MAPPING & CLASSIFYING BUSINESS MODELS TO REPLACE SINGLE-USE PACKAGING IN THE FOOD & BEVERAGE INDUSTRY: A STRATEGIC DESIGN TOOL

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ABSTRACT

Ocean plastics is threatening marine life and entering the food chain. Single-use packaging (SUP) represents a major share of ocean plastics, thus intervention is necessary. This paper explores Product-Service Systems (PSS) business models to replace SUP with reusable packaging (RP). Literature shows that RP offers environmental advantages over SUP. However, a classification system of RP business models is missing. This paper aims to fill this gap. Case studies of RP business models are analyzed. A theory building approach led to developing a classification system and clustering case studies in archetypal models. Then it's tested with 12 design students to validate it as a strategic design tool. The outcome is classification system and 15 archetypal models of RP systems, that provides an overview of RP solutions and is usable as a strategic design tool. The tool can be used by companies and designers to identify business opportunities and aid in shifting business models from SUP to RP systems.
Key Words: Product-Service Systems; Ocean Plastic; Single-use Packaging; Reusable Packaging; Business model

1.INTRODUCTION

The presence of packaging in the ocean represents a global system failure. The Ellen MacArthur Foundation (2016) estimates that by 2050 there will be more plastics in the ocean than fish. Plastic pollution is causing physical/chemical contamination, posing risk to human and environmental health (UNEP, 2014). Plastic packaging is a major source of ocean plastics (UNEP, 2014), an industry that is almost entirely single-use packaging (SUP) (EMF, 2016). Several strategies have been proposed to address this problem. Among these, it is considered crucial to shift from single-use to reusable packaging systems (RP), and thus preventing plastics to be released into the environment. WRAP has set targets of making 100% of plastic packaging produced by the UK reusable, recyclable or compostable by 2025. And, to "eliminate problematic or unnecessary SUP through redesign, innovation or alternative (re-use) delivery models" (WRAP, 2018).

The European standard BS En 13429:2004 defines reusable packaging as "Packaging component which has been conceived and designed to accomplish within its life cycle a minimum number of trips or rotations in a system for reuse" (EUR-Lex, 2004). Previous studies (Albrecht, Broedersen, Horst, & Scherf, 2011; Golding, 2002; Wood, G., Sturges, 2010) reported that RP possess great advantages over SUP if it is efficiently designed for this purpose. The more RP is circulated, the higher the environmental benefit will be as it eliminates the need for new packaging (Albrecht et al., 2011), and use less resources (Albrecht et al., 2011; Bader Babader, 2015; Golding, 2002; Lee et al., 2008). If the re-use system is continuously intensified, the business operators can reduce operation and disposal costs because they are economically incentivized to reuse and recycle more. However, there are some limitations associated with RP, such as that the containers most often need to be collected, transported and washed between every trip, with linked water and energy consumption (Albrecht et al., 2011).

In this context it is promising to look at the concept of Product-Service system (PSS), defined as the "result of an innovative strategy that shifts the centre of the business design and sale of physical products only to systems offering products and services that are jointly capable of satisfying a given customer application." (UNEP, 2002). While there are emerging innovative PSS that provide food and beverages RP systems, a comprehensive classification system is missing.

This paper aims at filling this knowledge gap by putting forward a classification system, and by exploring how this can be used to support companies and practitioners in ideating RP systems. The assumption is that this classification system can provide support in understanding the wide variety of RP systems and enable decision making and strategic design thinking.

The paper is structured as follows: Section 2 describes the methodology adopted in this research. Section 3 and 4 present, respectively the classification system and its archetypal models. Section 5 discusses applications of the classification system and its design implications. Section 5 provides some concluding remarks.

This paper is based on a master's dissertation thesis conducted at Brunel University London (Mansour, 2018).

2.RESEARCH METHODOLOGY

Three main research activities were conducted. Firstly, 21 case studies were collected and analyzed to identify their key characteristics. Secondly, different versions of the classification system were developed using the identified key characteristics of PSS and RP. Each version of the classification system was evaluated and used to develop the final version of the classification system and the archetypal models. Thirdly, the new classification system was then tested in a pilot study with 12 design students to assess its usefulness and usability. Results were analyzed and used to refine the classification system. In particular, the methodology was structured as follows:

- Development of the classification system: Case studies collection and analysis on PSS that use RP: To understand the different characteristics and variety of existing models, a diverse number of 21 existing and pilot case studies were collected. Classification system development: The key characteristics of the case studies' PSS models were analyzed and used to develop the first version of the classification system. Case studies population: Collected cases of RP were positioned in the classification system. Clustering and identification of archetypal models: Cases with similar characteristics were grouped in clusters defining archetypal models of PSS applied to RP (15 archetypal models in total).
- Testing of the classification system: A workshop with design students was conducted and activities were structured as follows. Testing ease of use: Participants were asked to position existing case studies on the classification system, in order to provide evidence that the classification system can be easily used to correctly map cases. Testing the usefulness: Participants were given the brief to replace a SUP solution with a RP system. They were asked to use the tool to identify market gaps and opportunities, and brainstorm alternative RP systems.
- Refinement of the classification system: After collecting feedback from participants, the classification system was developed further.

3. THE CLASSIFICATION SYSTEM

The proposed classification system [Figure 1] was developed to include the key identified primary characteristics of RP directly related to the offer being provided to the end-consumer. The characteristics were identified based on the unique features that differentiates each case study. The features were extracted, mapped out across all the case studies, and grouped together according to the feature type. This led to discovering the key characteristics that identifies a RP system. The key selected characteristics are: container ownership, delivery method, location, consumption context, value proposition & payment structure, and environmental sustainability potential. It was found that the six primary characteristics can be arranged in two groups.

The first group was placed on the y-axis and it includes: container ownership, value proposition & payment structure, and environmental sustainability potential. The container can be owned by the 'consumer', the main service 'provider', or a 'business' that is a client of the provider and deals with the consumer.

The second group was placed on the x-axis and it includes: the location and context of consumption. The location of the end-user during purchase has a great impact on the context the food/beverage is consumed, and user behavior regarding use and disposal. For example, stores and open public environments are mostly characterized with on-the go and having unpredictable consumption habits and thus provides more challenging collection. While home and closed public environments are mostly characterized with on-site consumption. The delivery method was included as an add-on characteristic to simplify the classification system's layout due that it can be implemented in any location. For example, automated dispensers can be used at home or in open public environments.

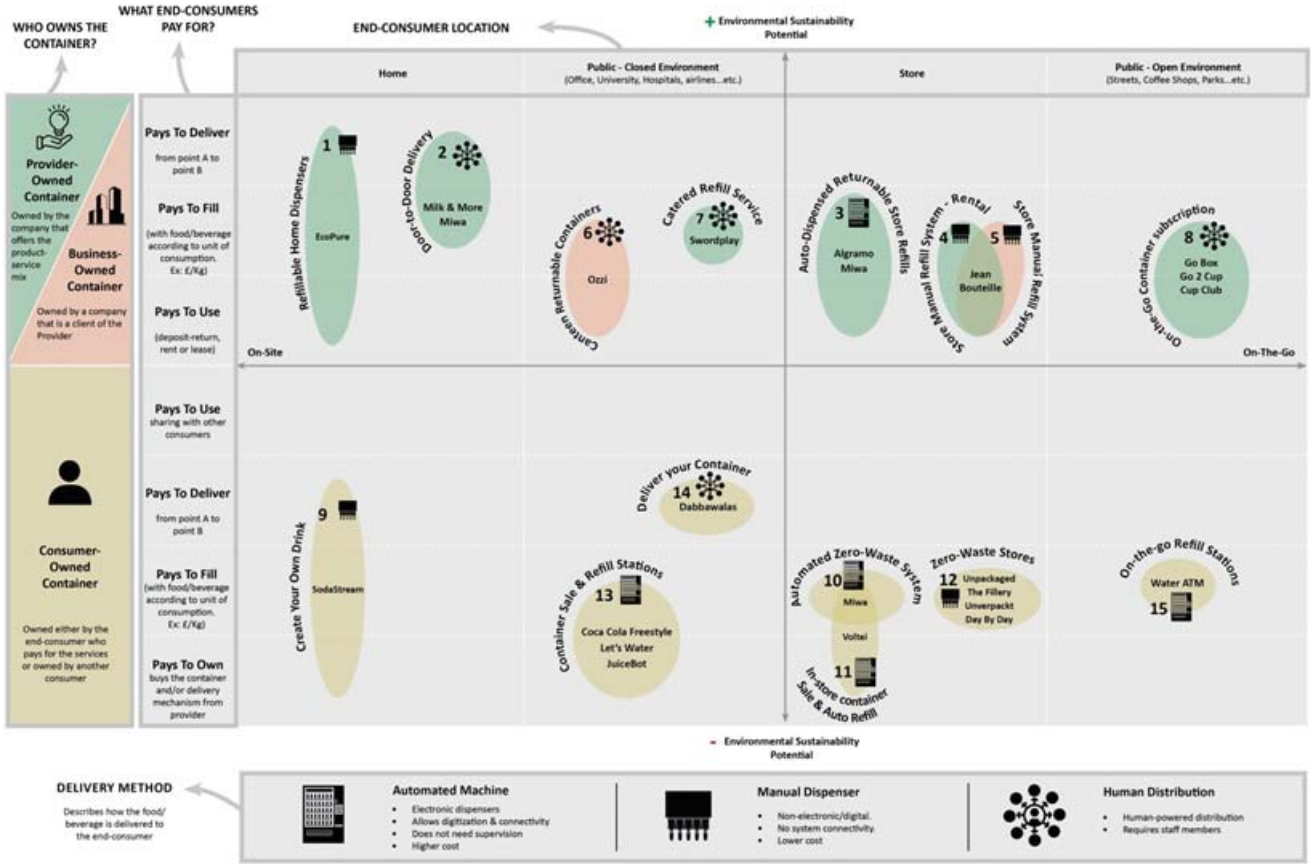


Figure 1 Classification system with case studies clustered in archetypal models.

4. THE ARCHETYPAL MODELS

The 'archetypal model' is a term that describes a model of a certain pattern of ideas with similar particular characteristics, and it is used in this research to describe a certain type of business models. After the classification system was developed, it was populated with the collected case studies. They were grouped in clusters depending on their offer model. This led to the identification of 15 archetypal models of PSS using RP in the food and beverage sector [Table 1]. The cases within each archetype are not exactly identical. However, their key characteristics, such as the value proposition, context of use, container ownership, delivery method and location grouping are similar. Cases that provide more than one business offer can be positioned in different places on the map. Each archetypal model was illustrated using a stakeholder system map, showing the stakeholders involved in the system and their relations. As an example, here we provide a more detailed description of archetype #8, and its stakeholder system map [Figure 2].

Table 1 the identified archetypal models and their summarized description. (Mansour, 2018)

No.	Archetypal Model	Consumer pays to:
1	Refillable Home Dispenser	Use, fill & deliver provider-owned container at home through manual dispenser owned by the provider. E.g. EcoPure(Ecopure, 2018)
2	Door-to_Door Delivery:	Fill & deliver provider-owned container in user's home through human distribution managed by provider. E... Milk & More(Milk&More, 2018)
3	Auto-Dispensed Returnable Store Refills	Use & Fill provider-owned container at the store through automated machines owned and managed by the provider. E.g. Algramo(Algramo, 2018)
4	Store Manual Refill System Rental	Use&Fill provider-owned container at the store through manual dispenser owned and managed by the provider.
5	Store Manual Refill System	Use & fill business-owned container at the store through manual dispenser owned by the store, and services managed by the businessand providerE.g. Jean Bouteille(Jean Bouteille, 2018)
6	Cabteen Returnable Containers	Use & fill provider-owned container in closed public environments through human distribution managed by the business provider Eg. Ozzi(Ozzi, 2018)
7	Catered Refill Service	Fill provider-owned container in closed public environments through human distributioin. E.g. Swordplay (Yoo, 2017)
8	On-The-Go Container Subscription	Use & fill provider-owned container in open public environments through human distribution. E.g. GoBox (GO Box, 2017)
9	Create Your Own Drink	Own, fill & deliver container at home through manual dispenser owned by the consumer. E.g. SodaStream (Soda Stream, 2019)
10	Automated Zero-Waste System	Fill consumer-owned container at the store through automated machines owned and managed by the provider. E.g. Miwa (Miwa, 2018)
11	In-Store Container Sale & Auto Refill	Own & fill container at the store through automated machines owned and managed by provider E.g. Voltrei(Broliato 2017)
12	Zero-Waste Store	Fill a self-owned container at the store through manual dispensers owned and managed by the provider. E.g. Unpackaged (Unpackaged, 2017)
13	Container Sale & Refill Station	Own & fill a container in closed public environments through automated machines owned and managed by the business. E.g. CocaCola Freestyle (CocaCola, 2017)
14	Deliver Your Container	Deliver the consumer's self-owned container in closed public environments through human distribution managed by the provider. E.g. Dabbawalas (Henderson, 2017)
15	On-The-Go Refill Station	Fill the consumer'self-owned container in open public environments through automated machines owned and operated by the provider E.g. Water ATM (Purohit, 2015)

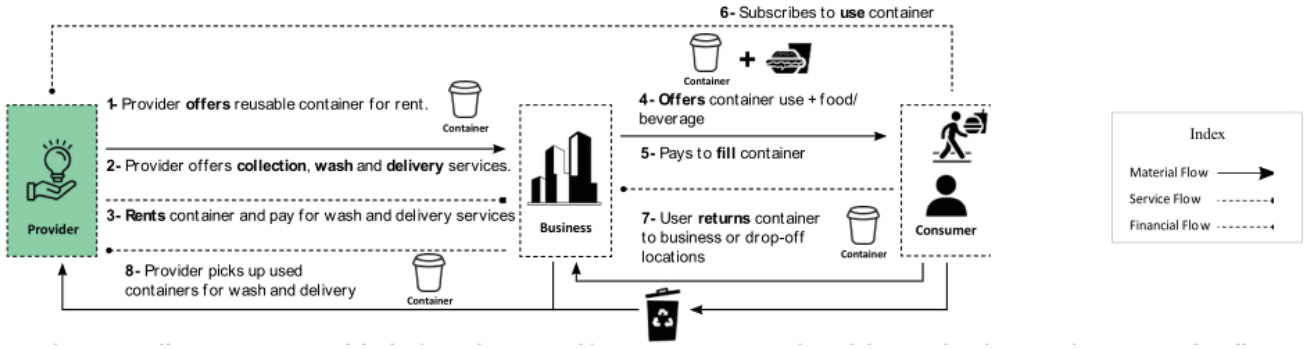


Figure 2 Archetype 8. Offering containers and food sale on-the-go in public open environments through human distribution. The PSS provider offers reusable containers to businesses that provide on-the-go food/beverage to consumers in open public environments (e.g. coffee shops and streets). The business pays the provider a regular subscription fee for container use, while the provider maintains ownership of the containers. The provider provides the services of wash and delivery. Consumers pay the business for the food/beverage and the provider for the container use. Consumers return the used containers to the business or drop-off locations set up by the provider, who then collects, washes and re-delivers the containers back to the business. 'Go Box' is a practical exemplification of this archetypal model.

5. POTENTIAL APPLICATIONS OF THE TOOL

The pilot study with 12 design students provided an initial validation of the potential applications of the classification system to support companies and designers in shifting the business model of a company from SUP to a PSS with RP. In particular the classification system can be used as a strategic design tool to:

- Get an understanding of the different RP systems and their characteristics.
- Identify opportunity areas in a market through positioning existing offers and identifying gaps.
- Develop possible alternative delivery models to deliver the food/beverage to consumers through a RP system.

Users of the classification system can be companies who are looking to shift from SUP to RP systems or enter into new markets, or start-up businesses who are looking to enter the market and position themselves to fill market gaps. Moreover, designers who are working with food/beverage manufacturers, packaging manufacturers or retailers can use it to inform their design and decision-making process.

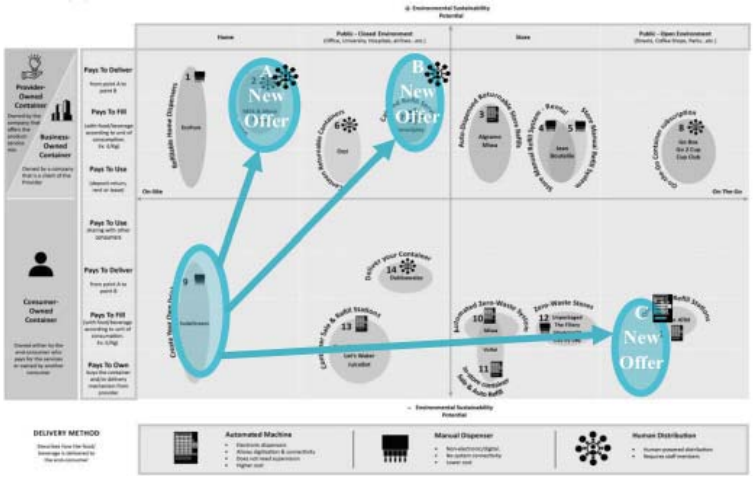
Reflecting on the workshop results, the classification system can be used to reposition existing offers into other parts of the map, generating in this way new offers [Figure 3]. For example, the company 'SodaStream', which sells soda-making machines to users for home use, can enter new markets by offering:

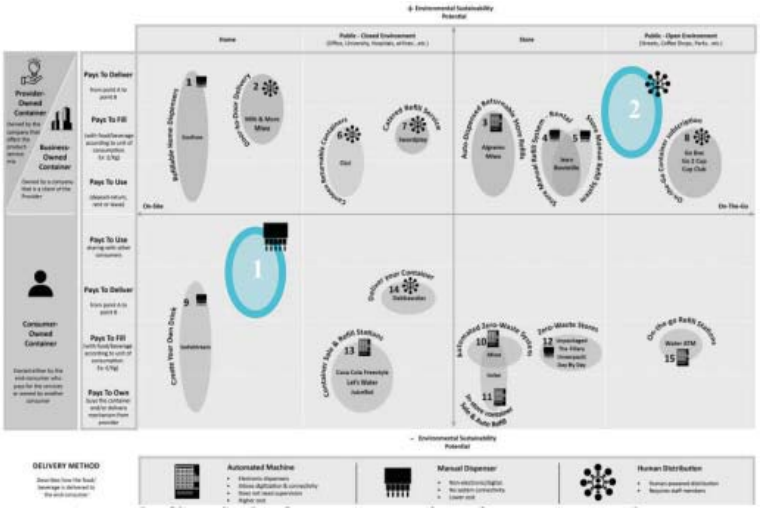
- Delivery and collection service of pre-filled company-owned containers to the users' homes (Archetype #2).
- Delivery and collection service of pre-filled company-owned containers to consumers at offices (closed public environments), with the consumer paying for the delivery and the beverage content.
- Automated machines on the street (open public environments) with users paying to fill their own containers, or buy a container from the machine to be filled when desired.

Moreover, the classification system can be used to generate new concepts for RP systems [Figure 4]. For example:

Concept 1: Stores can deliver food products to the consumer's home using manual dispensers in a minivan and the consumers dispense the amount of food needed in their own containers and pay to fill and deliver only.

Concept 2: Providing on-the-go meals in an open public environment (e.g. park); the consumer orders the ready-made meals and the provider delivers the food in a provider-owned container. The provider then collects the container once they are done with the meal.





[Figure 3] Example of how the classification system can be used to reposition an existing offer and generate new types of RP systems.

[Figure 4] Example of how the classification system can be used to generate new value propositions based on RP systems.

6. CONCLUSION

This research aimed at identifying and mapping existing RP alternatives to replace single-use food and beverage packaging, as well as exploring how a classification system can be used as a strategic design tool.

Case studies of food and beverage RP systems were collected and analysed. Main characterising dimensions were extracted from each case and used to create a classification system capable to comprehensively capture all

potential RP business models. Case studies were then positioned on the classification system and grouped together into clusters. This led to the identification of 15 archetypal models of RP systems. The pilot study provided an initial validation of the effectiveness of the classification system: despite the lack of a visually and graphically developed step-by-step user guide, most participants were able to successfully classify the provided case studies.

The pilot study also provided promising indications about the ability of the classification system to support practitioners in: understanding the variety of RP systems; perform market analysis by positioning existing competitor offers; identifying market opportunities to move away from SUP and supporting the generation of new ideas for RP systems. All participants evaluated the classification system to be very useful in providing an overview of possibilities to help eliminate SUP and in finding market gaps and supporting idea generation. Participants generated a multitude of concepts from the use of the classification system and the archetypal models.

Building upon the basis of this pilot study, the next step is to engage with practitioners and companies in the food/beverage packaging sector to provide a more in-depth assessment of the classification system and its applications.

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