
CE Study methodology related to Van Notten's Scenario Planning Steps

Van Notten Scenario Planning Steps (2006)	**Scenario Planning Stages in CE study**	**Participatory methods used**
Identification of subject problem area	Workshop to identify the parameters of the study	Dialogue
Description of relevant factors	Trend Development	Semi-structured interviews Participatory Workshop
Prioritisation and selection of relevant factors	Theme Development	Creative Workshop
The creation of scenarios	Scenario Development	Brain-writing Workshop Semi-structured interviews Feedback Participatory Workshop

3.1 Participants

The core participants engaged in the study included stakeholders from leading FMCG industries (representing four sectors: food, beverages, household and personal care products), CE experts, and academics (Table 2). Participants were selected based upon their extensive knowledge and experience of both the FMCG sector and the CE and as leaders within their industry or field who have the potential to influence the sector's development. All group members had an interest in FMCG innovation and the CE and were actively involved in developing expertise within that area, thus being able to reflect on the opportunities and limitations the scenarios present within the CE framework. In addition to engaging stakeholders with potential to influence decision-making, the research also sought to engage with end-users that held knowledge (Oteros-Rozas et al., 2015) of FMCG consumption and had an interest in seeing change within the sector. Thus a group of 10 postgraduate students undertaking degrees in design, innovation and sustainability were invited as part of the study to provide an additional perspective and add to the richness of the scenario planning process (van Asselt et al., 2000).

Table 2
Core Participant Group

Participant #	Organisation	Expertise	Years of Experience
1	CE Charity	FMCG and CE	22
2	Design and innovation consultancy	Innovation and brand strategy in FMCG	16
3	Resource Management Industry	Waste and resource management	8
4	Global beverage manufacturer	Sustainability	20

5	Global FMCG manufacturer	Packaging and sustainability	22
6	Food manufacturer	CE Research and development	19
7	Engineering and environmental consulting firm	Sustainability strategy	18
8	University	CE product and service design	10
9	University	Sustainability and service design	6
10	CE Charity	CE	1

3.2 Participant engagement

The engagement of the participants followed a collaborative approach (Cornwall et al., 1995) with the aim to include participants as often as possible during the process (Reilly, 2010). For example, the project sought methods most appropriate for the participants to engage with (Bergold & Stefan, 2012) varying from individual interviews to collaborative workshops (Fig 1). Yet, as with many projects the participation of all stakeholders at all stages was not possible due to availability, time and resource limitations. Nevertheless, stakeholders were involved in most stages of scenario development bringing their own perspective on the subject matter (Fig 1, Stage 1, Activities b, c,) as well as reflecting upon and synthesising the knowledge produced by others (Fig 1, Stage 2, Activities b & Stage 3, Activities a, b).

3.3 Scenario content development

The time scale for the scenarios was set at 10 years and can therefore be considered a short-term projection, grounding the study in the near future and making it more identifiable and practical for participants. The content of the scenarios (van Notten et al., 2003), can range from complex (comprising an intricate collection of interrelated events) to simple, (focused on a particular niche or extrapolating from a small trend set). The scenarios developed in this study fall somewhere in the middle of the spectrum. On one hand, the scenarios developed aim to offer a snapshot of the industry 10 years on. On the other, the data gathered reflects a broad view from the field, with many actors and variables, increasing the potential complexity of the scenarios.

As discussed in section 2.4 the process for developing exploratory scenarios relies on the "description of the past extrapolated by present trends to describe future outcomes" (Allwood et al., 2008: 1235). This approach was the basis for the development of the relevant themes in this study as seen in Figure 1 (Stage 1, Activities a, b).

Horizon scanning activity (Palomino et al., 2012) undertaken by the researcher aimed at identifying current trends as relevant innovative practices for the FMCG industry and this was complemented with insights gathered through semi-structured interviews (Robson, 2011) with FMCG industry experts (Table 2). The output of this stage was a collection of 56 examples of innovative practices and insights (Fig 1, Stage 1, Activity a). These were communicated using a set of cards (Appendix A) in the first participatory workshop with the core group (Fig 1, Stage 1, Activity c). The card set

was used as a visual stimulus (Robson, 2011) during the session where participants reflected on the trends and practices, identifying both the positive and negative characteristics, in the context of the CE. Additionally, participants synthesised 12 trends within the presented examples. At this stage the researcher collated and thematically analysed the information from the workshop, developing thematic maps (Appendix B) and identifying six overarching themes (Fig 1, Stage 2, Activity a). To refine the thematic analysis (Robson, 2011) a second participatory workshop was held with 10 postgraduate students (Fig 1, Stage 2, Activity b). Participants were split into three groups and assigned one FMCG sector: food and beverages, household care, or personal care. Each group was asked to undertake a brainstorming activity to generate creative ideas for products or services that might exist in their sector in 2025. The ideas generated were analysed by the researcher, in conjunction with the six themes previously identified, for further refinement, adding a user-focused perspective to the themes.

Multiple methods were used with the stakeholders (Oteros-Rozas et al., 2015) to develop scenarios from the themes. This included collaborative workshops and semi structured interviews. The brain-writing workshop involved several members of the core participant group (Fig 1, Stage 3, Activity a). The aim of the workshop was to generate granular ideas that could be synthesised into the final scenarios. Participants were briefed on the six themes identified in the previous stage and a brain-writing activity (Paulus & Yang, 2000), developed to mitigate groupthink and other weaknesses of brainstorming, was utilised to generate the ideas. The six overarching themes that were developed during the study were intended to permeate through the entire vision, rather than relate specifically to one particular scenario. Neither were the themes intended to complement one another. In many ways they are complementary, but in certain instances they appear to contradict one another. What is important is that, taken as a set, or independently, and considered alongside the principles of the CE these themes are the lens through which the future of FMCG could be approached. Finally, the workshop (Fig 1, Stage 3, Activity a) was supplemented with several one-to-one interviews between the researcher and core group participants who were unable to take part in the workshop. As a result, 120 ideas were captured. The ideas were thematically coded by the researcher and built into four scenarios. In order to refine and validate the scenarios, the researcher held a Feedback workshop (Fig 1, Stage 3, Activity d) with an expanded CE expert group. The reflective discussion on the opportunities and limitations scenarios present within the CE was captured and used to amend the four scenarios as well as adding fifth scenario to the set.

4. Trends, Themes, and Scenarios

In this section, we describe the results of the activities described in Figure 1. The order of the results reflects the process of the scenario planning activity from: trends; themes; to scenarios.

4.1 Trends

During the theme identification workshop 12 trends were identified as innovative practices collected during the horizon scanning activity: Take-Back Systems, Leasing/Product-Service Systems, Reusable Packaging, Traditional Retail, Delivery Systems/Subscriptions, Vending Machines/Dispensers, Biological Cascades, Urban Closed Loop, Positive Impact, Community/Collaboration, Modularity, Gimmicks.

These trends are presented in Appendix C. The trends were not intended to connote CE attributes, but rather to ensure that the scenarios created accurately reflect and build upon the current activities of the FMCG industry.

4.2 Themes

Using the 10-step thematic analysis approach proposed by Braun and Clarke (2006), the twelve trends were reduced into a set of six overarching themes. The purpose of these themes was to guide the scenario development. Themes are the highest level of abstraction in the scenario development process, with the scenarios digging down into tangible ideas and concepts. The sections below elaborate on each theme.

4.2.1 Retail Becomes Two-Way

This theme refers to the relationship that exists between the retailer and the customer. In the current paradigm this is a linear, one-way relationship with products transferred from the retailer to the consumer who is then responsible for their disposal.

In a circular future, this needs to be a two-way relationship to enable products, and the materials contained within, to flow back to the retailer from the customer. The theme encompasses the growth of the relationship between the retailer and consumer in a mutually beneficial manner. The customer still receives products from the retailer, but the materials (currently seen as waste) are then returned to the retailer who is in a position to make maximum use of the value still embedded in the material.

4.2.2 The Power of Data

The role of information technology has to be considered in any future thinking activity. The Power of Data theme captures this role and seeks to apply it to the industry of FMCG in a circular future. While literature on CE focuses on cycling of resources, especially physical materials, through the system, the flow of information for example about the consumer and the use of the products in the opposite direction is missing. Data can be used not only to enhance service offerings, but also to maximise the effective use of resources. Services could be tailored to individual needs and behaviours, adapting to minimise waste creation.

4.2.3 The World Doesn't Reward Oversupply

In our current system, there are numerous mechanisms through which oversupply is rewarded, for manufacturers, retailers and consumers. An example mechanism is the reduction of unit costs with the increased size of the purchase, which creates a constant loop of oversupply and overconsumption. Manufacturers are rewarded for increasing their volumes. Retailers, seeking to shift these volumes, then reduce the price of the product to appeal to customers who do not necessarily need the additional products. As manufacturers continue to seek the growth needed in a linear economy, the effect compounds with all parties rewarded for the overproduction and overconsumption of the product.

These mechanisms, which reward oversupply cannot be a feature of the FMCG industry in a circular future, particularly in the food and beverage sectors where products are perishable and, not able to be consumed fast enough, lead to increased food waste.

4.2.4 Personalisation of Everyday Products

Many FMCG products are considered as commodity items, purchased frequently, used and disposed of. This theme relates to bringing a sense of personalisation to these products, designing them to be emotionally durable so that people will think twice about just throwing them away and possibly reusing them. This approach will derive the most value from the resource.

4.2.5 Community Level Solutions

'Community level solutions' can be seen as a theme with two parts. The first relates to the use of local resources or labour for activities such as the creation of goods or the management of waste. It includes the concept of collaborative consumption and the sharing of products and services amongst members of the community.

The second part refers to the idea that any solution needs to be developed to suit the local conditions in which it is intended to operate. What works in one geographic or economic location may not work in another. Systems need to be developed to suit the local conditions rather than manipulating the conditions to meet the system requirements.

4.2.6 Whole System Solutions

The final theme, 'whole system solutions', acknowledges the fact that surrounding every product or service there is an extremely complex, far-reaching system. Solutions cannot be designed in isolation, but rather need to be designed with the entire system in mind. The entire product lifecycle and all stakeholders need to be considered. This theme also incorporates the idea that collaboration, across industries and between competitors, is key to achieving a circular future. The role of policymakers and legislation in driving change must also be taken into account.

4.3 Scenarios

The five scenarios were developed from the trends and themes. For each scenario, the main concepts, relevant trends and themes are described in Table 3. Each of the scenarios are elaborated on further in this section.

Table 3
Summary of Scenarios, Main Concepts including Trends and Themes

Scenarios	*Main Concepts*	*Trends Applicable*	T*hemes Applicable*
1. Rinse and Reuse	B2B, B2C	T1, T3	TH1, TH2 Retail Becomes Two Way The Power of Data
	Reusable packaging through innovation in packaging technology, packaging reconditioning	Take-Back Systems	
	Availability of data and innovation in logistics enables reverse flow management of smart packaging	Reusable Packaging	
	Access to resource information and new systems of information exchange support reusable packaging systems		
	Service innovation through Big Data to engage consumers and business in new reusable systems		

2. The Cycling of Pure Materials	B2B, B2C Local production and consumption of packaging materials supports pure cycling of materials Businesses develop new local services using data tracking to manage packaging logistics Businesses use data to sort material flows into pure streams for recycling and remaking it within specific localities Urban waste materials feed back into local biospheres through community-level solutions	T1, T3, T7, T8, Take-Back Systems Reusable Packaging Biological Cascades Urban Closed Loop	TH2, TH5 The Power of Data Community Level Solutions
3. The Rise of the Circular Retailer	Urbanisation creates opportunities for waste to be either returned to local retailers by consumers themselves or collected by the retailer from the consumer through service innovation… This allows for biological cascades that redirect waste streams for energy production etc. New urban waste management systems allow for better data collection around consumer behaviour and waste Proliferation of dispensers in urban communities increases precise consumption as well as shifts in consumer attitudes to dispensers Retailers partner with local urban producers; Innovations in packaging technology (reconditioning) as well as shifts in consumer attitudes to take-back systems	T1, T6, T7, T8, T10 Take-Back Systems Vending Machines/ Dispensers Biological Cascades Urban Closed Loop	TH1, TH2, TH5 Retail becomes Two Way The Power of Data Community Level Solutions The World Doesn't Reward Oversupply
4. A World without supermarkets	Direct manufacturer to customer household delivery facilitated through new delivery systems and subscriptions (e.g. reusable containers) using innovations in logistics Use of data analytics informs manufacturers' services based on the exact needs of customer to optimise supply and demand	T5 Delivery Systems/Subscriptions	TH2 , TH3 The Power of Data The World Doesn't Reward Oversupply
5. Connected Living	Tailor-made services ensure a waste free scenario such pre-planned weekly meal deliveries Innovation in sensor and tracking technologies allows for maintaining inventory stock in the house enabling precise purchase and use of consumables	T5, T1 Delivery Systems/Subscriptions Take-Back Systems	TH2, TH3, TH4 The Power of Data The World Doesn't Reward Oversupply Personalisation of Everyday Products

4.4.1 Rinse and Reuse

Single-use packaging has been effectively phased out and replaced with reusable packaging, for business-to-business trade, transportation and in consumer-facing applications. Packaging is designed to be reused either by customers themselves or is cycled back through to the product manufacturer and retailer for reuse. Innovations in reusable packaging technology, such as the development of new materials, and creation of new reverse logistics models and service systems for packaging engage consumers and business in new reusable systems. For example, smart, reusable containers are helping manufacturers to better manage their supply chains and increase transparency, tracking the location and contents of their products at all times. This same technology facilitates the recovery of packaging for reuse or recycling. Large and small business owners get the most value out of an intelligent packaging solution developed specifically for their operation.

4.4.2 The Cycling of Pure Materials

Advances in materials technology have led to the development of palettes of non-toxic materials that can be cycled through the urban systems. Packaging remains single-use from the user's perspective, but through comprehensive collection and processing systems the material is remade into new packaging. Materials that cannot be collected and remade are designed to feed into the biosphere without causing damage, both to human health and the environment, possibly even having a positive effect. For example, locally abundant natural materials combined with green chemistry can support development of bioplastics and other materials that have high performance as well as decompose at the end of their life. This palette of materials has been developed to fit into local systems, particularly urban settings.

4.4.3 The Rise of the Circular Retailer

Urban retail stores have undergone changes in the last 10 years as the world has gone circular. What was once a one-way flow of products from retailer to consumer, has now become a two-way relationship. For example, waste from customers is returned back to the store either by the customer or through a retail led service innovation. Packaging is either reconditioned for reuse or sent for recycling and organic waste is fed into the anaerobic digesters that power the store.

Proliferation of dispenser systems means customers can purchase exact quantities, shifting their perceptions about the dispenser system. It also allows products to be shipped to stores in concentrate form for on-site reconstitution, reducing transport costs and emissions.

The store has also become a hub for the local community. Retailers partner with local urban growers that sell their produce in the allotment aisle. Loyalty programs for customers offer rewards based on what they use, not simply what they buy, and new urban waste management systems allow for better data collection and analysis around waste returned to store to build consumer behaviour insights.

4.4.4 A World Without Supermarkets

There is a demise of the traditional supermarket that has long dominated the FMCG scene. Manufacturers provide their products directly to customers through tailored services designed to meet people's unique food, household care and personal care needs.

Big data analytics are used to build a picture of the unique needs of individual customers so that the service can be personalised to their needs, providing the perfect products, in exact quantities, right when they are needed.

Leasing and subscription business models mean that customers no longer need to retain ownership of the products they require, but rather pay for the benefit the product brings. Coupled with advances in reverse logistics systems, manufacturers retain ownership of their non-consumable materials that they can reuse or recycle.

4.4.5 Connected Living

The world is more connected now than ever before. Communities, people, businesses, appliances and products are all connected to one another. These connections have allowed the creation of tailor-made services, dynamic logistics systems, intelligent homes, smart packaging and digital community marketplaces.

The use of sensor and connectivity technologies enable consumers to track the provenance of products, extend shelf-life and even communicate with other products to maintain an inventory of stock levels in the consumers' home which can be used by service providers to tailor their service to the individual customer. Smart appliances within homes are connected to each other and to us and can actively manage this household inventory and control their use of consumables.

5. Discussion

In this section, cross-cutting aspects of the scenarios are discussed alongside aspects that underpin the CE concept in the literature that are relevant to consider for further work relating to FMCG in the CE.

5.1 Sustainable-PSS and Service-Dominant logic

The use of (presumed) sustainable product-service systems (sPSSs) (Mont, 2002) is widespread in the presented scenarios. FMCG businesses envision developing low-impact services as they are able to get closer to what Tukker (2004) defines as the most sustainable PSS model. For instance, most scenarios focus on process and relationship innovation that lead to a new value proposition that is typically realised through a service. This proposes a new way for FMCG industry to think about its offer, moving beyond the product, and seeing it as an integrated system of products and services in a wider service ecosystem.

Further the scenarios highlight the complexity of how and for whom the offer or value is created within FMCG sPSSs. For example, in the Rise of Circular Retailer scenario, customers, retailers, urban growers and local community are at the same time producers and beneficiaries of the new solution. This illustrates an ongoing shift in the logic used to design and develop new PSS value propositions. In particular a shift from Goods-Dominant (G-D) logic to Service-Dominant (S-D) logic (Vargo & Lusch, 2017) is apparent. The G-D logic perspective sees value embedded in a product which is delivered to the customer and is exchanged for money. A customer is perceived as a passive value receiver and value destroyer in a business-to-customer interaction (Vargo & Lusch, 2011). In contrast, S-D logic suggests that the unit of exchange is a service where that service is defined as either applied knowledge or skills, which is exchanged for another service that is needed. Value is no longer embedded in the goods, which are seen as service transmitters. Instead value is co-created, in an actor-to-actor exchange, where all actors can be providers and consumers of the service (Ekman, Raggio, &

Thompson, 2016; Vargo & Lusch, 2011). Scenarios that refer to packaging, (Rinse and Reuse, The Cycling of Pure Materials, and Rise of Circular Retailer), provide examples of how value is no longer embedded in packaging alone, such as in its logistics and marketing functions (Saghir, 2004). Instead the value is also derived from the service innovation where consumers and other stakeholders engage in services that support recycling and reuse of the packaging material, which can also provide energy generation and behaviour insights.

S-D logic also requires stakeholders to shift their behaviour. For example, following value co-creation logic, manufacturers would need to collaborate closely and be transparent with consumers and other stakeholders who in turn need to reciprocate. This can lead to more efficient and effective use-based services. Particularly, when sPSSs are designed and developed to enable transparent and open flows of information exchange (Kowalkowski, 2011) between all stakeholders. For example, in the scenarios, manufacturers by having access to information about the consumer's use of the product rather than its purchase, can improve waste management systems and loyalty card reward systems. Consumers on the other hand, make decisions to purchase and use a product based on the provenance information supplied by the manufacturer.

Further, because value is determined in-use, it is derived contextually by the stakeholders as they integrate their resources with services (resources) provided to them, and variables such as time, place and resource networks are important in determining value (ibid.). Therefore, organisations need to develop and support long-term relationships with their stakeholders to enable value-in-context allowing for improved customer relationship and brand loyalty. Enabling this long-term relationship means continuously securing the knowledge of the needs and wants of the stakeholders as well as usage contexts (Kowalkowski, 2010). Personalisation of products and services as described in the business-to-business scenario of Rinse and Reuse and business-to-consumer scenario of World Without Supermarkets refers to such a relationship, demonstrating how the manufacturer can use the Internet-of-Things (IoT) to engage with the needs and contexts of stakeholders that can lead to developing a value proposition that is valuable to their stakeholders. A long-term relationship between retailer and consumer around waste management in the Rise of the Circular Retailer scenario is also described, yet what is not clear is the expected value proposition for the consumer that this scenario envisions.

The shift towards value co-creation in line with S-D logic proposes the view of the stakeholders as resource integrators and sPSSs as value propositions and enablers for value co-creation (Kowalkowski, 2010). This suggests that organisations can unbundle, dematerialise, and reconfigure their resources into new types of configurations where all actors 'actively influence each other's processes and outcomes' (Grönroos & Gummerus, 2014). These new value propositions require platforms that move beyond the traditional physical spaces into a variation of physical and virtual practices. Such new platforms are evident in the Rise of Circular Retailer, World Without Supermarkets and Connected Living scenarios.

In the scenarios, multiple opportunities for innovation, in line with S-D logic, can be conceived for all actors. These scenarios present ideas on how these services may work in the FMCG industry and the additional value they could bring to the businesses. The scenarios presented suggest that firms not only expand their offers to include more services, but use services to innovate their relationship with stakeholders and create value. By recognising that each actor is embedded in their own networks as part of a larger ecosystem, innovation in perception will lead to new services that can challenge the status quo (Ekman et al., 2016).

5.2 Information technology

The integration of information technology into sPSSs is an integral part of the scenarios. This supports recent research by Li & Found (2017), Papadopoulos et al. (2017) and Pang et al. (2015) who describe a range of ways in which digital technologies can assist with the implementation of circular concepts. These include data tracking and analytics for optimised logistics, stock management, provision of information about the resource (e.g. packaging material, reuse data) and big data use for insights on consumer behaviour, as well as providing dynamic feedback on aspects relating to in-use data of various stakeholders.

For instance, radio frequency identification (RFID) tags can assist with the tracking of products and IoT sensors are put forward to aid in the better management of overall value chains (Papadopoulos et al., 2017). The Rinse and Reuse scenario is an example where smart, reusable containers help manufacturers to manage their supply chains by tracking location and content of products, the tracking capabilities also support the recovery process for reuse and recycling. At the same time in the Connected Living scenario, sensors are used to extend the shelf-life of the product. 'Shelf life predictions' (Pang et al., 2015) allow manufacturers and retailers to shift away from the traditional inventory management systems, integrating information about product freshness and selecting distribution points in real time (Tsironi, Gogou, Velliou, & Taoukis, 2008). Another common characteristic of the scenarios is the provision of products as a service, in volumes perfectly suited to a given customer's requirements. This is important for perishable products such as foodstuffs that have a limited shelf life. Supplying only what a person can use would be a means to reduce food waste, an issue that plagues the current FMCG industry (Quested & Johnson, 2012b).

Furthermore, issues, such as the complexity of coordinating high-value recyclate streams in a world that is ever-more urbanised and on-the-go exacerbates the challenge of intervening in the FMCG sector and this is an area that data and information technology can be particularly meaningful for. For example, sensors can enable efficient city waste management (Perera, Zaslavsky, Christen, & Georgakopoulos, 2014) that scenarios described here (The Cycling of Pure Materials, Rinse and Reuse and the Rise of the Circular Retailer) adhere to. Here, the data is used by manufacturers for collection and processing of the waste, reusing and recycling it. It can be said that the manufacturer is a primary beneficiary of the 'sensor service' provided through a web of intelligent systems (Perera et al., 2014). At the same time IoT in itself is energy intensive and can have negative effects if the notion of 'green IoT' is not considered (Shaikh, Zeadally, & Exposito, 2017). One way for this to happen is to consider how the 'sensor service model' is used. For example, Perera et al., (2014) notes that distributing sensors and collecting data for each stakeholder that is interested in waste management (eg. city council, manufacturers, health and safety authorities, recycling plants) can be costly both financially and environmentally. Instead multiple stakeholders could collaborate and share one infrastructure, retrieving data from one source and using it to achieve their individual objectives. This reflects how such solutions would require new forms of collaborations between actors enabled by advances in information technologies.

All scenarios place an importance on systemic innovation and highlight the complex ecosystem of actors involved. Some scenarios, such as World Without Supermarkets and Connected Living, promote services that are personalised and tailored. Redlich et al. (2014) suggest that the increase in the actors contributing to the value proposition, partly enabled by digital technologies, and the need for

individualised services can be a challenge for manufacturers. Information technologies enables the FMCG sector to resolve this tension. For example, harvesting information and big data analytics are seen as a way to integrate and manage these two seemingly polar aims. In the Connected Living scenario the use of information technology helps industry to follow the changing needs of various users in one household and create an integrated offer that is suitable for all. In this case the data is not collected at the point of exchange but in-use (Vargo & Lusch, 2011) through multiple connected products, allowing the manufacturer to build a picture of characteristics and needs of the users (Ng, Scharf, Pogrebna, & Maull, 2015). Further, the manufacturer does not use G-D logic (Vargo & Lusch, 2011) to develop a tailored product, instead using S-D logic the manufacturer views the product as incomplete (Ng et al., 2015) until it is combined with the data from the household sensors. These scenarios can further be expanded in the context of additive manufacturing (Despeisse et al., 2017) for example consumers using sensor data and accessing 3D printers at home or in a Hub, to design and produce a customised part that will complete a product (Ng et al., 2015). For example, in the Rinse and Reuse scenario, the consumer, through service and material innovation can be enabled to 3D print a personalised packaging component. This IoT capacity could allow FMCG industry to engage with their customers on an ongoing basis, gaining insight into their needs thus being able to closer align the value proposition on offer.

The scenarios illustrate how integrating information technology within the FMCG industry, businesses can facilitate the exchange of information (and thus better management of resources) between multiple actors within a more complex value chain, based on repeat and multiple exchanges. For instance, the potential for new packaging services, in which the packaging manufacturer retains ownership of the packaging, such as in the World Without Supermarkets, could decouple product and packaging costs bringing savings to manufacturers, retailers and consumers alike.

These examples support the study of Pang et al. (2015) who suggest the design of the IoT systems for the CE is shifting from ‘trace-centric’ to ‘value-centric’. Whilst traceability allows for a number of process innovations, there are few incentives or business cases for manufacturers to engage with traceability. Design of added value IoT systems such as personalisation, shelf-life prediction, and waste management is needed to enable change at a scale (Pang et al., 2015).

5.3 Consumer Role

The implications of the scenarios discussed here are not intended to be exhaustive, but give a sense of how consumers can engage and derive value in future FMCG scenarios such as those identified by this research. Scenarios identify the role of the consumer as a vital ingredient in the shift of FMCG towards CE. For example, scenarios illustrate not only manufacturers’ using S-D logic to realise sPSSs innovation, but also consumers’ alignment of their perception and behaviour with S-D logic. For example, in the Rise of the Circular Retailer scenario customers are returning waste back to the store. In the World Without Supermarkets and Connected Living scenarios, customers are willing to provide information around their product uses to derive value from personalised sPSSs. What is illustrated here is not a typical acceptance by the customer to consume a product or a service, but instead an acceptance to continuously engage in value co-creation processes and to share a beneficiary role with the manufacturer and other potential stakeholders.

Understanding the consumer engagement aspects of these business strategies and seeing it as a complex process of change is critical in the FMCG sector (Ekman et al., 2016; Lofthouse & Prendeville, 2017; Lofthouse & Prendeville, 2018). For

example, the scenarios refer to consumer's behavioural, cognitive and emotional (Brodie, Hollebeek, Jurić, & Ilić, 2011) aspects of engagement with the new systems. In Rise of the Circular Retailer, a new behaviour, a two-way rather than one-way interaction between service provider and consumer is described. Whereas scenarios such as World Without Supermarkets and Connected Living refer to a cognitive shift in how consumers understand the uses of their personal data as well as emotional shift towards 'performance instead of ownership' (Planing, 2014). This follows the work of Brodie et al. (2011, p.259) who posit consumer engagement as "multidimensional...and context/stakeholder-specific expression of relevant cognitive, emotional and behavioural dimensions". Yet, this multidimensional aspect of the consumer engagement has been largely overlooked by the CE literature. Further, the scenarios highlight the positive view of consumer uptake of the future CE systems. Yet other authors (Lofthouse & Prendeville, 2018; Planing, 2014) emphasise that the adoption of the existing CE models by consumers has been slow and a greater understanding of what consumers expect, need and will accept is required. For instance, new services need to consider consumer capabilities, such as financing as well as recognise the influence of past experiences on consumer engagement with a service (Lofthouse & Prendeville, 2018).

Another way of describing consumer engagement with the CE systems is- as a 'working consumer' (Cova & Dalli, 2009) where the consumer performs various activities that add or enhance value of the business proposition. In the scenarios this is illustrated for example through consumers providing data or returning waste back to the store. Cova and Dalli (2009) suggest that although 'working consumers' benefit from this co-production relationship through the feeling of satisfaction, gratification on the personal level, and sometimes social recognition, the existing business models are rarely designed to enable the return of the market value that the consumers co-produced. However, the proliferation of sensors, as illustrated by the Connected Living scenario, will mean that the providers will depend (perhaps more-and-more) on information from sensors to keep developing relevant value propositions. Here, the personal/household sensor owners, the consumers, become business entities, making decisions whether or not to sell their data, and to whom (Perera et al., 2014). Sensing as a service model (Perera et al., 2014) is an example of a solution to the issue of the 'working consumer' and an opportunity for further circular business model innovation.

5.4 Implications for Future Research and Practice

The scenarios describe a number of avenues for exploration of the CE for the FMCG industry from policy, research and industry perspectives. The discussion on cross-cutting issues has allowed the identification of a number of areas for further research to be identified.

- Economic analyses, consumer research or feasibility studies to further elaborate on the proposed scenarios
- Consumer behaviour change studies to elaborate on the potential consumer role within the proposed scenarios
- Broadening the study to include additional industry stakeholders
- Expanding the study to include additional interpretations of FMCG sector and circular economy
- Additional studies considering viability of the scenarios could inform an industry roadmap

It was not the intention of this study to determine whether these examples are environmentally beneficial or not and thus further research on this sector should consider this.

5.5 Limitations of the Study

The intention of the participatory process was to engage key industry stakeholders in the iterative, collaborative development of the scenarios. However, due to time and availability, not all stakeholders were accessible for each stage of the research. This means the scenarios presented emphasise an industry perspective. In addition whilst representatives from four sectors (food, beverages, household and personal care products) were involved in the research this may not represent a complete perspective of the sector as a whole.

Further, while the scenarios were circulated for validation, responses tended to simply be acceptance or rejection. This challenge has been faced by other researchers utilising participatory scenario processes (Higdem, 2014) and can be attributed to a failure to clarify roles from the outset. This is also the case in this study, which needs to be considered for future work.

6 Conclusions

The aim of the study was to envision, through an inductive scenario planning approach, future scenarios of the FMCG industry within a CE context. The participatory approach taken to develop the scenarios involved members of the FMCG industry, CE experts, consumers and academics.

Doing so, the study has identified a set of six themes that guided the creation of the scenarios: (1) Retail Becomes Two-way, (2) The Power of Data, (3) The World Doesn't Reward Oversupply, (4) Community-level Solutions, (5) Personalisation of Everyday Products and (6) Whole System Solutions. Five future scenarios that can inform a vision for the future of the FMCG industry with respect to developing a CE were developed from these themes: (a) Rinse and Reuse, (b) The Cycling of Pure Materials, (c) The Rise of the Circular Retailer, (d) A World Without Supermarkets and (e) Connected Living.

Three mutually interdependent conceptual pillars are identified across the scenarios; S-D logic, information technologies, and consumer behaviour. In particular, the future scenarios are linked to the development and design of new types of service formations. Thus, the transition to a CE within the FMCG sector sees a shift from G-D logic to S-D logic. In turn, this is enabled by information technologies including IoT and big data. The scenarios also require shifts in consumer behaviour that can be understood in terms of S-D logic and informed by the use of information technologies.

The scenarios presented here are snapshots of what a circular future may hold and are thus conceptual tools through which a circular future may be influenced. Thus, the study contributes to the field by constructing future scenarios, identifying conceptual pillars to inform future work in this area, as well as stipulating avenues for future research.

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References

Allwood, J. M., Laursen, S. E., Russell, S. N., de Rodríguez, C. M., & Bocken, N. M. P. (2008). An approach to scenario analysis of the sustainability of an industrial sector applied to clothing and textiles in the UK. *Journal of Cleaner Production*, *16*(12), 1234–1246. https://doi.org/10.1016/j.jclepro.2007.06.014

Ambler, T., & Styles, C. (1997). Brand development versus new product development: Towards a process model of extension decisions. *Journal of Product & Brand Management*, *6*(1), 13–26. https://doi.org/10.1108/10610429710160002

Amer, M., Daim, T. U., & Jetter, A. (2013). A review of scenario planning. *Futures*. https://doi.org/10.1016/j.futures.2012.10.003

Bakker, C., den Hollander, M., van Hinte, E., & Zijlstra, Y. (2014). *Products that Last: Product design for circular business models*. TU Delft Library / Marcel den Hollander IDRC.

Bakker, C., Wang, F., Huisman, J., & Den Hollander, M. (2014). Products that go round: Exploring product life extension through design. *Journal of Cleaner Production*, *69*, 10–16. https://doi.org/10.1016/j.jclepro.2014.01.028

Bergold, J., & Stefan, T. (2012). Participatory Research Methods : A Methodological Approach in Motion. *Forum: Qualitative Social Research*, *13*(1), Art. 1. Retrieved from http://www.qualitative-research.net/index.php/fqs/article/view/1801

Blomsma, F., & Brennan, G. (2017). The Emergence of Circular Economy: A New Framing Around Prolonging Resource Productivity. *Journal of Industrial Ecology*, *21*(3), 603–614. https://doi.org/10.1111/jiec.12603

Bocken, N. M. P., Bakker, C., & Pauw, I. De. (2016a). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, *1015*(0), 20. https://doi.org/10.1080/21681015.2016.1172124

Bocken, N. M. P., Bakker, C., & Pauw, I. De. (2016b). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, *1015*(0), 20. https://doi.org/10.1080/21681015.2016.1172124

Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2013.11.039

Börjeson, L., Höjer, M., Dreborg, K. H., Ekvall, T., & Finnveden, G. (2006). Scenario types and techniques: Towards a user's guide. *Futures*, *38*(7), 723–739. https://doi.org/10.1016/j.futures.2005.12.002

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3, 77-101.

Brodie, R. J., Hollebeek, L. D., Jurić, B., & Ilić, A. (2011). Customer engagement: Conceptual domain, fundamental propositions, and implications for research. *Journal of Service Research*, *14*(3), 252–271. https://doi.org/10.1177/1094670511411703

Chermack, T. J., & Lynham, S. A. (2002). Definitions and Outcome Variables of Scenario Planning. *Human Resource Development Review*. https://doi.org/10.1177/1534484302013006

Cohen, B., & Muñoz, P. (2016). Sharing cities and sustainable consumption and production: towards an integrated framework. *Journal of Cleaner Production*, *134, Part* , 87–97. https://doi.org/http://dx.doi.org/10.1016/j.jclepro.2015.07.133

Cornwall, A., Jewkes, R., Jewkes-, R., Wcih, L., Promotion, H., Unit, S., & Medicine, T. (1995). What is participatory research? *Soc Sci Med*, *41*(12), 1667–1676. https://doi.org/10.1016/0277-9536(95)00127-s

Cova, B., & Dalli, D. (2009). Working consumers: The next step in marketing theory? *Marketing Theory*, *9*(3), 315–339. https://doi.org/10.1177/1470593109338144

D'Amato, D., Droste, N., Allen, B., Kettunen, M., Lähtinen, K., Korhonen, J., … Toppinen, A. (2017). Green, circular, bio economy: A comparative analysis of sustainability avenues. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2017.09.053

De los Rios, I. C., & Charnley, F. J. S. (2017). Skills and capabilities for a sustainable and circular economy: The changing role of design. *Journal of Cleaner Production*, *160*, 109–122. https://doi.org/10.1016/j.jclepro.2016.10.130

Despeisse, M., Baumers, M., Brown, P., Charnley, F., Ford, S. J., Garmulewicz, A., Knowles, S., Minshall, T.H.W., Mortara, L., Reed-Tsochas, F.P. and Rowley, J. (2017). Unlocking value for a circular economy through 3D printing: A research agenda. *Technological Forecasting and Social Change*, *115*, 75–84.Ekman, P., Raggio, R. D., & Thompson, S. M. (2016). Service network value co-creation: Defining the roles of the generic actor. *Industrial Marketing Management*, *56*, 51–62. https://doi.org/10.1016/j.indmarman.2016.03.002

Ellen MacArthur Foundation. (2013). Towards the Circular Economy: Opportunities for the consumer goods sector. *Ellen MacArthur Foundation*, 1–112. https://doi.org/10.1162/108819806775545321

Folhes, R. T., Aguiar, A. P. D. de, Stoll, E., Dalla-Nora, E. L., Araújo, R., Coelho, A., & Canto, O. do. (2015). Multi-scale participatory scenario methods and

territorial planning in the Brazilian Amazon. *Futures*, *73*, 86–99. https://doi.org/10.1016/j.futures.2015.08.005

Fujimoto, J., Poland, D., & Matsumoto, M. (2009). Low-carbon society scenario: ICT and ecodesign. *Information Society*, *25*(2), 139–151. https://doi.org/10.1080/01972240802701726

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2015.09.007

Grönroos, C., & Gummerus, J. (2014). The service revolution and its marketing implications: service logic vs service-dominant logic. *Managing Service Quality: An International Journal*, *24*(3), 206–229. https://doi.org/10.1108/MSQ-03-2014-0042

Hawken, P., Lovins, A., & Lovins, L. H. (2014). *Natural Capitalism: Creating the Next Industrial Revolution*. *BUSINESS & ECONOMICS*. https://doi.org/10.1002/1099-1719(200008)8:3<165::AID-SD142>3.0.CO;2-S

Higdem, U. (2014). The co-creation of regional futures: Facilitating action research in regional foresight. *Futures*, *57*, 41–50. https://doi.org/10.1016/j.futures.2014.01.006

Higgins, J. M. (1996). Innovate or Evaporate: Creative Techniques for Strategists. *Long Range Planning*, *29*(3), 370–380. https://doi.org/10.1016/0024-6301(96)00023-4

Hobson, K., & Lynch, N. (2016). Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world. *Futures*, *82*, 15–25. https://doi.org/10.1016/j.futures.2016.05.012

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*. https://doi.org/10.1016/j.resconrec.2017.09.005

Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular Economy: The Concept and its Limitations. *Ecological Economics*, *143*, 37–46. https://doi.org/10.1016/j.ecolecon.2017.06.041

Kowalkowski, C. (2010). What does a service-dominant logic really mean for manufacturing firms? *CIRP Journal of Manufacturing Science and Technology*, *3*(4), 285–292. https://doi.org/10.1016/j.cirpj.2011.01.003

Kowalkowski, C. (2011). Dynamics of value propositions: insights from service-dominant logic. *European Journal of Marketing*, *45*(1/2), 277–294. https://doi.org/10.1108/03090561111095702

Li, A. Q., & Found, P. (2017). Towards Sustainability: PSS, Digital Technology and Value Co-creation. In *Procedia CIRP* (Vol. 64, pp. 79–84). https://doi.org/10.1016/j.procir.2017.05.002

Linnenluecke, M. K., Verreynne, M.-L., de Villiers Scheepers, M. J., & Venter, C. (2016). A review of collaborative planning approaches for transformative change towards a sustainable future. *Journal of Cleaner Production*, *142*, 1–13. https://doi.org/10.1016/j.jclepro.2016.10.148

Lofthouse, V. A., & Prendeville, S. (2017). Considering the User in the Circular Economy. *PLATE Conference*, (November), 1–7. https://doi.org/10.3233/978-1-61499-820-4-213

Lofthouse, V., & Prendeville, S. (2018). Human-centred design of products and services for the circular economy - a review. *The Design Journal*, (PLATE Special Issue).

Magnier, L., & Schoormans, J. (2015). Consumer reactions to sustainable packaging : The interplay of visual appearance , verbal claim and environmental concern. *Journal of Environmental Psychology*, *44*, 53–62. https://doi.org/10.1016/j.jenvp.2015.09.005

Manzini, E., & Vezzoli, C. (2003). A strategic design approach to develop sustainable product service systems: examples taken from the "environmentally friendly innovation" Italian prize. *Journal of Cleaner Production*, *11*(8), 851–857. https://doi.org/10.1016/S0959-6526(02)00153-1

McDonald, M. H. B., de Chernatony, L., & Harris, F. (2001). Corporate marketing and service brands - Moving beyond the fast- moving consumer goods model. *European Journal of Marketing*, *35*(3/4), 335–352. https://doi.org/10.1108/03090560110382057

Merli, R., Preziosi, M., & Acampora, A. (2018). How do scholars approach the circular economy? A systematic literature review. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2017.12.112

Mont, O. (2002). Clarifying the concept of product – service system. *Journal of Cleaner Production*, *10*, 237–245. https://doi.org/10.1016/S0959-6526(01)00039-7

Moreno, M., De los Rios, C., Rowe, Z., & Charnley, F. (2016). A conceptual framework for circular design. *Sustainability (Switzerland)*, *8*(9). https://doi.org/10.3390/su8090937

Mugge, R., Jockin, B., & Bocken, N. (2017). How to sell refurbished smartphones? An investigation of different customer groups and appropriate incentives. *Journal of Cleaner Production*, *147*, 284–296. https://doi.org/https://doi.org/10.1016/j.jclepro.2017.01.111

Murray, A., Skene, K., & Haynes, K. (2015). The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *Journal of Business Ethics*, (May), 0–37. https://doi.org/10.1007/s10551-015-2693-2

Ng, I., Scharf, K., Pogrebna, G., & Maull, R. (2015). Contextual variety, Internet-of-Things and the choice of tailoring over platform: Mass customisation strategy in supply chain management. *International Journal of Production Economics*, *159*, 76–87. https://doi.org/10.1016/j.ijpe.2014.09.007

Nußholz, J. L. K. (2017). Circular business models: Defining a concept and framing an emerging research field. *Sustainability (Switzerland)*, *9*(10). https://doi.org/10.3390/su9101810

Oteros-Rozas, E., Martín-López, B., Daw, T. M., Bohensky, E. L., Butler, J. R. A., Hill, R., Martin-Ortega, J., Quinlan, A., Ravera, F., Ruiz-Mallén, I. and Thyresson, M., (2015). Participatory scenario planning in place-based social-ecological research: Insights and experiences from 23 case studies. *Ecology and Society*, *20*(4). https://doi.org/10.5751/ES-07985-200432

Palomino, M. A., Bardsley, S., Bown, K., De Lurio, J., Ellwood, P., Holland- Smith, D., … Owen, R. (2012). Web- based horizon scanning: concepts and practice. *Foresight*, *14*(5), 355–373. https://doi.org/10.1108/14636681211269851

Pang, Z., Chen, Q., Han, W., & Zheng, L. (2015). Value-centric design of the internet-of-things solution for food supply chain: Value creation, sensor portfolio and information fusion. *Information Systems Frontiers*, *17*(2), 289–319. https://doi.org/10.1007/s10796-012-9374-9

Papadopoulos, T., Gunasekaran, A., Dubey, R., & Fosso Wamba, S. (2017). Big data and analytics in operations and supply chain management: managerial aspects and practical challenges. *Production Planning and Control*, *28*(11-12), 873–876. https://doi.org/10.1080/09537287.2017.1336795

Park, C. (2015a). *Influencing factors for sustainable design implementation in the front-end of new product development process within the Fast-Moving-Consumer-Goods sector*. Cranfield. Retrieved from https://dspace.lib.cranfield.ac.uk/handle/1826/9267

Park, C. (2015b). *Influencing factors for sustainable design implementation in the front-end of new product development process within the Fast-Moving-Consumer-Goods sector*. Cranfield.

Paulus, P. B., & Yang, H. C. (2000). Idea generation in groups: A basis for creativity in organizations. *Organizational Behavior and Human Decision Processes*, *82*(1), 76–87. https://doi.org/10.1006/obhd.2000.2888

Perera, C., Zaslavsky, A., Christen, P., & Georgakopoulos, D. (2014). Sensing as a service model for smart cities supported by Internet of Things. *Transactions on*

Emerging Telecommunications Technologies, *25*(1), 81–93. https://doi.org/10.1002/ett.2704

Petala, E., Wever, R., Dutilh, C., & Brezet, H. (2010). The role of new product development briefs in implementing sustainability: A case study. *Journal of Engineering and Technology Management*, *27*(3-4), 172–182. https://doi.org/10.1016/j.jengtecman.2010.06.004

Planing, P. (2014). Business Model Innovation in a Circular Economy Reasons for Non-Acceptance of Circular Business Models. *Open Journal of Business Model Innovation*, 1–11.

Prendeville, S., Hartung, G., Brass, C., Purvis, E., & Hall, A. (2017). Circular Makerspaces: the founder's view. *International Journal of Sustainable Engineering*, *10*(4-5), 272–288. https://doi.org/10.1080/19397038.2017.1317876

Prendeville, S. M., Connor, F. O., Bocken, N. M. P., & Bakker, C. (2017). Uncovering ecodesign dilemmas : A path to business model innovation. *Journal of Cleaner Production*, *143*, 1327–1339. https://doi.org/10.1016/j.jclepro.2016.11.095

Quested, T., & Johnson, H. (2012a). *Household Food and Drink Waste in the UK*. *October*. https://doi.org/10.1111/j.1467-3010.2011.01924.x

Quested, T., & Johnson, H. (2012b). *Household Food and Drink Waste in the UK*. *October*. https://doi.org/10.1111/j.1467-3010.2011.01924.x

Redlich, T., Krenz, P., Basmcr, S. V., Buxbaum-Conradi, S., Wulf, S., & Wulfsbcrg, J. P. (2014). The impact of openness on value co-creation in production networks. In *Procedia CIRP*. https://doi.org/10.1016/j.procir.2014.01.007

Reilly, R. C. (2010). Participatory case study. *Encyclopedia of Case Study Research*, 658–660. https://doi.org/10.4135/9781412957397.n247

Robinson, W. T., & Fornell, C. (1985). Sources of Market Pioneer Advantages in Consumer Goods Industries. *Journal of Marketing Research*, *22*(3), 305. https://doi.org/10.2307/3151427

Robson, C. (2011). Real world research. *Edition. Blackwell Publishing. Malden*, 1–608. https://doi.org/10.1016/j.jclinepi.2010.08.001

Saghir, M. (2004). the Concept of Packaging Logistics. *Business*, 1–31.

Salvia, G. (2016). The satisfactory and (possibly) sustainable practice of do-it-yourself: the catalyst role of design. *J. of Design Research*, *14*(1), 22–41. https://doi.org/10.1504/JDR.2016.074782

Schoemaker, P. J. H. (1995a). Scenario Planning: A Tool for Strategic Thinking. *Sloan Management Review*, *36*(2), 25–40. https://doi.org/doi.org.proxy2.lib.umanitoba.ca/10.1

Schoemaker, P. J. H. (1995b). Scenario Planning: A Tool for Strategic Thinking. *Sloan Management Review*, *36*(2), 25–40. https://doi.org/doi.org.proxy2.lib.umanitoba.ca/10.1

Schulte, U. G. (2013). New business models for a radical change in resource efficiency. *Environmental Innovation and Societal Transitions*, *9*, 43–47. https://doi.org/10.1016/j.eist.2013.09.006

Shaikh, F. K., Zeadally, S., & Exposito, E. (2017). Enabling technologies for green internet of things. *IEEE Systems Journal*, *11*(2), 983–994. https://doi.org/10.1109/JSYST.2015.2415194

Srai, J. S., Kumar, M., Graham, G., Phillips, W., Tooze, J., Ford, S., … Tiwari, M. K. (2016). Distributed manufacturing: scope, challenges and opportunities. *International Journal of Production Research*, *54*(23), 6917–6935.

Stahel, W. R., & Clift, R. (2015). Stocks and flows in the performance economy. In *Taking Stock of Industrial Ecology* (pp. 137–158). https://doi.org/10.1007/978-3-319-20571-7_7

Steffen, D., & Gros, J. (2003). Technofactory versus Mini-Plants: Potentials for a decentralized sustainable furniture production. In *MCPC03: The 2nd International Conference on Mass Customization and Personalization* (pp. 6–8).

Tapinos, E. (2012). Perceived Environmental Uncertainty in scenario planning. *Futures*, *44*(4), 338–345. https://doi.org/10.1016/j.futures.2011.11.002

Tress, B., & Tress, G. (2003). Scenario visualisation for participatory landscape planning - A study from Denmark. *Landscape and Urban Planning*, *64*(3), 161–178. https://doi.org/10.1016/S0169-2046(02)00219-0

Tsironi, T., Gogou, E., Velliou, E., & Taoukis, P. S. (2008). Application and validation of the TTI based chill chain management system SMAS (Safety Monitoring and Assurance System) on shelf life optimization of vacuum packed chilled tuna. *International Journal of Food Microbiology*, *128*(1), 108–115. https://doi.org/10.1016/j.ijfoodmicro.2008.07.025

Tukker, A. (2004). Eight types of product-service system: Eight ways to sustainability? Experiences from suspronet. *Business Strategy and the Environment*, *13*(4), 246–260. https://doi.org/10.1002/bse.414

Tukker, A. (2015). Product services for a resource-efficient and circular economy - A review. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2013.11.049

Urbinati, A., Chiaroni, D., & Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. *Journal of Cleaner Production*, *168*, 487–498. https://doi.org/10.1016/j.jclepro.2017.09.047

Van Asselt, M., Anastasi, C., Greeuw, S., Mellors, J., Peters, S., Rothman, D., … Rotmans, J. (2000). Visions for a sustainable Europe. *Futures*, *32*(9), 809–831. https://doi.org/10.1016/S0016-3287(00)00033-1

Van Notten, P. (2006). Scenario development: A typology of approaches. In *Schooling for Tomorrow Think Scenarios, Rethink Education* (pp. 69–92). https://doi.org/10.1016/S1574-101X(08)00407-9

Van Notten, P. W. F., Rotmans, J., van Asselt, M. B. A., & Rothman, D. S. (2003). An updated scenario typology. *Futures*, *35*(5), 423–443. https://doi.org/10.1016/S0016-3287(02)00090-3

Van Weelden, E. Van, Mugge, R., & Bakker, C. (2016). Paving the way towards circular consumption : exploring consumer acceptance of refurbished mobile phones in the Dutch market. *Journal of Cleaner Production*, *113*, 743–754. https://doi.org/10.1016/j.jclepro.2015.11.065

Vargo, S. L., & Lusch, R. F. (2011). It's all B2B...and beyond: Toward a systems perspective of the market. *Industrial Marketing Management*, *40*(2), 181–187. https://doi.org/10.1016/j.indmarman.2010.06.026

Vargo, S. L., & Lusch, R. F. (2017). Service-dominant logic 2025. *International Journal of Research in Marketing*, *34*(1), 46–67. https://doi.org/10.1016/j.ijresmar.2016.11.001

Vezzoli, C., & Manzini, E. (2008). *Design for environmental sustainability*. *Design for Environmental Sustainability*. https://doi.org/10.1007/978-1-84800-163-3

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the Process of Sensemaking. *Organization Science*, *16*(4), 409–421. https://doi.org/10.1287/orsc.1050.0133

Wilkinson, A. (2009). Scenarios practices: In search of theory. *Journal of Futures Studies*.

Wright, A. (2005). The role of scenarios as prospective sensemaking devices. *Management Decision*, *43*(1), 86–101. https://doi.org/10.1108/00251740510572506

Web References

Albert Heijn XL store Eindhoven- Philips Lighting. (n.d.). Retrieved March 7, 2018, from http://www.lighting.philips.com/main/cases/cases/food-and-large-retailers/albert-heijn

Amazon. (2014). Amazon Prime Air. Retrieved from http://www.amazon.com/b?node=8037720011

Back to the Roots – Official Site®. (n.d.). Retrieved March 7, 2018, from https://backtotheroots.com/

Birchbox, Join the UK's #1 beauty box. (n.d.). Retrieved March 7, 2018, from https://www.birchbox.co.uk/

Chesky, B. (n.d.). Shared City – Brian Chesky – Medium. Retrieved March 7, 2018, from https://medium.com/@bchesky/shared-city-db9746750a3a

Clever Caps. (n.d.). Retrieved March 7, 2018, from http://www.cleverpack.com.br/clever-caps/en/quem-somos.html

Coca Cola. (n.d.). A World of Choice. Retrieved March 7, 2018, from https://www.coca-colafreestyle.com/#!/about-the-soda-fountain/

Coffee Machines, Coffee Capsules ; Accessories | Nespresso UK. (n.d.). Retrieved March 7, 2018, from https://www.nespresso.com/uk/en

CoffeeFlour®. (n.d.). Retrieved March 7, 2018, from http://www.coffeeflour.com/#home

CROPMOBSTER™ - San Francisco Bay Area. (n.d.). Retrieved March 7, 2018, from https://sfbay.cropmobster.com/

Dog Toys, Treats & Gifts Every Month | BarkBox. (n.d.). Retrieved March 7, 2018, from https://barkbox.com/

Dollar Shave Club | Shave and Grooming Made Simple. (n.d.). Retrieved March 7, 2018, from https://uk.dollarshaveclub.com/

Farmer's Fridge | Eat Happier. (n.d.). Retrieved March 7, 2018, from https://www.farmersfridge.com/

FLOOW2 World's Reset Button. (n.d.). Retrieved March 7, 2018, from http://www.floow2.nl/sharing-marketplace.html

Google Express - Home. (n.d.). Retrieved March 7, 2018, from https://express.google.com/

Grande Primo | Natural Whey Protein Ingredients. (n.d.). Retrieved March 7, 2018, from https://www.grandecig.com/primo

Graze - Home. (n.d.). Retrieved from https://www.graze.com/uk

GrowUp Urban Farms. (n.d.). Retrieved March 7, 2018, from http://growup.org.uk/

Home | Plant Chicago. (n.d.). Retrieved March 7, 2018, from http://plantchicago.org/

How to Make Non Toxic Body Wash: 10 Steps (with Pictures). (n.d.). Retrieved March 7, 2018, from https://www.wikihow.com/Make-Non-Toxic-Body-Wash

Jewell, N. (n.d.). Petomato Bottle Caps Convert Plastic Bottles into Tiny Gardens | Inhabitat - Green Design, Innovation, Architecture, Green Building. Retrieved March 7, 2018, from https://inhabitat.com/petomato-bottle-caps-convert-plastic-bottles-into-tiny-hydroponic-gardens/

Kennett, S. (n.d.). Zero-waste supermarket to sell food products without plastic packaging | 2degrees Community | 2degrees. Retrieved March 7, 2018, from https://www.2degreesnetwork.com/groups/2degrees-community/resources/zero-waste-supermarket-sell-food-products-without-plastic-packaging/

KiwiCo | Hands-On Learning & Experience Based Play. (n.d.). Retrieved March 7, 2018, from https://www.kiwico.com/

Kromkommer. (n.d.). Retrieved March 7, 2018, from https://www.kromkommer.com/

Living Aveda - Our Story - Responsible Packaging | Aveda. (n.d.). Retrieved March 7, 2018, from https://www.aveda.com/living-aveda/responsible-packaging

Lum, R. (n.d.). Coca-Cola Phone Booth Turns Bottle Caps Into Currency. Retrieved March 7, 2018, from http://www.creativeguerrillamarketing.com/guerrilla-marketing/coca-cola-phone-booth-turns-bottle-caps-currency/

MAC Cosmetics. (n.d.). Retrieved March 7, 2018, from https://www.maccosmetics.com/giving_back/back_to_mac.tmpl

Materiom (n.d.) Retrieved November 19, 2018 from http://materiom.org/

Merchant, B. (n.d.). Vending Machine Grows 20,000 Heads of Lettuce a Year Without Sunlight : TreeHugger. Retrieved March 7, 2018, from https://www.treehugger.com/green-food/vending-machine-grows-20000-heads-of-lettuce-a-year-without-sunlight.html

Mitchell's Brewing - The Craft Beer That Started Craft Beer. (n.d.). Retrieved March 7, 2018, from http://www.mitchellsbrewing.com/

NESCAFÉ Alarm Clock - YouTube. (n.d.). Retrieved March 7, 2018, from https://www.youtube.com/watch?v=8ZohB3q7rJo

Original Stitch | Original Stitch. (n.d.). Retrieved March 7, 2018, from https://shop.originalstitch.com/

Pairings Box - Turntable Kitchen. (n.d.). Retrieved March 7, 2018, from http://www.turntablekitchen.com/pairings-box/

Perfect Draft Beer Kegs | Perfect Draft Machine | Fresh Draft Beer. (n.d.). Retrieved March 7, 2018, from http://www.perfectdraftbeerkegs.co.uk/

Pley.com - Monthly Activity box. (n.d.). Retrieved March 7, 2018, from https://www.pley.com/

Quitbit | Smart Lighters to Help Track, Reduce & Quit Smoking. (n.d.). Retrieved March 7, 2018, from http://www.quitbitlighter.com/

Reeves, H. (n.d.). Doug Rauch Wants to Sell Outdated Food at Junk-Food Prices - The New York Times. Retrieved March 7, 2018, from http://www.nytimes.com/2013/11/10/magazine/doug-rauch-wants-to-sell-outdated-food-at-junk-food-prices.html?_r=0

Riverford organic food | order your fresh delivery online. (n.d.). Retrieved March 7, 2018, from https://www.riverford.co.uk/

Sainsbury's. (n.d.). Retrieved March 7, 2018, from https://www.sainsburys.co.uk/

Schiller, B. (n.d.). The Newest Piece Of The Sharing Economy: A Subscription Service For Wa. Retrieved March 7, 2018, from https://www.fastcompany.com/3029726/the-newest-piece-of-the-sharing-economy-a-subscription-service-for-washing-machines

Search Articles & Stories - Patagonia.com. (n.d.). Retrieved March 7, 2018, from http://eu.patagonia.com/enGB/worn-wear/

Snact: delicious food waste fighting snacks. More taste, less waste! (n.d.). Retrieved March 7, 2018, from https://snact.co.uk/

SodaStream | Water Made Exciting. (n.d.). Retrieved March 7, 2018, from https://www.sodastreamusa.com/

South African Breweries. (n.d.). Retrieved March 7, 2018, from http://www.sab.co.za/

Splosh – Save hassle. Save money. Save the planet. (n.d.). Retrieved March 7, 2018, from https://www.splosh.com/#1

Storey, H., & Ryan, T. (n.d.). Catalytic Clothing. Retrieved March 7, 2018, from http://www.catalytic-clothing.org/home.html

Tahmincioglu, E. (2007). Remember the Milkman? In Some Places, He's Back. Retrieved from https://www.nytimes.com/2007/12/16/business/yourmoney/16milk.html?pagewanted=all

TaskRabbit connects you to safe and reliable help in your neighbourhood. (n.d.). Retrieved March 7, 2018, from https://www.taskrabbit.co.uk/

TerraCycle. (n.d.). Retrieved March 7, 2018, from https://www.terracycle.com/en-US

Tesco groceries. (n.d.). Retrieved from https://www.tesco.com/groceries/

Turntoo. (n.d.). Retrieved from http://turntoo.com/

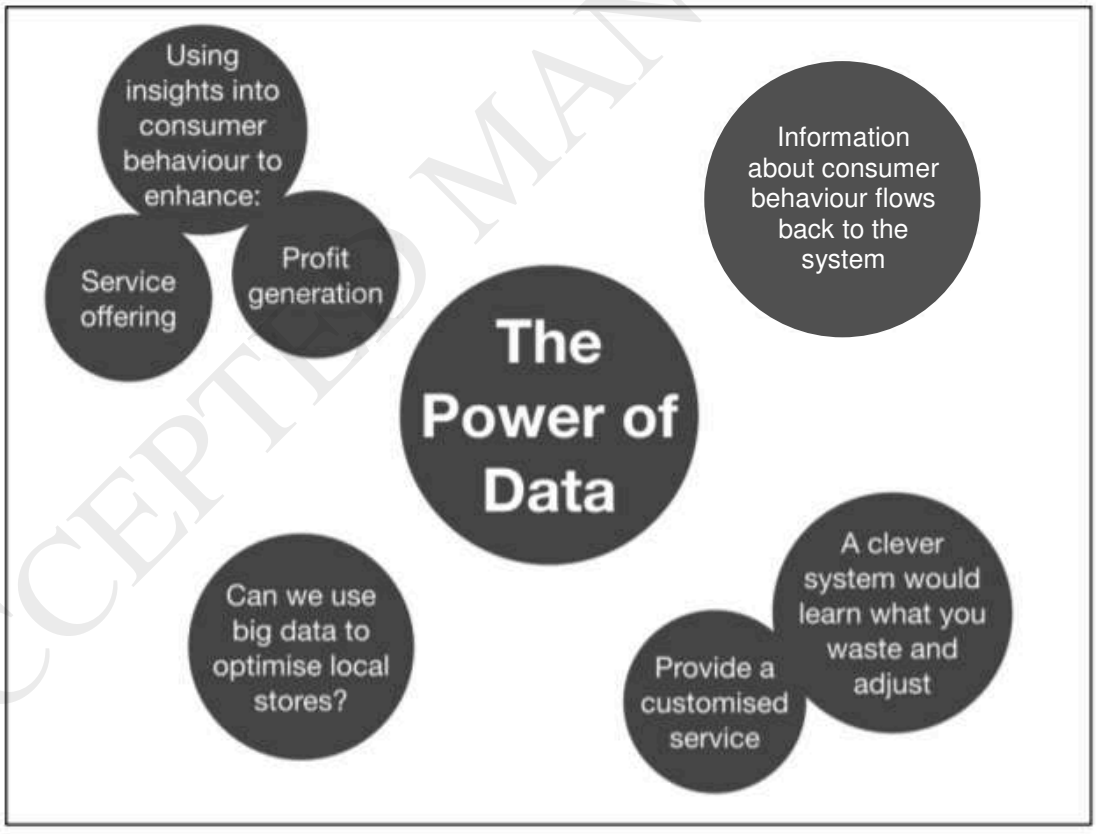
Watts, J. (n.d.). Beijing introduces recycling banks that pay subway credits for bottles | Environment | The Guardian. Retrieved March 7, 2018, from https://www.theguardian.com/environment/2012/jul/04/beijing-recycling-banks-subway-bottles

APPENDIX A

Example of the Trend cards developed for the participatory workshop

APPENDIX B

Example of the Thematic map



APPENDIX C

Trends - Descriptions

Trend	Description
Take-Back Systems	Encompasses various models for the recovery of products after use.
Leasing/Product-Service Systems	Business models whereby customers pay for the use of a product rather than ownership of the product itself.
Reusable Packaging	Business models involving the use of packaging designed to be used multiple times.
Traditional Retail	Physical retail stores.
Delivery Systems/Subscriptions	Subscription based business models and the delivery of goods directly to customers.
Vending Machines/Dispensers	The use of a vending machine or dispenser system to provide customers with the product.
Biological Cascades	'Biological cascades' is the term given to those systems where biological waste is used for another purpose rather than simply disposed of, such as coffee grounds to grow mushrooms.
Urban Closed Loop	Urban Closed Loop involves the integration of numerous 'waste to input' streams in a closed system often in an urban environment.
Positive Impact	Business models with the primary purpose of positively impacting either their customers or the environment.
Community/ Collaboration	This trend speaks to the increase of community-based services including the rise of the sharing economy. These examples made use of local produce or skills rather than large-scale centralised systems.
Modularity	Mass customisation technique, where products are designed with multiple sub components, which increases the variety and allows customer to prolong the ultimate customer decision (on flavour, volume etc.) until as late as possible.
Gimmicks	Products that do not exhibit true innovation that enhances their offering, but rather a simple and potentially short-lived gimmick.

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